

M.Sc.(Phy.) Semester - 3 (CBCS) Examination
Oct/Nov-2021 (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.

Que.1 Answer any seven.**(14)**

- a) Which one is the fastest ADC? What is its conversion time?
- b) Draw the circuit of binary full adder by cascading two half adders
- c) Which of the following counters can be operated at higher clock frequency?
Ripple counter and synchronous counter
- d) Draw the circuit of 4-bit shift right register. Show that how a 4-bit binary number 1011 can be entered and retrieved serially?
- e) Define: Dynamic range of ADC
- f) Define operational amplifier and list the applications of an op-amp.
- g) Draw schematic symbol of 8-pin op-amp IC and label each pin.
- h) Define filter, what are the different types of filter.
- i) What do you understand by open-loop and closed-loop op-amp configurations?
- j) List the ideal op-amp parameters.

Que.2 Answer any TWO:**(14)**

- a) Discuss with neat diagrams designing steps of differential amplifier from two emitter-biased circuits.
- b) Draw block diagram of a typical op-amp and explain functioning of each block in brief.
- c) Discuss application of inverting configuration with feedback having three inputs V_a , V_b and V_c , as a summing, scaling and averaging amplifiers.

Que.3

- a) Define following electrical parameters of an op-amp. **(14)**
(i) CMRR (ii) Slew rate (iii) Band-width (iv) output resistance.
- b) Explain differential, inverting and non-inverting open-loop op-amp configuration with neat circuit diagrams and derive necessary output voltage (V_o) equations in terms of voltage gain (A) and input voltages (V_{in}).

OR

- a) A binary full adder circuit has three inputs: X_n , Y_n and previous carr C_{n-1} and two outputs SUM and CARRY. Design binary full adder circuit using all 2-input NAND gates
- b) Write a note on Look Ahead Carry generator to speed up the binary addition process.

Que.4 Answer any TWO:**(14)**

- a) Draw the circuit of synchronous BCD- counter and explain its operation with counting sequence and timing diagram.
- b) Explain the logic and operation of 8-bit successive Approximation ADC with neat diagrams.
- c) Draw circuit of 4x1 Multiplexer and show that how a Boolean function of three variables can be implemented with it.

Que.5 Write a note on any two:**(14)**

- a) Write a note on BCD to 7 segment decoder and driver
- b) With neat circuit diagram explain working of digital to analog converter (DAC) with R-2R ladder network.
- c) Frequency response curves of active filters.
- d) Discuss in detail non-inverting comparator.
