

M.Sc.(Phy.) Semester - 3 (CBCS) Examination
Oct/Nov-2022 (NEW COURSE)
Analog and Digital Systems (Elective (New))

Time: 2:30 Hours**Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

-
- Q.1** Answer any seven questions. **14**
- (a) Discuss the advantages of an operational amplifier as compared to a transistor amplifier.
 - (b) Discuss schematic symbol of 8-pin mini DIP and label each pin.
 - (c) List the ideal op-amp parameters.
 - (d) Define filter. What are the different types of filters?
 - (e) What do you understand by open-loop and closed-loop configurations?
 - (f) Draw the circuit of the 4bit shift right register.
 - (g) What are the different types of analog-to-digital convertes?
 - (h) Draw the circuit of a binary half adder.
 - (i) Draw the circuit of a 2-input multiplexer.
 - (j) What is the MOD-number of twisted ring counter (Johson counter)?
- Q.2** Answer any two of the following. **14**
- (a) Discuss in detail, how the differential amplifier circuit can be fabricated from two emitter-biased circuits.
 - (b) Draw the block diagram of a typical op-amp and Discuss the function of each block.
 - (c) Briefly discuss designing steps of low pass filter. Design a low-pass filter at a cut-off frequency of 1kHz with a pass band gain of two with the necessary circuit and interpretation of the frequency response curve.
- Q.3** Answer the following questions. **14**
- (a) Explain the operation of successive approximation of ADC.
 - (b) Draw the circuit of a 4-bit ripple (asynchronous) counter using J-K flip-flops and Explain its operation with a truth table, state and timing diagram.
- OR**
- (a) Draw a circuit diagram of three open-loop op-amp configurations and derive necessary output voltage (V_o) equations.
 - (b) Define the following electrical parameters of an op-amp.
 1. CMRR
 2. Out-voltage swing
 3. Slew Rate (SR)
 4. Supply voltage rejection ratio (SVRR)
- Q.4** Answer any two of the following. **14**
- (a) Discuss the working of tracking ADC with a neat diagram. What is a tracking error?
 - (b) What are the steps of designing procedures for a combinational logic circuit? Explain designing of BCD-to-excess-3 code converter and sketch the logic circuit.
 - (c) Write a detailed note on the magnitude comparator which compares two 4-bit binary numbers.
- Q.5** Write a note on any two. **14**
- (a) Multiplexer and its applications.
 - (C) Zero-crossing detector
 - (b) Binary full subtractor
 - (D) Frequency response curves of active filters
