**S'11 : 2 FN : AN 203/AD 303 (1403)**

**COMPUTING AND INFORMATICS**

*Time : Three hours*

*Maximum marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question (a, b, etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

**1.** (*a*) What is an algorithm and a flow-chart? Taking a simple problem as an example, give an algorithm for that problem and also its corresponding flow-chart. 7

(*b*) Illustrate call-by-value and call-by-reference with suitable examples. 7

(*c*) Write a $C^{++}$ program to read 100 numbers from the user and output their sum. 6

**2.** (*a*) What is function overloading in $C^{++}$? Explain with a suitable example. 6

(*b*) What is a constructor? Explain its use using an example. 6

(*c*) What is a recursive function? Write a recursive function, factorial (), for computation of factorial of an integer. Also, show execution of fact(3). 8

**3.** (*a*) Write a program to sort an array of 100 integral numbers. 10

(*b*) Discuss the functionalities of different TCP/IP layers. 10

**4.** (*a*) What do you mean by office automation? Explain the primary activities relating to office automation. 8

(*b*) Explain the stages of compilation for a C compiler. 8

(*c*) What is an interpreter? 4

**Group B**

**5.** (*a*) Show that

$$A + \bar{A}B = A + B$$ 6

(*b*) What is an operating system? Discuss about different types of operating systems. 6

(*c*) Explain the working of NAND latch with a diagram. 8

**6.** (*a*) Explain the purpose of following DOS commands: $6 \times 2$

C: DIR MD CD COPY Del

(*b*) Explain the concepts of pipelines and filters in UNIX operating system with suitable examples. 4+4



**7.** (*a*) Explain the difference between primary and secondary computer memory. 4

(*b*) Discuss briefly the role of secondary storage. 4

(*c*) How does the CPU execute program instructions? Explain using a block diagram. 12

**8.** (*a*) Compare a system software and an application software. Give examples of each. 6

(*b*) Draw truth table for the Boolean function

$$f(A, B, C) = A \oplus B \oplus C$$ 6

(*c*) Explain the organization and working of a hard disk. 8

**Group C**

**9.** Answer the following: $10 \times 2$

(*i*) What is the purpose of exit() command?

(*ii*) What is a global variable? How long does a global variable remain alive?

(*iii*) What do you mean by a pointer variable in C programming? Give an example.

(*iv*) Explain how one can recall a previously used DOS command by pressing some key.

(*v*) What happens when the following command is used?

chmod u=rwx,go=r-x foo

(*vi*) Transform $(37.24)_8$ into its equivalent binary form.

**W'11:2 FN:AN 203/AD 303 (1403)**

**COMPUTING AND INFORMATICS**

*Time : Three hours*

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**Group A**

**1.** (*a*) What do you understand by structured programming ? 5

(*b*) What is a function prototype ? Why is it required ? 5

(*c*) Using an example, show how a single dimensional array is passed to a function (your example should have both the function definition and the call statement). 5

(*d*) Using an example, show how two-dimensional array is passed to a function (your example should have both the function definition and the call statement). 5

2. (*a*) Between recursion and iteration, which is more efficient ? Why ? 5

(*b*) Write a recursive function that would take as its parameters a single dimensional integer array and an integer value indicating the number of elements present in the array and would return the sum of numbers in the array. 10

(*c*) Declare a structure named student having name (10 characters), roll (integer), mark (float). 5

3. (*a*) What will be printed out by the following C program ? Explain the reason behind your answer. 10

```
#include < stdio. h >
int  a [J = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
main ( ) {
  int i ;
  for (i = 0;  i < 10;  i++){
    *(a + i) + = 1;
    Printf("%d \ n",*(a + i));
  }
```

(*b*) Briefly explain how TCP/IP achieves error-free transmission of data ? 10

4. (*a*) Explain the working of a e-mail system, and the specific protocols that it uses. 10



(*b*) What do you understand by a client-server system ? Give an example of a client-server system. What are the advantages of a client server system as compared to a monolithic system ? 10

**Group B**

5. (*a*) Convert 211.25 in decimal to binary. 5

(*b*) Convert 211.25 in decimal to octal. 5

(*c*) Draw the truth table for the Boolean expression $\bar{a}b + \bar{b}c + a\bar{c}$. 5

(*d*) What is a cache memory ? What is its role in computer operation ? 5

6. (*a*) Using an appropriate block diagram, explain how CPU, main memory, cache memory, secondary memory, and the input/output units are interconnected in a computer. 10

(*b*) Draw the truth table of a 2 to 4 decoder, and realize the decoder circuit using AND and NOT gates. 10

7. (*a*) Explain the principal differences between a system software and an application software. 5

(*b*) What is a virtual memory operating system ? 5

(*c*) Explain, using a suitable diagram, how the virtual address is mapped to a physical address. 10

8. (*a*) What is meant by a process in an operating system ? 5

(*b*) What is meant by a time-shared operating system ? 5

(*c*) What is meant by a system call ? Give an example of a system call. How is a system call different from a function call ? 10

**Group C**

**9.** Answer the following : 10 × 2

(*i*) How much time will be required to transmit 100 K bits of data over a 100 Mbps line ?

(*ii*) What does 'scope' of a variable mean ?

(*iii*) What will be the output of the following C program ?

```
main ( ){
    int i = 0;
    for (; ; ;) Printf ("%d\n", i++) ;
```

(*iv*) What will be printed by the following program segment ?

```
int a;
a = 2 + 5 / 20*30 - - 1;
Printf ("value of a = %d \n",a) ;
```

(*v*) Which of the following best describes the Internet ?

(*a*) LAN

(*b*) MAN

(*c*) WAN

(*d*) Ethernet



(*vi*) Consider the following function in C :

```
void swap (int a, int b) {
    int temp ;
    temp = a ;
    a = b ;
    b = temp ;
}
```

Correct the function (if necessary) so that a call to the function, e.g., swap (&*x*, &*y*) would interchange the values of *x* and *y*.

(*vii*) Which one of the following statements is false ?

(*a*) Compilers can detect runtime errors.

(*b*) Some Unix versions can run on laptops.

(*c*) Mouse is connected to the computer through the serial interface.

(*d*) Executable files contain machine code.

(*viii*) Which one of the following can be considered as an output device of a computer ?

(*a*) VDU

(*b*) Mouse

(*c*) Keyboard

(*d*) Modem

(*ix*) Which one of the following statements is false ?

(*a*) Main memory can be accessed faster than secondary memory.

(*b*) Main memory is a permanent storage memory.

(*c*) Cache memory is a volatile memory.

(*d*) Hard disk is a secondary memory.

(*x*) What is the full form of HTML ?

**S'12:3 FN:AN 203/AD 303 (1403)**

**COMPUTING AND INFORMATICS**

*Time : Three hours*

*Maximum Marks : 100*

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**Group A**

**1.** (*a*) Design an algorithm to convert a character of 32-bit 2s complement number into its decimal equivalent. 7

(*b*) Represent your algorithm arrived at **Q.1** (*a*) in flow-chart form. 5

(*c*) Write a C function that accepts a character string of 32 characters representing a 2s complement number and returns its decimal equivalent. 8

**2.** (*a*) What is the difference between a local and a global variable ? 6

(*b*) What is a static variable ? 6

( *Turn Over* )

(*c*) Write a C function that would return an integer value, indicating the total number of times it is called. The first time it is called, it would return one, second time two, and so on. 8

3. (*a*) What do you understand by a macro in C ? 4

(*b*) What is the advantage of writing a processing step as a macro as compared to a function ? 8

(*c*) Write a macro definition for determining the larger of two integers. 8

4. (*a*) Briefly explain the working of the CSMA/CD protocol. At which ISO/OSI layer does it operate ? 7

(*b*) Briefly explain the client-server technology. How is a client-server application developed ? 7

(*c*) What is the difference between a hub and a switch ? 6

## Group B

5. (*a*) What is a process in the Unix operating system ? How is a process created ? 6

(*b*) What is virtual memory ? How does an operating system translate a virtual address into a physical address ? 8

(*c*) What is the difference between a volatile and a non-volatile memory ? Explain the advantage and disadvantage of each memory. 6

6. (*a*) What is the role of the control unit in a CPU ? Explain the difference between microprogrammed and hardwired control. Identify their relative advantages. 10

(*b*) What is an interrupt ? Who generates interrupts ? How are interrupts handled by an operating system ? 10



7. (*a*) Briefly explain, by using suitable diagrams, how various basic logic gates can be realized using NOT gate. 7

(*b*) What is a D flip-flop ? By using an appropriate diagram, briefly explain how a shift register can be realized using D flip-flops ? 7

(*c*) Convert the following sum of product (SOP) expression into product of sum (POS) expression : $\overline{A}\,\overline{B} + \overline{C}\,\overline{D}$. 6

8. (*a*) Convert the following octal number into its binary equivalent : 735. 6

(*b*) Convert the following hexadecimal number into its octal equivalent : AFB8. 6

(*c*) How is a floating point number represented in a computer ? 8

## Group C

9. Answer the following in brief : 10 × 2

(*i*) To realize 8 Mbyte of memory, how many chips of size 512 kbytes are required ?

