2015

COMPUTER SCIENCE

[**Honours**]

PAPER – IV

Full Marks : 90

Time : 4 hours

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

GROUP – A

Answer any **two** questions : 15×2

1. (*a*) Draw and explain an one bit logic unit. 2 + 3

   (*b*) Impliment 4-bit adder-subtractor unit using XOR logic. 4

(*c*) Why CLA is called fast parallel adder ? 2

(*d*) What do you mean by logical shift unit ? Draw a 4-bit circular shift unit. 1 + 3

2. (*a*) Explain a method of translating virtual address to physical address. 5

(*b*) Explain the design of hardwired control unit. 5

(*c*) Explain, in detail, the principles of associative memory. 5

3. (*a*) Solve the recurrence relation :

$$f(n+1) = f(n) + f(n-1) + f(n-2),$$
$$f(0) = f(1) = f(2) = 1. \quad 5$$

(*b*) Twenty five girls and twenty five boys sit around a table. Is it always possible to find a person both of whose neighbors are girls ? 4

(*c*) How many diagonals does a 2007-gon have ? 2

(*d*) In a local store there are 8 different shirts, 7 different pairs of pants, and 3 different pairs

of shorts in your size. How many ways can you buy an outfit (a shirt and a pair of pants OR a shirt and a pair of shorts) ? 4

4. (*a*) What is memory controller ? For what type of semiconductor memory is it used ? What are its functions ? 1 + 1 + 2

(*b*) Write down the difference between static and dynamic RAMs. 3

(*c*) Write down the difference between PROM and E PROM. 3

(*d*) What is Booth's algorithm ? Write down of an 8 bit multiplier implementing the Booth's algorithm. 1 + 4

GROUP – B

Answer any **five** questions : 8 × 5

5. (*a*) Explain with simple block diagram DMA modes of data transfer. 2 + 3

(*b*) What do you mean by Polling ? 3

6. (*a*) Explain control word resistor bit pattern of IC 8255. 5

(*b*) Write a program for 8085 microprocessor to find largest number from a data array containing *n* number of data. 3

7. (*a*) What is interrupt ? 2

(*b*) Explain the bit patterns of SIM of 8085 microprocessor. 4

(*c*) Ordered the interrupt signal of 8085 μp according to the priority. 2

8. (*a*) If the clock frequency is 5 MHz, how much time is required to execute an instruction of 18 *t*-states. 4

(*b*) What is the role of clock in microprocessor ? 4

9. Design a 4-bit adder-subtractor circuit using full adder and explain. 8

10. What is bus arbitration ? Describe the centralized approach for bus arbitration with the help of diagram. 8

11. Why the lower order address bus is multiplexed with data bus ? How they will be demultiplexed ? 8

12. (*a*) What is recurrence relation ? 2

(*b*) What is the principle of Inclusion-Exclusion ? 4

(*c*) Write down the difference between RISC and CISC machines. 2

GROUP – C

Answer any **five** questions : 4×5

13. Find the generating function of the sequence,

1, 3, 3, 1, 0, 0, 0, 0, ... 4

14. (*a*) What is a carry lookahead adder ? 2

(*b*) What is coprocessor and what functions are performed by the coprocessors ? 2

15. Explain SIM and RIM instructions. 4

16. (*a*) What is fetch and execute cycle ? $1\frac{1}{2}+1\frac{1}{2}$

(*b*) What is op code ? 1

17. (*a*) What is tri-state buffer ? 2

(*b*) Draw a 3-bit bus structure using tri-state buffer. 2

18. (*a*) Why does DMA have priority over the CPU when both request a memory transfer ? 2

(*b*) What is the difference between INR and INX instruction ? 2

19. Explain with block diagram handshaking asynchronous data transfer technique. 4