2021

ELECTRONICS — HONOURS

Sixth Paper

Full Marks : 100

The figures in the margin indicate full marks.

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

Group - A

Answer ***question no.* 1** and ***any four*** questions from the rest, taking ***two*** from ***Unit*-I** and ***two*** from ***Unit*-II**.

1. Answer ***any five*** questions : 2×5

(a) What is meant by USB?

(b) What is a half-subtractor?

(c) What is a demultiplexer?

(d) What is race-condition in J-K flip-flop?

(e) What is a characteristic table for a flip-flop?

(f) What is a keyword in C?

(g) What is Ubuntu?

(h) What is a WAN?

Unit - I

(Digital Electronics II)

2. (a) Draw the circuit of a full-adder with basic gates and write its truth table.

(b) Draw the circuit and write the truth table for an octal to binary encoder. What is a priority encoder? (2+2)+(3+2+1)

3. (a) What is a BCD adder? Draw the block diagram and briefly explain the operation of a BCD adder.

(b) What is a multiplexer? (1+4+3)+2

4. (a) What is the difference between a combinational and a sequential circuit?

(b) What is the difference between a level-clocked and an edge-triggered flip-flop?

(c) Draw the circuit and write the truth table of an S-R flip-flop (i) with NAND gates and (ii) with NOR gates. How can you convert an S-R flip-flop to a D flip-flop? 2+2+(2+2+2)

5. (a) Draw the circuit and the timing diagram of a 3-bit asynchronous counter.

(b) Draw the circuit and explain the operation of a 3-bit R-2R digital-to-analog converter. (3+2)+(3+2)

Unit - II

(Introduction to Computers and C Programming)

6. (a) What is the importance of an operating system? Name a few operating systems. Explain the meaning of the following Linux commands: cd, su, echo, fsck.

(b) How is a hub different from a router? What is the difference between circuit-switched and packet-switched networks? (1+2+4)+(1+2)

7. (a) What is the difference between a high-level language and a low-level language? Give examples of each.

(b) What are logical operators in C? What would be printed on the screen when the following program segment is executed?

```
int i= -5;
if(i)
  printf("i=%d",++ i);
```

(c) Write a C program to find the real roots of a quadratic equation. (1+2)+(1+2)+4

8. What is an array in C? How do you declare and initialize a one-dimensional array in C? What are user-defined functions? What is meant by prototype declarations? Explain with examples, what is meant by 'passing by value' and 'passing by reference' in context of a function in C. What is the importance of including the `stdio.h` file in a C program? 1+2+1+1+3+2

Group B

Answer ***question no.* 9** and ***any four*** from the rest,
taking ***at least one*** from each of the ***Units*-I**, **II** & **III.**

9. Answer ***any five*** questions : 2×5

(a) What is a flag register?

(b) What are CALL and RET instructions?

(c) Name two instructions related to I/O mapped I/O interfacing.

(d) What is the role of the program counter?

(e) Where are handshake signals used?

(f) What does the signal $\overline{\text{INTA}}$ do?

(g) What are vectored interrupts?

(h) What are SID and SOD?

Unit - I

(8085 Microprocessor Architecture & Organization)

10. Draw the functional block diagram of the 8085 microprocessor. What is meant by a bus? Name the three different types of buses and their specific roles. 6+1+3

11. (a) What is a Stack and what is a Stack Pointer? What is meant by a LIFO stack? What does the instruction PUSH B mean?

(b) What do the following instructions do?

(i) LXI H 8000H (ii) CMP D (iii) DCX B (1+1+1+1)+(2×3)

Unit II

(Communicating with the 8085 Microprocessor)

12. Explain in brief the role of the following signals : *ALE*, $\overline{RD}$, $\overline{WR}$, $IO/\overline{M}$ and *HOLD*. 2×5

13. (a) Draw the timing diagram for the full instruction cycle corresponding to the execution of the instruction MOV B, C.

(b) List the number of op-code fetch/memory read/memory write machine cycles for the instructions: (i) RAL (ii) INR A (iii) LDA 9000H 4+(2×3)

14. How many bits do the data and address bus for the 8085 microprocessor carry and why? Why is the lower order address and data bus multiplexed? Explain with a schematic circuit diagram how it can be demultiplexed using a latch. 2+2+6

Unit - III

(Basic Concepts of 8085 Microprocessor Interfacing)

15. (a) What are the two types of I/O interfacing? Differentiate between the two.

(b) What is an interrupt signal? Write the different interrupt signals for the 8085 microprocessor in the order of decreasing priority. What is an interrupt service routine?

(c) What is DMA? (1+2)+(1+2+2)+2

16. What is meant by a programmable peripheral interfacing (PPI) device? Write a short note on the 8255A PPI device explaining its different modes of operation. 2+8