(*ii*) When an instruction is under execution, it should be in which register in the CPU ?

(*iii*) What would be the binary representation of the decimal value 0·25.

(*iv*) What is the full form of TCP ?

(*v*) What is the name of the parameter passing mechanism that is used to pass an array as a parameter during a function call ?

(*vi*) Why is it necessary to normalize the database tables ?

(*vii*) What would be displayed when the following program is compiled and run ?

```
Main() {
        float a = 0·7;
        if (a = = 0·7) printf("Equal\n");
        else printf("Not Equal\n");
}
```

(*viii*) Which protocol is involved when a mail client sends an e-mail to its mail server ?

(*ix*) Why is redundancy a threat in a DBMS ?

(*x*) What is the full form of CSMA/CD ?

## W'12:3FN:AN203/AD303 (1403)

### COMPUTING AND INFORMATICS

*Time : Three hours.*

*Maximum Marks : 100*

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### Group A

1. (*a*) What do you mean by typeconversion and typecasting ? Explain with an example. Write a program in C to find the largest of three numbers using ternary operator. Write a program in C to sum the series $1/1^2 + 1/2^2 + \ldots 1/3^2$. 3 + 3 + 4

(*b*) Differentiate between formal parameters and actual parameters. Write a program to print the Fibonacci series using recursion. 5

(*c*) Write a program in $C^{++}$ to read marks of 10 students in the range of 0-100. Then make 10 groups : 0-10, 10-20, 20-30, etc. Count the number of values that falls in each group and display the result. 5

( *Turn Over* )

2. (*a*) What are generic pointers ? Explain with an example. 4

(*b*) Using pointers, write a program in C to read and print a text. Also, count the number of characters, words, and lines in the text. 16

3. (*a*) Write a program in C using an array of pointers to a structure to read and display the data of a student (like Roll No, Name, Course Fee). 8

(*b*) What is an algorithm ? Explain the key features of an algorithm. Explain the differences between time complexity and space complexity. 1 + 3 + 3

(*c*) Describe briefly various categories of algorithms. Write an algorithm to find the largest of three numbers. 3 + 2

4. (*a*) Write a $C^{++}$ program to demonstrate how to call base class constructor in derived class. 8

(*b*) What do you mean by a virtual function ? Explain its importance. 6

(*c*) Write a $C^{++}$ program to demonstrate the concept of virtual function. 6

## Group B

5. (*a*) (*i*) Find the hexadecimal equivalent of $(0{\cdot}3)_{10}$. 4

(*ii*) Find the octal equivalent of the decimal fraction 0·789. 4

(*b*) Simplify the following Boolean function in both sum-of-products and product-of-sums forms : 3 + 3

$F(A, B, C, D) = \Sigma(0, 1, 2, 5, 8, 9, 10)$

(*c*) Write a truth table for full adder. Also, draw a logic diagram. 3 + 3



6. (*a*) Give differences between (*i*) RISC *vs.* CISC, and (*ii*) static RAM *vs.* dynamic RAM. 4 + 4

(*b*) Write a zero-address instruction for the following : 6

$$X = (A + B)*(C + D)$$

(*c*) Perform the arithmetic operations (+70) + (+80) and (−70) + (−80) with binary numbers in signed-2s complement representation. Use eight bits to accommodate each number together with its sign. Show that overflow occurs in both cases that the last two carries are unequal and there is a sign reversal. 6

7. (*a*) Describe, with a neat block diagram, the concept of DMA controller. 8

(*b*) (*i*) How does MS-WINDOWS differ from MS-DOS. 4

(*ii*) What are various functions of kernel of UNIX OS ? 4

(*c*) Why is BIOS stored in a ROM. What do you understand by the term 'throughput' of a computer system. 2 + 2

8. (*a*) Distinguish between internet, intranet and extranet. 3 × 2

(*b*) Explain TCP/IP with a neat diagram. 6

(*c*) Explain the following : Assembler, loader, linker and interpreter. 4 × 2

## Group C

9. Answer the following : 10 × 2

(*i*) State Moore's law.

(*ii*) What is the full form of ENIAC ?

(*iii*) What is a Baud rate ?

(*iv*) What would be the output of the following program :

```
# define SQR(x)(x*x)
main ( )
{ int a, b = 4 ;
a = SQR (b + 3) ;
printf ("\n%d", a ) ;
}
```

(*v*) Would the following code compile successfully ? (Yes or no) What is the output ?

```
main ( )
{
printf (" % c", 6[Hindustan]) :
}
```

(*vi*) What is a NULL pointer ?

(*vii*) What would be the output of the following program :

```
main ( )
{
    char * str [  ] = {"Frogs", "Do","Not","Not",
                        "Die","They","Croak!"};
printf ("%d%d", sizeof(str[0]));
}
```

(*viii*) What is the similarity between a structure, union and an enumeration ?

(*ix*) What would be the output of the following program ?

```
main ( )
{
print ("\n%%%");
}
```

(*x*) What do the 'c' and 'v' in argc and argv stand for ?

## S'13:3FN:AN 203/AD303 (1403)

### COMPUTING AND INFORMATICS

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### Group A

1. (*a*) Design an algorithm to count the number of non-zero digits in an integer. For example, for the number 42103, it should return 4. Represent your algorithm in the form of pseudo code and also in the form of a flow chart. 10

   (*b*) Implement the algorithm you have designed for part (*a*) of this question using C language. 10

2. (*a*) What do you understand by command line argument ? Write a C program that would take a string as its command line argument and display whether it is a palndrone or not. 10

   (*b*) What do you understand by a block structured language ? Is C a block structured language ? If yes, using an example, illustrate how a block can be defined in C. 10

3. (*a*) What do you understand by flow control in TCP/IP ? What is the purpose of flow control ? Briefly explain how flow control is achieved in TCP/IP. 10

(*b*) What is a management information system (MIS) ? Using a schematic block diagram, discuss a 3 tier architecture of an MIS. Clearly show the tier to which a DBMS would belong. 10

4. (*a*) Briefly describe how does electronic mail exchange work. In particular, include discussion on mail client, mail server, and the specific protocols used. 10

(*b*) What do you understand by address arithmetic in C ? How can address arithmetic be used to print all the elements of the linear array ? 6

(*c*) Are array arguments in a function call passed by reference or value ? Explain your answer using an example. 4

**Group B**

5. (*a*) Using a block diagram, explain the important parts of a computer and how they are interconnected. 10

(*b*) Explain the components of an input/output device. Briefly explain how does the computer address an input/output device and how data transfer to/from the computer takes place. Include a suitable block diagram in your answer. 10

6. (*a*) What do you understand by file management ? How is file management achieved by a popular operating system such as Unix ? Explain your answer. 10

(*b*) What is a virtual memory operating system ? Briefly explain how virtual memory management is achieved by the operating system. 10

7. (*a*) Convert the following two binary numbers into Hex and Octal numbers : 01101010 and 01011011. 10

(*b*) Identify different functional and storage units of a CPU. Depict these using a block diagram and briefly explain their roles. 10

8. (*a*) What is a flip-flop ? For what purpose it is used for ? Explain how a flip-flop can be realized using NAND gates. 10

(*b*) What is an application software ? Using suitable examples, briefly explain how an application software can invoke operating system services. 5

(*c*) Identify five main advancements achieved by Window operating system over MS-DOS operating system. 5

**Group C**

9. Answer the following in brief : 10 × 2

(*i*) In C syntax, define a structure named Student. It should contain name of the student (sting of 20 characters) and roll number (integer).

