WEST BENGAL STATE UNIVERSITY

B.Sc. Honours PART-I Examinations, 2017

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.

Answer Question 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 is the purpose of a decision table?

   (b) What is self-complementary code?

   (c) What are the disadvantages of K-Map method?

   (d) Using Boolean identities prove that

   $$A\overline{B}C + B + B\overline{D} + AB\overline{D} + \overline{A}C = B + C$$

   (e) Distinguish between level-triggered and edge-triggered flip flop.

   (f) What are the demerits of parity-error detection method?

   (g) What do you mean by special purpose registers? Give two examples.

   (h) What do you mean by tolerance of a Zeeman diode?

   (i) What is the significance of using the term 'Field Effect' in 'Field Effect Transistors (FET)'?

(j) Give an outline of the design of a transistor based inverter.

(k) What is flash memory?

(l) What is a Hybrid counter?

(m) What are the advantages of Register– Direct Addressing Mode?

(n) What is duty cycle?

(o) What are the differences between primary and secondary storage?

Group-A

(Computer Fundamentals)

2. (a) Draw a flowchart to find the second smallest of four numbers. 4

(b) What are the differences between weighted codes and non-weighted codes? 4

(c) 'The dual of exclusive-or is equal to its complement.' – Justify. 4

(d) Find the complement of the following Boolean function. 4

$$AB + AC'D + ABC + AB'C$$

3. (a) Minimize the following expression using K-map and implement the simplified expression using NAND gates only. 6

$$F(w, x, y, z) = \prod (0, 2, 3, 4, 8, 9, 10, 14)$$

(b) Write an algorithm to convert a decimal number into base 16. 4

(c) What do you mean by parity code? Comment on the error detection capability of parity code. 1+2

(d) Design a circuit that takes a 3-bit message and generates the even parity code of the message. 3

Group-B

(Basic Electronics)

4. (a) State Thevenin's theorem. 3

   (b) Explain the I/O characteristics of a transistor in CE mode. 5

   (c) Design an integrator circuit using Op-amp. 4

   (d) Write a short note on Schmitt trigger. 4

5. (a) Compare between a Half-Wave and a Full-Wave rectifier. 4

   (b) What are the advantages and disadvantages of a Bridge rectifier? 4

   (c) Define Ripple Factor (γ) and Rectification Efficiency (η). Find the values of γ and η for a Full-Wave rectifier. 6

   (d) What is Transformer Utilisation Factor (TUF) in connection of rectifiers? 2

Group-C

(Digital System Design)

6. (a) Design a code converter circuit to convert a 2, 4, 2, 1 code to its corresponding binary code. 6

   (b) Design a 4-bit Parallel Adder using Full-Adders. 3

   (c) If propagation delay of a Full-Adder is *d*, calculate the total time required to add two *n*-bit binary numbers using *n*-bit Parallel Adder. Is it possible to perform the same task with reduced time for large *n*? If so, how can it be possible? 1+1+5

7. (a) Define Setup time, Hold time and Propagation delay, in context of Flip-Flops. 5

(b) Mentioning its characteristic equation, realise a J-K Flip-Flop using D Flip-Flop and 2×1 MUX. 5

(c) Design a 4-bit synchronous counter with J-K Flip-Flop. 3

(d) Perform the conversion from D-Flip Flop to J-K Flip Flop. 3

Group-D

(Computer Organisation-I)

8. (a) Compare between RISC and CISC architecture. 4

(b) Explain the concept of virtual memory. 3

(c) How many address lines and data lines will be required for a memory of capacity 16K×8? If the starting address of the memory is $(10\ AB)_{16}$, what will be the ending address in Hex? 2+2

(d) What do you mean by instruction set completeness? 2

(e) Write a short note on USB. 3

9. (a) Describe the features of Von Neumann Computer with suitable diagram. 5

(b) What are the differences between Register stack and memory stack? 3

(c) What are the differences between SCSI and PCI? 2

(d) Explain the following addressing modes: 6

(i) Register indirect mode.

(ii) Indexed addressing mode.

(iii) Immediate mode.