B. Sc. Semester-III (Honours) Examination, 2020 (CBCS)
Subject: Physics
Paper: CC-VII

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

Answer any eight of the following: 8×5=40

1. What are the main parts of a CRO? What is the function of the sweep generator of a CRO? Briefly explain how the phase difference between two sine waves can be measured with the help of a CRO?

2. (a) A and B are two 8 bit binary numbers. Find the values of A-B and (-A-B) using 2's complement method for the following decimal values of A and B.
$$A=29, B=15.$$
(b) In a hypothetical number system, the sum of 12 and 34 is 101, where the magnitude of the symbols are given as $0<1<2<3<4$. Find the base of the number system.
(c) Draw the circuit diagram of a positive logic two input AND gate using diode and resistor and explain its operation.

3. (a) Obtain the logical expression, $Y = (A + BC)(B + \overline{C}A)$ in standard SOP and POS forms. (b) Plot a SOP form on a three variable Karnaugh map and simplify the expression.

4. (a). Give the logic symbol, truth table and Boolean expressions of a binary full adder. (b) Draw a logic circuit for adding two decimal numbers 7 and 12. Write down the result in binary.

5. What is an encoder? Give the block diagram of a decimal to BCD encoder. Explain with truth table how the decimal digits 0 to 9 can be encoded into BCD by using basic gates.

6. Modify an S-R flip-flop with two AND gates to form a J-K flip-flop. Give the truth - table and verify it. Convert a J-K flip-flop into a delay (D-type) unit.

7. (a). Draw the logic circuit of a Mod-5 counter that counts in the natural count sequence using JK flip-flops and NAND gate.
(b). Construct a 4 bit shift register from S-R flip-flops. Explain its operation as a serial in parallel out register. Give the timing waveforms.

8. Draw the circuit diagram of an IC 555 based astable multivibrator to get an output waveform with 50% duty cycle. Find out an expression for the frequency of the output wave. Show the relevant waveforms.

9. What is computer memory? Briefly discuss different types of internal memories of a computer.

10. How does a microprocessor perform 'Memory Read' operation? Write down the necessary instructions using mnemonic opcode and operand for an 8085 microprocessor in right sequence to perform the addition of two numbers 32H and 8AH, and to store the result in the microprocessor address 2050H. Write down the comments of each instruction.