(*ii*) What is the maximum number of comparison operations required to search a given integer from an array of 800 linearly ordered integers using binary search ?

(*iii*) In C syntax, write a code snippet to open a file named marks. dat and print out all the marks (integer) stored in it. Assume that it contains only marks (integer) and no other data.

(*iv*) Name a popular LAN protocol.

(*v*) Write the truth table for a 1-bit half adder.

(*vi*) Explain method overloading in $C^{++}$ using an example.

(*vii*) How is a compiler different from a language translator ?

(*viii*) Write *two* important advantages of using a DBMS as compared to using a file for storing data.

(*ix*) Write *two* advantages of using client-server software over monolithic software.

(*x*) Write *two* important ways in which a system software differs from an application software.

# W'13:3FN:AN203/AD303 (1403)

## COMPUTING AND INFORMATICS

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### Group A

1. (*a*) What is the difference between iteration and recursion ? What are their relative advantages ? Write a program to find the value of $n^m$ using recursion. 2 + 2 + 4

   (*b*) Write a program to convert uppercase string to lowercase string without using strlwr ( ). 5

   (*c*) How does an inline function differ from a pre-processor macro ? Write a program to illustrate the use of object arrays. 2 + 5

2. (*a*) What is a destructor ? When is it invoked ? Write a program to illustrate that the destructor has been invoked implicitly by the complier. 5

   (*b*) What is the difference between array of integer pointers and pointer to an integer array ? Discuss with a suitable example. 3 + 3

(*c*) Write a program to check whether a year is leap year or not. What do you understand by scope of a variable ? What is a scope resolution operator ? Give an example. 9

3. (*a*) What is the difference between the following two # include directives :

```
# include "abc.h"
# include <abc.h>
```

Write a program to carry out the following : 4 + 4

(*i*) To read a text file "INPUT.TXT"

(*ii*) Print each word in the file.

(*b*) What is the difference between array and linked list ? Create a structure to specify data on students given below :

Roll number, Name, Department, Course, Year of joining.

Assume that there are not more than 300 students in the college.

(*i*) Write a function to print names of all students who joined in a particular year.

(*ii*) Write a function to print the data on a student whose roll number is given. 2 + 10

4. (*a*) Write a program for conversion of a decimal number to binary number. 5

(*b*) What is the difference between call by value and call by reference ? Discuss with a suitable example. 5

(*c*) Write a C function to pick the largest number from any 4 × 4 matrix. 5

(*d*) What do you mean by a virtual function and explain its use with a suitable example program. 5

## Group B

5. (*a*) What do you understand by normalization of a database ? What is the advantage of normalization ? 7

(*b*) Prove, using Boolean algebra, that 6

$$(X+Y')(X+Z') = (X+Y'+Z)(X+Y'+Z)(X+Y+Z)$$

(*c*) Draw the logic circuit for the following expression using NAND gate only : $((XY'Z')'(XY'Z))'$. 7

6. (*a*) Write working principle of a CRT monitor. What is the difference between raster scan and vector scan ? 3 + 3

(*b*) What is a batch file ? Create a batch file for the following : 4 + 4

(*i*) To display the current date and time

(*ii*) List the files in the working directory with extension of .txt.

(*c*) Explain, in sequence, all the tasks performed at the time of booting up. 6

7. (*a*) Briefly describe client-server model and its application. 5

(*b*) What is the role of a modem ? Discuss the concept of multiplexing and demultiplexing ? 8

(*c*) What is a network topology ? Discuss two popular network topologies with their relative advantages and disadvantages. 7

8. (*a*) Briefly describe OSI model for computer networks. 8

(*b*) Describe the following networking components : 4 × 3

(*i*) Bridge

(*ii*) Two layer switch

(*iii*) Router

(*iv*) Gateways.

**Group C**

**9.** Find the outputs for (*i*) to (*vi*) and answer in brief for (*vii*) to (*x*) : 10 × 2

(*i*)
```
int a = 32768 ;
printf("%d",a);
```
(Assume integer takes two bytes of memory)

(*ii*)
```
printf("%d", printf ("abc"));
```

(*iii*)
```
int a [ ] = {1, 3, 2 } ;
printf("%d", (a [2] + 2 [ a ] ));
```

(*iv*)
```
int a = 97 ;
printf("%c", a);
```

(*v*)
```
int i = 0;
for (printf ("A"), i<2;printf("C")){
    printf("B");
    i ++ ;
}
```

(*vi*)
```
int a = 5;
printf("%d%d%d", a = = 2, a = 3, a > 5);
```

(*vii*) What do you mean by "throughput" of an operating system ?

(*viii*) Identify at least one factor that makes cache memory faster than main memory.

(*ix*) What do you mean by word length of a computer ?

(*x*) What is the difference between a complier and an interpreter ?

# S'14: 3FN: AN 203/AD 303 (1403)

## COMPUTING AND INFORMATICS

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### Group A

**1.** (*a*) Design an algorithm to find the sum of the following series :

$$S = 1 + \frac{x^2}{1!} + \frac{x^3}{2!} + \frac{x^4}{3!} + \cdots + \frac{x^n}{(n-1)!}$$

Represent it using a flow-chart. 10

(*b*) Write a program in C or $C^{++}$ for your algorithm of part (a) above. 10

**2.** (*a*) What is the difference between a low-level and a high-level computer language ? Write their relative advantages and disadvantages. 5

(*b*) What are the control statements available in language C ? Explain each of them with suitable examples. 5

(*c*) Discuss different parameter passing mechanisms supported in C. Which one of these is considered efficient and why ? 5

(*d*) Explain, using suitable code snippets, how multidimensional array can be passed as arguments to a C function. 5

**3.** (*a*) What is a DBMS ? Discuss different database models with the help of suitable diagrams. Which database model is popular and why ? 10

(*b*) Write C code segment to explain how memory can dynamically be allocated for a two-dimensional integer array of size 2 × 100. Write code segment to explain how the individual elements of the dynamically allocated two-dimensional array be accessed. 5

(*c*) Write the important functions of each layer in TCP/IP protocol suite. 5

**4.** (*a*) Explain briefly the role of SMTP, HTTP and FTP with respect to client-server architecture. At which ISO/OSI layer do these operate ? 10

(*b*) Briefly explain how TCP provides reliable communication. 5

(*c*) What do you mean by address arithmetic in C ? Using suitable code fragments, explain how the elements of an integer array and a floating point array can be accessed using address arithmetic. 5

## Group B

**5.** (*a*) What are the choice of different storage devices available in a computer system ? Arrange them in increasing order of their retrieval speed and storage size. 10

(*b*) How is SRAM different from DRAM ? Which one is faster ? Which one is more expensive ? Explain your answer. 5

(*c*) What do you mean by disk cache ? How is it different from cache memory used between processor and main memory of a computer ? What is its role ? 5

**6.** (*a*) Differentiate between user and kernel space in an operating system. How are they different from physical address space ? Explain with examples. 5

(*b*) What is a page fault ? Explain what causes a page fault in a virtual memory system and how is it handled. 5

(*c*) Distinguish between a page and a page frame in a virtual memory system. 5

(*d*) Explain how virtual address is translated into physical address using a suitable block diagram. 5

**7.** (*a*) Write an algorithm to convert the decimal numbers into binary numbers. Explain your algorithm. 5

(*b*) Write an algorithm to convert a binary number to an octal number. Explain your answer. 5

(*c*) What do you mean by universal logic gates ? Design a full adder using a universal logic gate. 8

(*d*) Write at least two differences between sequential and combinational circuits. 2

**8.** (*a*) Identify at least five characteristics that distinguish an application software from a system software. $5 \times 2$

(*b*) Draw a block diagram to show the important hardware blocks in a processor. Briefly explain their roles. 5

(*c*) Explain how processor, memory and hard disk are interconnected with the help of a block diagram. 5

## Group C

**9.** Answer the following : $10 \times 2$

(*i*) In $C^{++}$ syntax, define a class named employee. It should contain name of the employee (string of 25 characters) and employee identification (integer).

(*ii*) In which situation serial search is better than binary search ? Give an example situation.

(*iii*) At present what is the physical medium used in a wired Ethernet LAN ?

(*iv*) Show the symbol and boolean expression for logic gate EX-NOR.

(*v*) What is an ADT ? Is a $C^{++}$ class an ADT ?

(*vi*) Give two examples of computer languages which are interpreted instead of compiled.

