



MBT-003-027403

Seat No. _____

M. Sc. (CEI) (Sem. IV) (CBCS) Examination

April / May - 2018

Op-Amp and its Applications : Paper - 15
(Old Course)

Faculty Code : 003

Subject Code : 027403

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

[Total Marks : 70

1 Answer the following questions in brief : (Any **Seven**) **14**

- (1) Draw and explain equivalent circuit of an operational amplifier.
- (2) Draw the circuit diagram of an integrator. Also explain its working.
- (3) Enlist characteristics of an ideal operational amplifier.
- (4) Draw the circuit diagram of a non-inverting amplifier with gain 3.
- (5) For a voltage follower using 741 (slew rate = $0.5V/\mu S$) operating at $\pm 10V$, determine maximum frequency that can produce distortionless output.
- (6) Explain working of an op-amp integrator in brief.
- (7) Design a first order low pass filter with $F_c = 500Hz$.
- (8) Enlist types of oscillators.
- (9) What is Q factor of a filter?
- (10) Define input bias current and input offset current.

2 Attempt any **two** of the following questions : **14**

(Each 7 Marks)

- (1) What is a filter? Explain design and working of wide-band bandpass filter. Design a bandpass filter with $F_L = 1000Hz$ and $F_H = 5000Hz$.

- (2) For voltage series feedback circuit, derive expressions for closed-loop voltage gain, input resistance, output resistance, bandwidth and total output offset voltage.
- (3) Derive expressions to calculate values of closed loop gain (A_F), input impedance (R_{iF}), output impedance (R_{oF}), bandwidth (f_F) and offset voltage (V_{OOT}).

3 Answer the following questions :

- (1) Explain working of a differential input differential output amplifier with help of neat diagrams. **5**
- (2) With neat diagram explain working of Wein-bridge oscillator. **5**
- (3) What is slew rate? What are the causes? Explain effect of slew rate in real applications of op-amp. **4**

OR

3 Answer the following questions :

- (1) Design a band-pass filter with $f_L = 800Hz$ and $f_H = 1000Hz$. Also calculate its Q factor and decide whether to follow narrow-band or wide-band design rules. **5**
- (2) Explain AC amplifier with single power supply with help of necessary diagrams. **5**
- (3) Explain the working of very high input impedance circuit. **4**

4 Answer the following questions :

- (1) Write a short note on peaking amplifier using op-amp. **5**
- (2) What is the working principle of an oscillator? Explain frequency stability. **5**
- (3) With appropriate circuit diagram explain any one application of instrumentation amplifier. **4**

5 Answer any **two** of the following questions : **14**

(Each 7 Marks)

- (1) Explain use of instrumentation amplifier in temperature indicator and controller.
 - (2) Write a detailed note on various open-loop configurations of an op-amp.
 - (3) Give a detailed account on voltage to current converter with floating and grounded loads.
 - (4) Classify oscillators. With help of neat diagrams explain working of quadrature oscillator.
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