



WEST BENGAL STATE UNIVERSITY

B.Sc. Honours PART-I Examinations, 2018

COMPUTER SCIENCE-HONOURS

PAPER-CMSA-I

Time Allotted: 4 Hours

Full Marks: 100

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Answer Q. No. 1 and any five from the rest taking at least one from each group

1. Answer any **ten** questions from the following: 2×10 = 20
- (a) What do you mean by gray code?
 - (b) Convert the following to the other canonical form $F(x, y, z) = \Sigma(0, 1, 3, 6)$.
 - (c) What are the differences between intrinsic and extrinsic semiconductors?
 - (d) What do you mean by peak Inverse voltage?
 - (e) What is current amplification factor?
 - (f) What is self-bias?
 - (g) What is a Mini Super Computer?
 - (h) Perform $(233)_4 + (322)_4 = (?)_4$.
 - (i) What is the value of largest possible positive number, that can be stored in a computer that has 10-bit word length and uses 2's complement arithmetic?
 - (j) Using Boolean Identity prove $A\bar{B}C + B + B\bar{D} + AB\bar{D} + \bar{A}C = B + C$
 $(0.110111)_2 \times 2^5 - (0.1101)_2 \times 2^4 = (?)_2 \times 2^5$
 - (k) What are the disadvantages of 8421 code, than pure binary?
 - (l) What is Reverse Saturation Current?
 - (m) What is drift velocity?
 - (n) What do you mean by instruction cycle?
 - (o) Differentiate between Data and Information.

Group-A

2. (a) Draw a flowchart to find the LCM of three numbers. 4+4+5+3
- (b) What are the differences between machine language and assembly language?
 - (c) What is the need of Hamming code? Give suitable example.
 - (d) What do you mean by pseudo codes? Give example.

3. (a) Show diagrammatically, how a 2-input XOR gate could be achieved by connecting only Four (04) 2-input NAND gates. Mention the intermediate values obtained at each step. 4+5+2+5

(b) Find the values of the Boolean Variables A, B, C, D; by solving the set of simultaneous equations

$$AB = AC$$

$$\bar{A} + AB = 0$$

$$AB + A\bar{C} + CD = \bar{C}D$$

(c) Define a BUS.

(d) Make a comparative study between Super, Mainframe, Mini and Personal Computers.

Group-B

(Introduction to Basic Electronics)

4. (a) Why CMOS circuit has become more popular compared to NMOS/PMOS circuits? 3

(b) “The barrier potential across a p-n junction diode cannot be measured by placing a Voltmeter across the diode terminals.” – Explain. 4

(c) What is cut-in-voltage? Give its approximate value from a Germanium transistor and a Silicon transistor. 2+2

(d) Explain the operation of half wave rectifier with suitable diagram. 5

5. (a) In an OP-AMP why virtual ground is called virtual? 4+4+4+4

(b) Design and explain a differentiator circuit using OP-AMP.

(c) What are the differences between FET and transistor?

(d) Write short note on SCR.

Group-C

(Digital System Design)

6. (a) Distinguish between Synchronous and Asynchronous counter. 2+3+5+6

(b) Design a 16:1 multiplexer using only 4:1 MUX chips.

(c) Design a 4-bit adder-subtractor circuit using logic gates.

(d) Draw the circuit diagram of synchronous counter using JK flip-flop for the following sequence.

$$0 \rightarrow 3 \rightarrow 5 \rightarrow 7 \rightarrow 0 \rightarrow 3 \rightarrow 5 \rightarrow 7 \rightarrow \dots$$

7. (a) What is the main difference between a Decoder of a De-multiplexer? 3
(b) Differentiate between Latch and Flip-Flop. 3
(c) How an RS Latch could behave as a static RAM cell? 3
(d) What are Unipolar and Bipolar DACs? 2
(e) What are the advantages of Successive Approximation Approach of A/D Conversion? 2
(f) An 8-bit A/D converter is driven by a 500 kHz CLOCK. Find the maximum conversion time — 1.5×2
(i) If counter based approach is used.
(ii) If Successive-Approximation-Method is used.