(*vii*) TCP and IP operate at which layers of ISO/OSI protocol suite ?

(*viii*) How is a syntax error different from a semantic error ? Explain with an example.

(*ix*) Draw a logic circuit using NAND gates which can store 1 bit of information.

(*x*) Write two advantages of client-server software over a monolithic software.

## W'14 : 3 FN : AN 203/AD 303 (1403)

### COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question ( a,b,etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

### Group A

1. (*a*) List *five* important differences between C and $C^{++}$ languages. 5

   (*b*) Explain 'call by value' and 'call by reference' in C language with the help of examples. 8

   (*c*) Write a function in C, which would return two roots of a quadratic equation of the form $ax^2 + bx + c = 0$. Assume that valid values of the coefficients *a, b* and *c* are given as input. 7

2. (*a*) Show the difference between 'While Loop' and 'Do-while Loop' with the help of a flow control diagram. 8

   (*b*) What are pointers and why do we need them ? Briefly explain. 4

(*c*) Write a C program using pointers to read in an array of integer numbers and print its elements in the reverse order. 8

3. (*a*) What are two required characteristics of a good algorithm ? 2 + 2

(*b*) Draw a flow-chart for finding maximum and minimum elements in a set of *n* elements. 6

(*c*) Write a procedure to find the square root of an integer number up to the first decimal place. For example, square root of 31 up to first decimal place is 5.5. Implement your procedure using C. 10

4. (*a*) Briefly explain the decision-making process using Management Information Systems. Illustrate your answer with suitable examples. 8

(*b*) Bring out the differences between LAN and WAN. 4

(*c*) Write a short note on Electronic Data Interchange (EDI). 8

**Group B**

5. (*a*) Give a brief account of the different generations of *computers*. 10

(*b*) Draw a labelled block diagram showing the important hardware blocks in a processor and clearly explain the role of each block during the execution of an instruction. 10

6. (*a*) Construct the truth tables for NAND and NOR gates. 6

(*b*) Implement the following : 7 + 7

(*i*) $Y = (A + C)(A + D')(A + B + C')$ using NOR gates

(*ii*) $Y = (AB + BC)\,C$ using NAND gates

7. (*a*) Draw the block diagram and briefly explain the components of a computer. 6

(*b*) Describe the memory hierarchy in a computer. 7

(*c*) Explain, with a truth table, the working of R-S flipflop. 7

8. (*a*) Bring out the differences between *System Software* and *Application Software* with suitable examples. 10

(*b*) Explain how file management is achieved in UNIX operating system. 10

**Group C**

9. Answer the following : 10 × 2

(*i*) Write a C program to find the sum and product of *n* numbers.

(*ii*) Illustrate function overloading in C++ with a simple example.

(*iii*) List two differences between a structure and an array.

(*iv*) Why do we need virtual memory ? Write any one important reason.

(*v*) TCP and IP protocols operate at which ISO/OSI layers ?

(*vi*) Convert $(101.101)_2$ to decimal.

(*vii*) What are *two* important advantages of gray codes ?

(*viii*) Draw the circuit of J-K flip-flop using NAND gate.

(*ix*) List *any two major functions carried out* by an operating system.

(*x*) Differentiate between a compiler and an interpreter.

## S'15: 3FN: AN203/AD303 (1403)

### COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question ( a,b,etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

### Group A

**1.** (*a*) Write a 'C' program to calculate the mean and standard deviation of an array of 100 integer values. The array elements are to be read from the keyboard. Write functions to calculate standard deviation and mean. 10

(*b*) A class of *n* students take an annual examination in *m* subjects. Write a 'C' program to read the marks obtained by each student in various subjects and to compute and print the total marks obtained by each of them. 10

**2.** (*a*) Write an algorithm to check a given number is prime or not. Draw the flow chart for this algorithm. 8

(*b*) What are pointers and structures ? Explain their use through suitable examples. 6

(*c*) What is a Management Information System (MIS) ? Give at least two realistic MIS examples. 6

**3.** (*a*) What is wireless LAN ? Explain why it is needed and how it is used ? 7

(*b*) Explain the architecture of an email system. What are the standard protocols used in such a system ? 7

(*c*) Briefly explain the mechanism by which TCP is able to provide reliable transmission service. 6

**4.** (*a*) Discuss the main characteristics of a database and how it differs from traditional file systems. 7

(*b*) What are the responsibilities of the database administrators and the database designers ? 7

(*c*) Briefly explain the 3-tier client-server architecture. Clearly mention the role and services provided by each layer. 6

**Group B**

**5.** (*a*) Convert the following numbers : 2 + 2 + 4 + 2

(*i*) $(723)_8 = (?)_2$

(*ii*) $(10001010101)_2 = (?)_{16}$

(*iii*) $(285{\cdot}48)_{10} = (?)_{16}$

(*iv*) $(0{\cdot}8125)_{10} = (?)_2$

(*b*) Compare and contrast between serial access memory with random access memory. 5

(*c*) Define the terms 'seek time' and 'latency time' of a hard disk. How can each be reduced to small values ? 5

**6.** (*a*) Design a logic circuit to add two positive numbers that are each 2 bits long. 6

(*b*) Using theorems of Boolean algebra, prove the following: 4 + 4

(*i*) $X \cdot Y + X \cdot Z + Y \cdot Z = X \cdot Y + \overline{X} \cdot Y \cdot Z + X \cdot Z$

(*ii*) $(X \cdot Y) \cdot (\overline{X} \cdot \overline{Z} + Z) \cdot (X \cdot \overline{Z + Y}) = 0$

(*c*) What is a scripting language ? In what way it is different from application or applicative language ? Name two scripting languages. 6

**7.** (*a*) Describe UNIX pipes and filters with examples. 6

(*b*) What is a time sharing operating system ? How is it different from a multitasking operating system ? 7

(*c*) Briefly explain the UNIX file system. What is an *i*-node ? 7

**8.** (*a*) Distinguish among the following classes of computers : Supercomputer, mainframe computer, mini computer, personal computer and embedded computer. 8

(*b*) Explain the working of optical character reader, video graphic terminal and dot matrix printer. 3 × 2

(*c*) Write the purpose of following DOS commands : 6 × 1

(*i*) TYPE (*ii*) REN (*iii*) RD (*iv*) PATH (*v*) ATTRIB (*vi*) FORMAT

**Group C**

**9.** Answer the following : 10 × 2

(*i*) What is Moore's law ?

(*ii*) Represent the decimal number 12 as a 2s complement number.

(*iii*) A 2·5 inch diameter disk pack has six plates, 512 bytes per sector, 256 sectors, 5268 tracks per surface. What is the capacity of disk and density of disk ?

(*iv*) How many different digits are there in a octal system ? List them.

(*v*) What is the role of a linker ?

(*vi*) What should be the output for the following code segment in C ?

```
int main ( )
  {
int a = 2,  b = 3 ;
Print f ( " %d ", ++a – b);
 return o ;
  }
```

(*vii*) Identify *two* reasons as to why data redundancy in a database considered to be harmful.

(*viii*) Suppose the binary encoding of a decimal number is *n* bits long. What would be the length of the octal encoding of the number ?

(*ix*) Write any *two* categories of services provided by an operating system to the user.

(*x*) Arrange the following types of storage elements in increasing order of access time : (*a*) Hard disk, (*b*) cache memory, (*c*) main memory and (*d*) register.

