B.Sc. 3rd Semester (Honours) Examination, 2019 (CBCS)

Subject : Physics

Paper : CC-VII

Time: 2 Hours   **Full Marks: 40**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words
as far as practicable.

1. Answer *any five* of the following questions: 2×5=10

   (a) Mention four advantages of integrated circuits.

   (b) Differentiate between combinational logic circuit and sequential logic circuit.

   (c) Convert the hexadecimal number 1F1·99A into its equivalent binary and decimal numbers.

   (d) Verify the Boolean identity $A + \overline{A}B = A + B$.

   (e) Perform the following subtraction using 2's complement method:

   $48 - 23$

   (f) Define a register. Briefly explain how a shift register may be used to introduce a time delay into a system.

   (g) Consider a memory of size 8 words. Find the binary address of each location.

   (h) What are the demerits of IC technology?

2. Answer *any two* of the following questions: 5×2=10

   (a) Distinguish between active and passive circuit. Based on the scale of integration classify ICc. How do analog and digital ICs differ?   1+3+1=5

   (b) Consider two 4-bit numbers A and B with $B > A$. Verify that to subtract A from B it is only required to add $B, \overline{A}$ and 1. Indicate in simple form a 4-bit subtractor obtained from a full adder.   3+2=5

   (c) What is deflection sensitivity of a CRT? Derive an expression for the deflection sensitivity of a CRT using electro static deflection.   1+4=5

   (d) Write down the truth table of a three-input EX-OR gate. Hence explain its operation as a parity checker.   3+2=5

3. Answer *any two* of the following questions: 10×2=20

   (a) Explain how to modify a ripple counter so that it divides by N, where N is not a power of 2. Draw the block diagram of a decade ripple counter. Explain its operation.   3+3+4=10

18251   **Please Turn Over**

(b)   (i)   Minimize the following logic expression and realize using NAND gate

$$f(A, B, C, D) = \sum m(0, 1, 2, 3, 7, 8, 9, 10, 11, 12, 13)$$

    (ii)   A circuit has three inputs and one output. The output is 1 if any two of the three inputs are 1 and 0 for any other combination of the inputs. Write the output in terms of the inputs A, B, C. Draw a block diagram of this logic circuit.   (3+3)+(2+2)=10

(c)   What are the basic building blocks of a 8085 microprocessor? Briefly explain their functions. Briefly describe the addressing modes of a 8085 microprocessor. Write the contents of the registers of 8085 after the completion of the following commands: 'LDA 500H' and then 'MOVB,A'. Initially all the registers have OOH and at address 500H the data stored is 53H.

                                                  3+4+3=10

(d)   (i)   Explain the operation of decoder and Multiplexer.

    (ii)   Explain the operation of a BCD to decimal decoder.

   (iii)   Describe the operation of a priority encoder.   3+4+3=10

_____