Group-D

(Computer Organization)

8. (a) Differentiate between SRAM and DRAM. 3+5+8
(b) Draw a suitable diagram for Direct Memory Access (DMA) and explain its operation.
(c) What are the different addressing modes? Explain each with suitable example.
9. (a) What are the merits of using a PLA structure? 2
(b) What is the major problem of EEPROM, from the view point of erasing data? How the Flash Memory has overcome this limitation? (1.5+1.5)
(c) Make a brief comparison between Bit-Parallel and Bit-Serial organization of Associative Memory. 3
(d) Briefly discuss on write-through and write-back cache writing policies. (1.5+1.5)
(e) A computer has a main memory of 64 K × 16 and a cache Memory of 1 K (2+1.5+1.5) words. The cache uses direct mapping with a block size of 4 words.
(i) How many bits are there in the tag, index and word field of the address format?
(ii) How many bits are there in each word of cache?
(iii) How many blocks can the cache accommodate?

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WEST BENGAL STATE UNIVERSITY

B.Sc. Honours PART-I Examinations, 2018

COMPUTER SCIENCE-HONOURS

PAPER-CMSA-II-A

Time Allotted: 2 Hours

Full Marks: 50

The figures in the margin indicate full marks.

Candidates should answer in their own words and adhere to the word limit as practicable.

Answer Question No. 1 and any *three* questions from the rest taking at least *one* question from each group

1. Answer any *four* questions from the following: 2×4 = 8
- (a) What are the differences between malloc() and calloc()?
 - (b) What is O/P restricted Deque?
 - (c) What is the difference between variable declaration and definition in C?
 - (d) Write down the functionality of a cross compiler.
 - (e) Can we run a program without main()?
 - (f) How will you check the validity of an expression containing nested parentheses?
 - (g) 'A pointer is an unsigned integer variable' – Justify the statement.
 - (h) Define Bootstrap loader?

Group-A

2. (a) What are the phases of Compilation process? Among them which phase may not be considered as mandatory? Write in brief about this phase with a suitable example. 1+1+3
- (b) What are the advantages and disadvantages of Absolute loader? 3
- (c) Define Operating System. What are the basic tasks of an Operating System? 2+1
- (d) Distinguish between Linking loader and Linkage editor. 3
3. (a) Convert the following expression into prefix and postfix notation: 2+2
 $a * (b + d) / e - f * (g + h / k) .$
- (b) What is row-major and column-major ordering of an array? Explain with a suitable example. 5
- (c) What are the differences between recursion and iteration? 2
- (d) 'Recursion is a feature of operating system not of programming language' – Justify. 3
4. (a) Let $Z = (z_1, z_2, z_3, \dots, z_n)$ and $Z' = (z'_1, z'_2, z'_3, \dots, z'_m)$ be two single linked lists. 5
Write an algorithm to merge the two lists together to obtain the linked list
 $X = (z_1, z'_1, z_2, z'_2, z_3, z'_3, \dots, z_m, z'_m, z_{m+1}, \dots, z_n)$ if $m \leq n$ and
 $X = (a_1, b_1, a_2, b_2, a_3, b_3, \dots, a_n, b_n, b_{n+1}, \dots, b_m)$ if $m > n$. You cannot use any additional node.

- (b) Given a single circular linked list containing a set of data. Write an algorithm that finds the distance (number of nodes) between two given elements in the list. 4
- (c) Define Sparse matrix. Explain the concept of 3-tuple representation of Sparse Matrix with a suitable example. 5

Group-B

5. (a) What are the different Macros that can be used as a reference for the file pointer while using fseek(). 6
- (b) Would the following code compile correctly? Give reasons in support to your answer. 2

```
main()
{
#ifdef NOTE
    /*unterminated comment
    int a;
    a = 10;
#else
    int a;
    a=20;
#endif
    printf(“%d”.a);
}
```

- (c) What is recursion? How does it differ from normal function call in C? Describe the steps a C file goes through in order to get executed with a proper diagram. 2+4
6. (a) “C does not do boundary checking on the elements of an array”– Do you agree with this statement? Explain how an array reference is resolved by C. 5
- (b) What is the meaning of # include <stdio.h> and why this line is given in a C program? 3
- (c) Briefly describe different types of storage classes in C with suitable examples. 4
- (d) What do you mean by (·) and (→) operator in C with example. 2
7. (a) What do you mean by “Call by Value” and “Call by Reference”? 4
- (b) Explain the following: 3
- (i) rewind
- (ii) feof
- (c) What is null string? What is it’s length? 2+1
- (d) What is type casting? Explain it with suitable example. 4

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