## W'15 : 3FN : AN 203/AD 303 (1403)

### COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question ( a,b,etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

### Group A

1. (*a*) Explain the use of flow charts, algorithms and programs for solving a problem in computers. 3 × 2

   (*b*) What are the different control statements in language $C^{++}$ ? Illustrate the execution of a loop with the help of an example. 6

   (*c*) Design a flow chart and write a program in $C^{++}$ to find the sum of the following series : 8

$$S = 1 + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \ldots + \frac{x^n}{n}$$

2. (*a*) How is the structure in C different from union ? Explain with examples. 6

(*b*) Discuss the use of pointers in $C^{++}$. How can the elements of an array accessed using pointers ? Explain with an example. 6

(*c*) Consider that 100 numbers are stored in an array. Write a program in C or $C^{++}$ to find the sum of all odd numbers in the array. 8

3. (*a*) Write a program in C or $C^{++}$ to check whether a given string is palindrome or not ? 7

(*b*) What are the logical operations in C or $C^{++}$ ? Explain each of them with appropriate examples. 7

(*c*) What is MIS ? How is MIS different from a decision support system ? 6

4. (*a*) Define DBMS. Write the role of DBA in DBMS. 7

(*b*) Draw two popular network topologies. Discuss their advantages as well as disadvantages. 7

(*c*) Differentiate (using a table) between TCP/IP protocol stack and OSI/ISO reference model. 6

**Group B**

5. (*a*) Draw the basic block diagram of the von Neumann stored program computer. Explain the working of each of the blocks in the diagram with appropriate examples. 8

(*b*) Convert the following numbers as directed : 3 + 3

(*i*) $(253{\cdot}65)_{10} = (\ ?\ )_2$

(*ii*) $(325{\cdot}62)_8 = (\ ?\ )_2$

(*c*) Write the truth table, Boolean expression and the logic circuit diagram of a half adder. 3 × 2

6. (*a*) What is a flip-flop ? Write the truth tables for different types of flip-flops. 7

(*b*) What do you mean by a master-slave flip-flop ? Explain your answer with a proper diagram. 7

(*c*) What are the advantages of the hierarchical memory system ? Explain your answer with the help of a schematic diagram. 6

7. (*a*) What is an assembler ? How is assembler different from a compiler ? Explain with examples. 7

(*b*) What is a loader ? How is it different from a linker ? Differentiate between source code, object code and executable code. 7

(*c*) What is macro ? How are macros and pseudo-ops used in a program ? Explain with an example. 6

8. (*a*) What is the role of an operating system in a computer ? How is kernel mode different from the user mode ? Illustrate with the help of a diagram. 7

(*b*) What are the different scheduling criteria ? Explain two scheduling policies and compare them using a scheduling criteria. 7

(*c*) Explain important features of the file management system for Linux and Windows. 6

**Group C**

9. Choose the *correct* answer for the following : 10 × 2

(*i*) Which one of the following is not a part of a personal computer ?

(*a*) CPU

(*b*) Hard disk

(*c*) CD-ROM drive
(*d*) Network interface card
(*e*) Router

(*ii*) Which is the equivalent decimal number for binary number $(101 \cdot 111)_2$ ?

(*a*) 6·7
(*b*) 5·87
(*c*) 5·75
(*d*) 5·875
(*e*) 7·502

(*iii*) What is the output of two-input NAND and NOR gates when both inputs are the same ?

(*iv*) Write the Boolean expression and truth table for EX-NOR gate.

(*v*) Why is RAM called a volatile memory ? What is the size of RAM of a modern desktop computer ?

(*vi*) What problems may occur, if the database tables are not normalized ?

(*vii*) Give an example C program segment in which $a = C^{++}$ and $a = {}^{++}C$ cannot be used interchangeably and produce different results.

(*viii*) What is the difference between a page fault and a cache miss ?

(*ix*) What do you mean by a device driver ? What is its role ?

(*x*) Would any problems be faced by the users of a computer, if the operating system of the computer does not support virtual memory scheme ? Briefly explain your answer.

**S'16 : 3 FN : AN 203/AD 303 (1403)**

**COMPUTING AND INFORMATICS**

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question ( a,b,etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

1. (*a*) Illustrate the usage of union, structure and enum in C. 3 × 3

   (*b*) Draw the flow-charts for 'while' and 'Do-while' control statements in C. 2 × 3

   (*c*) Design a flow-chart to determine whether a given input string is a palindrome or not. 5

2. (*a*) Write a C program to read an integer 'N' and print the equivalent number of asterisks of each digit in a line. For example, if N is 325, then the following output should be produced : 10

```
***
**
*****
```

( *Turn Over* )

(*b*) Distinguish between recursive and non-recursive procedures. Develop a recursive procedure for finding the factorial of a given integer. Graphically show the recursive calls for your procedure for finding 5! 10

3. (*a*) Illustrate call-by-value and call-by-reference used to pass parameters during function calls in C. 10

(*b*) Develop a function in C that would compute the two roots of a quadratic equation of the form $ax^2 + bx + c = 0$. Show how this function will be called from Main() program. 10

4. (*a*) Briefly explain client-server technology and list its advantages and disadvantages. 6

(*b*) Explain the function of different layers of OSI reference model. 10

(*c*) Write the importance of modems in data communication. 4

**Group B**

5. (*a*) Convert the following numbers into appropriate base as directed : 3 × 2

(*i*) $(475.66)_{10} = (?)_2$

(*ii*) $(638.12)_{10} = (?)_8$

(*iii*) $(10110101011)_2 = (?)_{16}$

(*b*) Write the truth table, Boolean expression and the logic circuit diagram of a full adder. 8

(*c*) Draw logic diagrams for the following : (*i*) EX-OR (*ii*) NOR and (*iii*) AND. 3 × 2

6. (*a*) What are the disadvantages of using and S-R flip-flop ? Explain how J-K flip-flop overcomes these issues. Draw the basic block structure and the truth table of a J-K flip-flop. 10

(*b*) Explain the secondary storage devices used in modern day computing. 6

(*c*) Explain the hierarchy of memory as accessed by the CPU. 4

7. (*a*) With appropriate examples, bring out the difference between system software and application software. 5

(*b*) Contrast the difference between a compiler and an interpreter. Explain the advantages and disadvantages of a compiled language and an interpreted language. 10

(*c*) Briefly explain a logic circuit that can store 1 bit data. 5

8. (*a*) Describe the major functions of an Operating System. 10

(*b*) Explain the file systems of Unix and Windows. Highlight the major differences between these two file systems. 10

**Group C**

9. Briefly answer the following : 10 × 2

(*i*) Define a multiuser operating system. Give two examples for the same.

(*ii*) What is the primary difference between procedure-oriented programming language and object-oriented programming language ?

(*iii*) Why is a cache memory needed ?

(*iv*) What is a repeater and on which layer does it work ?

(*v*) Why do we need normalization in data management ?

(*vi*) Define access time and seek time of a hard disk.

(*vii*) What is a null pointer ? Give one example use of a null pointer.

(*viii*) Define address bus and data bus, and explain their roles in CPU-memory communication.

(*ix*) Why is a D flip-flop called delay flip-flop ?

(*x*) What is virtual memory and why is it necessary ?

# W'16:3FN:AN 203/AD 303 (1403)

## COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question (a, b, etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

### Group A

1. (*a*) Write a program in C to read an integer, then display the value of that integer in decimal. 7

   (*b*) Write a program in C to count even numbers between 1 and 200 and print their sum. 7

   (*c*) Write a program in C to calculate simple interest and compound interest. 6

2. (*a*) Write a program in C to enter a number and then calculate the sum of its digits. 7

   (*b*) Write a program in C to calculate GCD of two number. 7

   (*c*) Write a program in C to print the reverse of the enter number. 6

( *Turn Over* )

3. (*a*) Draw a Flow chart for printing the sum of those numbers divisible 5 between 1 and 100. 6

(*b*) Write a program in C to print the position of the smallest numbers using arrays. 7

(*c*) Write a program in C to calculate area of a triangle using function. 7

4. Write short notes on : 5 × 4

(*a*) TCP/IP

(*b*) Office Automation

(*c*) Database management technology

(*d*) Information resource management.

**Group B**

5. Answer the following : 4 × 5

(*a*) Find the hexadecimal equivalent of $(41819{\cdot}5625)_{10}$.

(*b*) Find the octal equivalent of $(D6C1)_{16}$.

(*c*) Find the binary equivalent of $(37.8125)_{10}$.

(*d*) Find the binary equivalent of $(727)_8$.

(*e*) What do you understand by the acronym MOSFET and list the purpose of logic gate in MOSFET.

6. Answer the following : 4 × 5

(*a*) List the purpose of data entry machine.

(*b*) Explain how an optical scanner works.

(*c*) Explain the operation of a flip-flop.

(*d*) List the characteristic of a memory cell.

(*e*) Explain how data is organised in a hard disk.



7. (*a*) List the features that are necessary in a high level language. 5

(*b*) What do you understand by lexical analysis ? 5

(*c*) Compare and contrast between compiler and translator. 5

(*d*) What do understand by simulation ? Is simulation a system software ? Justify. 5

8. (*a*) List the objectives of Windows OS. 5

(*b*) What do you understand by UNIX pipes ? 5

(*c*) What is micro kernel ? 5

(*d*) What are the functions of BIOS in PCs ? 5

**Group C**

9. Answer the following : 10 × 2

(*i*) BIOS stored in _____.

