



HO-003-020305

Seat No. _____

M. Sc. (Physics) (Sem. III) (CBCS) Examination

May / June – 2017

PHYSICS : ET - 7

(Analog & Digital Systems)

Faculty Code : 003

Subject Code : 020305

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) Figures on right side indicates marks.

1 Attempt any seven : 14

- (a) Define :
- (i) CMRR
 - (ii) Slew rate
- (b) What do you understand by first order and second order filter circuit?
- (c) What are the characteristics of an ideal op-amp?
- (d) What do you mean by open-loop and closed loop op-amp configurations?
- (e) Compare transistor amplifier with operational amplifier.
- (f) Define : Resolution of ADC. What will be the dynamic range of 12-bit ADC?
- (g) Write Boolean expression for 2-input equivalence function.
- (h) Draw the circuit of 3-bit shift register.
- (i) What are the BCD codes ? Convert decimal number 8421 in BCD codes.
- (j) Sketch the circuit 3-bit synchronous binary counter.

2 Answer the following : (Any Two) 14

- (a) Discuss in detail, how differential amplifier, building block of an op-amp, can be designed from two emitter biased circuits.

- (b) Draw block diagram of a typical op-amp and discuss function of each block. Draw and label schematic symbol of 8-pin op-amp.
- (c) What are the open loop op-amp configurations? Derive output voltage equation for all such configurations with neat circuit diagram.
- 3** (a) Draw and discuss frequency response curves of different active filters. **14**
- (b) Discuss with necessary circuit diagram applications of non-inverting and inverting closed loop op-amp configurations as a summing/scaling/averaging amplifiers.
- OR**
- 3** (a) What are binary half and full adders ? Design the circuit of binary full subtractor and implement with AND-OR gates. **14**
- (b) Design and draw the circuit of 4-bit binary magnitude comparator.
- 4** Attempt any **Two** : **14**
- (a) Draw the circuit of asynchronous (ripple) decade counter and explain its operation with counting sequence and timing diagram.
- (b) Explain the logic and operation of tracking ADC with neat diagrams.
- (c) What are the applications of shift-registers ? Write note on types of Ring counters.
- 5** Attempt any **Two** : **14**
- (a) Design and implement BCD to Excess-3 code converter
- (b) Flash ADC
- (c) Analog comparator using operational amplifier
- (d) Voltage follower using operational amplifier.