



JBC-003-1203006 Seat No. _____

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

December – 2019

Physics : Paper - ET - 4

(Analog & Digital Systems) (New Course)

Faculty Code : 003

Subject Code : 1203006

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

[Total Marks : 70

Instructions :

- (1) All questions are compulsory.
- (2) Number on right margin indicates marks.

1 Attempt any seven : 14

- (a) Draw and label schematic symbol for the most widely used 8-pin mini DIP.
- (b) What do you mean by feedback ? What are the different types of feedback ?
- (c) Define RF and AF filters.
- (d) List ideal operational amplifier parameters.
- (e) Compare transistor amplifier and operational amplifier in brief.
- (f) What are types of analog to digital convertors ?
- (g) Draw the logic circuit of the following
Boolean expression : $F = A' \cdot B' + A \cdot B$
- (h) Draw the circuit of 4-bit shift right register using D-flip flops.
- (i) Draw circuit of MOD-10 ripple counter.
- (j) Convert decimal number 8421 in BCD code.

2 Answer the following : (Any two)

- (a) Define any seven electrical parameters of an operational amplifier. **7**
- (b) Draw block diagram of multi stage op-amp and discuss functioning of each block. **7**

- (c) Draw and discuss circuit diagram of three open loop Op-Amp configurations and derive necessary output (V_o) equation. 7
- 3 Answer the following : 7
- (a) Draw and explain voltage gain versus applied signal frequency curves of various active filters. 7
- (b) Discuss in detail, how closed-loop inverting configuration with three inputs, V_a , V_b and V_c , can be used as summing, scaling and a overaging amplifier ? 7
- OR**
- (a) A binary full Odder circuit has three inputs : X_n , Y_n and previous carry C_{n-1} and two outputs SUM and CARRY. Obtain Boolean expression for SUM and CARRY outputs. Implement full odder by using gates. 7
- (b) Design 4-bit magnitude comparator circuit which compares two binary numbers $A = A_0A_1A_2A_3$ and $B=B_0B_1B_2B_3$ and produces three outputs $A = B$, $A > B$ and $A < B$. Sketch the circuit neatly. 7
- 4 Attempt any two : 7
- (a) Draw the circuit of 4-bit synchronous counter and explain its operation. 7
- (b) Sketch a circuit of presettable binary counter and explain its functioning in detail. 7
- (c) Write brief note on ring counter and its applications. 7
- 5 Write a short note on any two : 14
- (a) Wien bridge oscillator.
- (b) Zero-crossing deteotor
- (c) Tracking analog to digital converter
- (d) Designing of code converter circuit : Binary coded decimal to Excess - 3.