(*ii*) Which operator produces the 1's complement of the given binary value ?

(*iii*) A loop that always satisfies the test condition is known as _____.

(*iv*) The default storage class of a local variable is _____.

(*v*) If an array is declared as double arr [50], how many elements can it hold ?

(*vi*) Pointer to pointer stores _____.

(*vii*) Give one example of a utility software.

(*viii*) A 2·5-inch diameter disk pack has6 plates, 512 bytes per sector, 256 sectors, 5268 tracks per surface. What is the capacity of the disk in terms of Giga bytes ?

(*ix*) Which symbol is used for input and output operations in flow-chart ?

(*x*) Write the equivalent Boolean statement for $(A + B) \cdot (A + C) = ?$

# S'17:3 FN:AN 203/AD 303 (1403)

## COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question (a,b,etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

*Symbols have their usual meanings.*

### Group A

1. (*a*) What are the control statements available in language C ? Explain each of them with suitable examples. 8

   (*b*) Distinguish between Information system and a File system. 6

   (*c*) Are array arguments in a function call passed by reference or value ? Explain your answer using an example. 6

2. (*a*) Specify by schematic as well as description of the following network topology : 3 × 4

   (*i*) Mesh Topology

( *Turn Over* )

(*ii*) Star topology

(*iii*) Ring topology

(*iv*) Bus topology

(*b*) Write briefly about each of the following : 4 × 2

(*i*) ATM

(*ii*) Cross Talk

(*iii*) FTP

(*iv*) TCP/IP

**3.** (*a*) What is DBMS ? What are different types of DBMS ? Compare different types of DBMS. 10

(*b*) What is Client-Server technology ? What are their advantages and disadvantages ? Discuss them briefly. 10

**4.** (*a*) A class has 50 students. Each student has a name (up to 25 characters) and roll number (integer). Each student appears in an examination of 100 marks. The name of the students who have scored more than class average need to be printed. 5 + 5

(*i*) Draw flow-chart for the problem.

(*ii*) Write C++ code for solving the problem. The code should be adequately documented.

(*b*) What is a relational database management system ? 5

(*c*) Why data in an RDBMS needs to be normalized ? 5

**Group B**

**5.** (*a*) What is a virtual memory ? What are the necessary



layers of memory hierarchy that helps to create the virtual memory ? How is paged segment memory management feature of an operating system utilizes those layers to implement the virtual memory ? 10

(*b*) Distinguish between a text file and a binary file. 5

(*c*) What is a modem and its importance in a data communication ? 5

**6.** (*a*) What is multiplexing ? Distinguish between frequency division and time division multiplexing. 6

(*b*) Describe the working principle of a laser printer. 6

(*c*) How does the word length of a computer determine the architecture of its RAM ? Also, explain the role of RAM in the working of a computer. 8

**7.** (*a*) Differentiate between compilers, assembler and translator. Explain their working and the situations where each is useful. 10

(*b*) What are the function of an operating system ? Differentiate between multiprogramming and multi-processing. Which OS are single user and multiusers ? Give examples of each. 10

**8.** (*a*) Why are NAND and NOR gates called universal gates ? 6

(*b*) What is EPROM ? How is it different from PROM ? 6

(*c*) Design a full adder using a universal logic gate. 8

## Group C

**9.** Write short notes on : 5 × 4

(*i*) Object Oriented Programming

(*ii*) Management Information System

(*iii*) Simple Network Management Protocol (SNMP)

(*iv*) Flip Flops

(*v*) Central Processing Unit.

# W'17:3FN : AN 203/AD 303 (1403)

## COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question (a, b, etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

### Group A

1. (*a*) What is an algorithm ? What are the different properties of an algorithm ? How an algorithm is different from a flowchart ? Explain with an example. 6

   (*b*) Write a flowchart for finding the following sum of series

   $$S = 1 - \frac{x}{2!} + \frac{x^2}{3!} - \frac{x^3}{4!} + \cdots + \frac{x^n}{(n+1)!}.$$ 6

   (*c*) Write at least four different types of operations that can be performed by a CPU of a computer. Explain each type of operation with an example. 8

2. (*a*) Write down the different stages in decision making. Discuss the information system needed for different types of decision making of management ? 8

( *Turn Over* )

(*b*) What is a DBMS ? Distinguish between storage management of data using a generic file system and a database management system. 6

(*c*) What are the benefits and limitations of an office automation system as compared to traditional mannual system ? Give an example tool for commonly used office automation system. 6

3. (*a*) Write the structure of a switch statement in programming language C. Explain the use of a default block in a switch statement of C. Give an example of switch statement with a default block. 7

(*b*) Write a program in C ++ to generate first 25 odd Fibonacci numbers. 6

(*c*) Explain the role of a computer in an embedded system such as a microwave oven. 7

4. (*a*) Distinguish between client-server and peer to peer communication. Illustrate with a diagram and example system. 8

(*b*) What is a switch in Computer Network ? Discuss the need of different switches in various layers of OSI reference model. 6

(*c*) What do you mean by address resolution ? Give an example of address resolution and explain why it is necessary ? 6

**Group B**

5. (*a*) Perform the following number conversions : 3 + 3

(*i*) $(532{\cdot}627)_8$ to $(\ ?\ )_6$

(*ii*) $(6A25{\cdot}AD)_{16}$ to $(\ ?\ )_8$

Clearly show all the steps of conversion process.



(*b*) What do you mean by a bus standards ? Explain at least one bus standard for each of system bus, memory bus and peripheral bus. 6

(*c*) Write the logic circuit and truth table of a Full Adder using minimum number of logic gates. 8

6. (*a*) Write the different steps that occur during a read or write operation a data byte from or to memory by the processor in a computer system. Explain clearly, how the appropriate location in main memory is identified. 8

(*b*) Distinguish between memory mapped I/O and I/O mapped I/O. Which is more versatile and why ? Give an example for each of the above scheme. 8

(*c*) What is the role of Cache memory in a computer ? Using a schematic diagram explain how processor, cache, and main memory are interconnected. 4

7. (*a*) What is the difference between system software and application software for a multiuser system ? 6

(*b*) Write the merits and demerits of an interpreter as compared to that of a compiler. Give examples programming languages that are interpreted and those that are compiled. 6

(*c*) What is a device driver ? Briefly explain its role. 4

(*d*) What do you mean by dynamic memory allocation ? Explain your answer using an example. 4

8. (*a*) What is the Kernel of an operating system ? How the kernel of an operating system different from the shell ? Explain the important components of the kernel of an operating system. 8

(*b*) What are the different types of interrupts in a computer system ? Explain how prioritization of interrupts is achieved. 8

(*c*) Discuss a scheduling algorithm used by a job scheduler in OS. 4

**Group C**

**9.** Distinguish between the following : $10 \times 2$

(*i*) High level language and Assembly language

(*ii*) Flowchart and Pseudocode

(*iii*) Information system and Database management system

(*iv*) Ethernet and fibre optic cable

(*v*) TCP and UDP

(*vi*) Compiler and cross-compiler

(*vii*) D-Flip Flop and T- Flip Flop

(*viii*) Hard disk and RAM

(*ix*) UNIX and Windows

(*x*) RAM and ROM.

# S'18:3FN:AN 203/AD 303 (1403)

## COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question ( a,b,etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

### Group A

1. (*a*) Suppose an integer array contains 100 integer elements. Write an algorithm to remove all duplicate entries. 6

   (*b*) Draw a flow chart corresponding to your algorithm of part (*a*) of this question. 6

   (*c*) Write the C code that corresponds to the algorithm and flow chart for the part (*a*) and (*b*) of this question. 8

2. (*a*) Differentiate between parameter passing to a function by value and by reference. Explain the use of each through suitable examples. 10

   (*b*) Write a C function named find-largest that should take and integer array and the number of elements present

( *Turn Over* )

in it as arguments and return the largest element present in the array. 10

3. (*a*) Distinguish between a client-server software and a monolithic software. Compare the relative advantage of the two. 8

(*b*) In a client-server software, explain how do the clients and servers communicate. 4

(*c*) What do you understand by "middle ware" in the context of client-server software ? What is the role of the middle ware ? 8

4. (*a*) What are the principal roles of the TCP and IP layers in the TCP/IP protocol suite ? These two layers correspond to which two layers of the ISO/OSI model ? 10

(*b*) Differentiate between TCP and UDP. 5

(*c*) How does TCP provide reliable service ? Briefly explain your answer. 5

**Group B**

5. (*a*) What do you understand by a "stored program" computer ? Who is credited with introducing this concept ? What advantages did this bring over the previous computers ? 10

(*b*) Write an algorithm to convert an Octal number into a binary number. Briefly explain your algorithm. 10

6. (*a*) What do you understand by half adder and full adder ? Give a logic circuit for a half adder and also a logic circuit for realizing a full adder using half adders and OR gates. 10



(*b*) What is the difference between a combinational logic circuit and a sequential logic circuit ? Give one example of each. 5

(*c*) What is a *D* flip-flop ? How is it different from an SR flip-flop ? Give a truth table for a *D* flip-flop. 5

7. (*a*) What are the main functions of an operating system ? What difficulties would a user face if a computer has no operating system ? 10

(*b*) What are the main components of an operating system ? Briefly explain the major functionalities offered by these components. 10

8. (*a*) Distinguish between system software and application software. Give examples of each type of software. 10

(*b*) Differentiate between compilers and interpreters. Discuss the relative advantages of the two. Give at least one example of each. 10

**Group C**

9. Answer *all* questions : 10 × 2

(*i*) Briefly justify why C++ is called a hybrid language.

(*ii*) Explain the term polymorphism in the context of C++.

(*iii*) Differentiate between function overloading and function overriding.

(*iv*) Briefly explain the term electronic data intercharge.

(*v*) Convert the hexadecimal number EAF into Octal.

(*vi*) Is the C conditional expression (a > b) &&( b> c) equivalent to !((a <= b)||(b <= c)). Briefly justify your answer.

(*vii*) One peta byte is how many bytes ?

(*viii*) Do you agree with the statement : "In Unix, a directory is also a file." Briefly justify your answer.

(*ix*) Briefly explain a situation in which use of a database management system is preferable and a situation in which a file is preferable.

(*x*) Briefly explain the role of a router in a WAN.

# W'18 : 3 FN : AN 203/AD 303 (1403)

## COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question ( a,b,etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

### Group A

1. (*a*) Write the properties of an algorithm. Write an algorithm to check whether a given integer is odd or even. Verify that the properties are satisfied with the above algorithm. 5

   (*b*) Write a program in C to find the sum of digits of a given integer using macros. 5

   (*c*) Illustrate the use of switch, case and break statement in C with examples. 5

   (*d*) Write the difference between call-by-value and call-by-reference. Which among these is a better option of parameter passing. Justify your answer with necessary example. 5

( *Turn Over* )

2. (*a*) Write a program in C to reverse a string without using function strrev(). Specify the name of header files that defines string function in C. 10

(*b*) Write a program in C to find the median of 20 elements stored in an unsorted array A[20]. 10

3. (*a*) What do you understand by DBMS and DBA ? Write different data base models which data base model is practical and used in application . Explain the role of DBA in DBMS. 8

(*b*) How a client-server architecture is different from peer-peer architecture ? Explain with examples. 6

(*c*) Which protocol stack is used for the Internet ? Explain briefly the function of each layer of protocol stack. 6

4. (*a*) What do you understand by information system ? Explain five phases of information system. Explain the design of information system using SDLC. 8

(*b*) What do you mean by diagraming a business process ? Explain with an appropriate diagram. 6

(*c*) How office automation cell of an organisation improves the business process ? 6

**Group B**

5. (*a*) Arrange various storage devices in a digital computed in increasing order of their retrieval speed and storage capacity. Define seek time and latency with respect to various storage devices. 7

(*b*) Why DRAMS are slower as compared to SRAM ? Specify the used of SRAM and DRAM in a digital computer. 6



(*c*) Illustrate the mechanism to read and write a data type in both fixed and movable head disk system. 7

6. (*a*) Differentiate between paging and segmentation specify the hardware needed to implement paging and segmentation. 7

(*b*) What is disk cache ? How it is different from cache memory used in hierarchical memory system ? 6

(*c*) Explain the comparism between block, page, and segment in memory management system. 7

7. (*a*) What are the universal logic gates ? Develop a 3-to-8 decoder using universal logic gates. 5

(*b*) Justify that a flip-flop is a sequential logic device with appropriate example. 5

(*c*) What is the role of a clock in a digital computer ? Is it possible to have different clocks for different components in a digital computer ? Justify your answer with examples. 5

(*d*) Increasing clock speed of a digital computer will not improve the performance. Justify. 5

8. (*a*) Write an algorithm to convert a 3-digit hexadecimal number to its corresponding octal number. 4

(*b*) Convert : 4

(*i*) $(53AB)_{16}$ to $( ? )_8$

(*ii*) $(6293)_{10}$ to $( ? )_4$

(*c*) Write the truth table of a full adder and the corresponding logic circuit with minimal number of logic gates. 8

(*d*) What do you understand by tristate device ? Explain with examples. 4

**Group C**

**9.** Answer the following : 10 × 2

(*i*) Justify the use of a shared bus for address, data and control signals.

(*ii*) Write at least two common characteristics of high level languages.

(*iii*) Give an example of macros used in language C.

(*iv*) Justify that an information system is more than a computer.

(*v*) Differentiate between syntax and semantic errors in a program.

(*vi*) Write the name of registers used for storing the base address of a page and a segment respectively in a computer system.

(*vii*) Write at least two differences between compiler and interpreters.

(*viii*) What is the difference between user and Kernel space ?

(*ix*) What do you mean by command line arguments ?

(*x*) What do you mean by payload in a TCP/IP packet format ?

# S'19:3FN:AN203/AD303 (1403)

## COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question (a, b, etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

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### Group A

1. Assume that each of two integer arrays $A$ and $B$ contains 100 integer values that have been sorted in ascending order. There are no duplicate values in either of the two arrays or between the two arrays.

   (*a*) Write an algorithm to merge the two arrays $A$ and $B$ into an array $C$ of size 200, such that C would contain the elements sorted in ascending order. 7

   (*b*) Represent your algorithm in part (*a*) in the form of a flow chart. 6

   (*c*) Write a C function named merge, that would implement the algorithm you have presented in part (*a*) of this question. 7

( Turn Over )

2. (*a*) Define the following terms pertaining to *E-R* diagrams, giving at least one example for each of them : Entity, attribute, role and relationship between the entities. 8

(*b*) Would the following function **swap** achieve swapping the values of the integer variables x and y in the calling program when called as **swap (x, y)** ? if not, change the function **swap** appropriately, so that it can achieve this objective. 7

```
void  swap (int a, int b) {
        int temp ;
        temp = a ;
        a = b;
        b = a;
}
```

(*c*) List some of the advantages of a supermarket storing a large collection of customer and their corresponding purchase data in a DBMS as compared to storing these data in a file. 5

3. (*a*) What do you understand by operator overloading in C++ ? Explain its use by using an example. 6

(*b*) How can information systems help individual managers make better decisions when the problems are non routine and constantly changing ? 6

(*c*) Construct an *E-R* diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. 8

4. (*a*) Briefly explain the working of electronic mail. 6

(*b*) Briefly explain how TCP protocol provides reliable communication between two hosts. 7



(*c*) What are the important components of a modern decision support system ? Represent the interconnection among these components using a block diagram. Explain the role of a decision support system using an example. 7

**Group B**

5. (*a*) What do you understand by cache memory ? What problem might occur if a computer does not have any cache memory, but large main memory and hard disk ? 6

(*b*) With the help of a block diagram explain how the basic components of computer system : processor, cache memory, main memory, hard disk, key board, display terminal are interconnected. 6

(*c*) Name the different phases in the execution cycle of a basic processor and briefly explain the operations carried out in each of these phases. 8

6. (*a*) What do you understand by an interrupt ? Briefly explain how an interrupt is handled by a processor. 6

(*b*) What do you understand by virtual memory ? Briefly explain how virtual address generated by a processor is translated into physical address. 7

(*c*) What do you understand by booting of a computer ? What are the main activities that are carried out by a computer during booting ? 7

7. (*a*) Perform the following hexadecimal operations : 6
(*i*) $5F + AB$ (*ii*) $CD + BE$.

(*b*) Convert the following two hexadecimal numbers into binary and decimal numbers : 6
(*i*) $9F$ and (*ii*) $E7$.

(*c*) What do you understand by file management ? Explain the organization of a file system using a suitable schematic diagram. 8

8. (*a*) Explain how data is stored and accessed from a hard disk. 6

(*b*) What is BIOS in DOS ? What is its role ? 6

(*c*) Write at least four important ways in which Windows operating system is different from the Unix operating system. 8

## Group C

9. For the following questions, choose the *correct* answer out of the options given : 10 × 2

(*i*) Which one of the following octal number would be obtained on converting the binary number 1010111 to a base 8 number ?

(*a*) 531

(*b*) 721

(*c*) 67

(*d*) 127

(*ii*) What will be displayed when the following C code segment is executed ?

```
int *a , b [5] = {1, 2, 3, 4, 5 };
a = b ;
printf ("%d, %d", *(b + 2), *(a + 3)) ;
```

(*a*) 3, 3

(*b*) 3, 4

(*c*) 2, 3

(*d*) 3, 5



(*iii*) Which of the following protocol is used to retrieve emails ?

(*a*) SMTP

(*b*) POP3

(*c*) FTP

(*d*) SNMP

(*iv*) Which one of the following most correctly describes the functionality of the control unit in a CPU ?

(*a*) To perform arithmetic operations based on decoded program instructions

(*b*) To store program instructions

(*c*) To perform logic operations based on decoded program instructions

(*d*) To generate control signals based on decoded program instructions

(*v*) Which one among the following is the smallest integer that can be represented in 2's complement form using 8-bits ?

(*a*) –256

(*b*) –128

(*c*) –127

(*d*) 0

(*vi*) In the memory hierarchy of a computer, which one of the following is the fastest memory ?

(*a*) SRAM

(*b*) DRAM

(*c*) Registers

(*d*) Flash memory

(*vii*) Which one of the following is not a characteristics of DRAMs ?

(*a*) High density

(*b*) Low cost

(*c*) High speed

(*d*) Volatile

(*viii*) A combinational logic circuit which sends data coming from a single source to two or more separate destinations is called which one of the following ?

(*a*) Decoder

(*b*) Encoder

(*c*) Multiplexer

(*d*) Demultiplexer

(*ix*) What is the binary representation of the decimal value 0·125 ?

(*a*) 0·11

(*b*) 0·01

(*c*) 0·001

(*d*) 0·011

(*x*) A file has size of 10 KBytes. What is the size of the file in bits ?

(*a*) 10,000

(*b*) 81,920

(*c*) 10,240

(*d*) 80,240

# W'19: 3FN: AN203/AD303 (1403)

## COMPUTING AND INFORMATICS

*Time : Three hours*

*Maximum Marks : 100*

*Answer* FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question (a,b,etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

### Group A

1. (*a*) (*i*) What is the difference between call by reference and call by value with respect to memory allocation ? Give a suitable example to illustrate using C code.

(*ii*) What is function overloading ? Write an example using C++ to illustrate the concept of function overloading.

(*iii*) Explain in brief the purpose of function prototype with the help of a suitable example.

(*iv*) Write a user defined function DIVT() which takes an integer as parameter and returns whether it is divisible by 13 or not. The function should return 1 if it is divisible by 13, otherwise it should return 0.

( *Turn Over* )

(*v*) Explain data hiding with an example. 2 × 5

(*b*) Write a function in C++ TWOTOONE() which accepts two array $X[\ ]$, $Y[\ ]$ and their size $n$ as argument. Both the arrays $X[\ ]$ and $Y[\ ]$ have the same number of elements. Transfer the content from two arrays $X[\ ]$, $Y[\ ]$ to array $Z[\ ]$. The even places (0, 2, 4...) of array $Z[\ ]$ should get the contents from the array $X[\ ]$ and odd places (1, 3, 5...) of array $Z[\ ]$ should get the contents from the array $Y[\ ]$.
Example : If the $X[\ ]$ array contains 30, 60, 90 and the $Y[\ ]$ array contains 10, 20, 50. Then $Z[\ ]$ should contain 30, 10, 60, 20, 90, 50. 5

(*c*) An array $X$ [−15.....10, 15.....40] requires one byte of storage for each element. If beginning location is 1500 determine the location of $X[15][20]$. 5

**2.** (*a*) What is E-R diagram ? Why use ER diagrams ? What are the components of the ER diagram ? Give an example of ER diagram. 10

(*b*) Write a function in C to calculate factorial of a given number using recursion. 5

(*c*) Explain the concept of Cartesian Product between two tables, with the help of appropriate example. 5

**3.** (*a*) Define following with example code/syntax in C++ : 10

- Object
- Class
- Inheritance
- Polymorphism
- Abstraction

(*b*) UPS prides itself on having up-to-date information on the processing and current location of each shipped item. To do this, UPS relies on a company-wide information system. Shipped items are the heart of the UPS product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination and final delivery date. Shipped items are received into the UPS system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g. flight, truck), and a deliveryRoute.
Please create an Entity Relationship diagram that captures this information about the UPS system. Be certain to indicate identifiers and cardinality constraints. 10

**4.** (*a*) (*i*) Write the difference between twisted pair and coaxial pair cable.

(*ii*) Define the following : Firewall and VoIP

(*iii*) What is cloud computing ?

(*iv*) Write two characteristics of Wi-Fi.

(*v*) What is the difference between E-mail and Chat ? 10

(*b*) Compare OSI model with TCP/IP model. Give meaning of each layer of TCP/IP model. 10

**Group B**

**5.** (*a*) Draw block diagram of a computer system and explain each block in brief. 10

(*b*) Describe cache architecture and memory hierarchy in a computer system. How many total bits are required for a direct-mapped cache with 16 KiB of data and 4-word blocks, assuming a 32-bit address ? 10

6. (*a*) Define following : Main memory, ALU, Operating system, Application program, Internet, Booting, Compiler, Registers, Program Counter, Interrupt. 1 × 10

(*b*) Describe the steps that transform a program written in a high-level language such as C into a representation that is directly executed by a computer processor. 10

7. (*a*) Perform following hexadecimal operation : 2 × 3

(*i*) $AB + 28$
(*ii*) C2 – A1

(*b*) Convert following hexadecimal number in 16-bit binary and 5-digit decimal numbers : 2 × 3

(*i*) 1FF3
(*ii*) C2C

(*c*) What are the different types of operating systems ? Write ten important features of windows operating system. 3 + 5

8. (*a*) Draw labelled structure of a hard-disk. Define rotational latency and seek time. 10

(*b*) Explain main memory management module of an operating system. 10

## Group C

9. Multiple Choice Questions : 10 × 2

(*i*) The term 'Pentium' is related to

V



(*a*) DVD
(*b*) Hard Disk
(*c*) Microprocessor
(*d*) Mouse

(*ii*) What does HTTP stands for ?

(*a*) Head Tail Transfer Protocol
(*b*) Hypertext Transfer Protocol
(*c*) Hypertext Transfer Plotter
(*d*) Hypertext Transfer Plot

(*iii*) What type of software creates a smaller file that is faster to transfer over the Internet ?

(*a*) Compression
(*b*) Fragmentation
(*c*) Encapsulation
(*d*) Unzipped

(*iv*) Which is NOT a key word of C language

(*a*) if
(*b*) else
(*c*) while
(*d*) in

(*v*) Data type 'char' of C language has size equal to

(*a*) one byte
(*b*) two byte
(*c*) two bit
(*d*) one bit

(*vi*) The word 'associative' is related with

(*a*) main memory
(*b*) cache memory

(*c*) hard disk
(*d*) microprocessor

(*vii*) LAN stands for

(*a*) Large area network
(*b*) Long area network
(*c*) Local area network
(*d*) Light area network

(*viii*) The property / properties of a database is / are :

(*a*) It is an integrated collection of logically related records.

(*b*) It consolidates separate files into a common pool of data records.

(*c*) Data stored in a database is independent of the application programs using it

(*d*) All of the above

(*ix*) Which is the equivalent decimal of a signed number $(11010010)_2$ represented in 8-bit 2's compliment binary form.

(*a*) –92
(*b*) –46
(*c*) –210
(*d*) 210

(*x*) BIOS used during

(*a*) Booting time
(*b*) Compile time
(*c*) Shutdown time
(*d*) Execution time