Seat No. : _____

JH-126

June-2022

M.Sc., Sem.-II

410 : Physics

(Analog Electronics – I)

(New Course)

Time : 2 Hours] **[Max. Marks : 50**

Instructions : (1) **All** questions in Section – **I** carries equal marks.
(2) Attempt any **three** questions in Section – **I**.
(3) Question – **9** in Section – **II** is COMPULSORY.

Section – I

1. (A) What is Butterworth response ? Discuss first order high pass Butterworth filter. Write different steps for designing such filter. **7**

   (B) How are filters classified ? What is an all-pass filter ? Where and why is it needed ? **7**

2. (A) How IC723 positive voltage regulator works as a foldback current limiter and external current boost transistor ? Discuss. **7**

   (B) Define Voltage regulation. Explain IC723 high and low voltage regulators with suitable circuit diagram. **7**

3. (A) What is poles and zeros in Pole-Zero diagram ? Investigate and explain Pole-Zero diagram of single tuned amplifier and write its use. **7**

   (B) Obtain expression of bandwidth of tuned secondary FET amplifier with suitable circuit diagram. **7**

4. (A) With neat and clean diagram, discuss PLL briefly and clarify lock range and capture range from it. **7**

   (B) Discuss shunt-peaked video amplifier with maximally flat gain response curve and time delay factor. **7**

5. (A) What is power amplifier ? How it differs from a voltage amplifier ? What are the different classes of operation of power amplifiers ? Describe them briefly. **7**

(B) Draw circuit diagram of direct coupled resistive load Class - A power amplifier. Show that the maximum theoretical conversion efficiency of this amplifier is 25 %. **7**

6. (A) Draw a circuit diagram of an astable multivibrator using transistors and explain its operation with necessary waveforms. **7**

(B) (i) Write short note on: Cross over distortion **7**

(ii) Discuss advantages and disadvantages of single ended transformer coupled amplifier.

7. (A) Draw basic circuit of a phase shift oscillator using operational amplifier. Sketch the circuit waveforms, and briefly explain the circuit operation. Write the oscillating frequency equation. Discuss the amplifier gain requirements. **7**

(B) Explain application of operational amplifier as Differential bridge amplifier. **7**

8. (A) Draw the diagram for an Op-amp integrating circuit. Sketch the output waveforms produced by a rectangular waveform input to the Op-amp integrating circuit. Explain the output waveform. **7**

(B) Explain application of operational amplifier as

(i) voltage to current converter and

(ii) current to voltage converter. **7**

Section – II

9. Select correct answer from the given options : (Each question is of **ONE** mark) **8**

(i) Sample and hold circuits in analog to digital converters are designed to_____.

(A) sample and hold the output of the binary counter during the conversion process

(B) stabilize the comparator's threshold voltage during the conversion process

(C) stabilize the input analog signal during the conversion process

(D) sample and hold the D/A converter staircase waveform during the conversion process

(ii) A log amplifier has _____ in the feedback loop.

(A) A diode (B) A BJT

(C) A Resistor (D) Either a diode or a BJT

(iii) Root locus specifies the movement of closed loop poles especially when the gain of system_____.

(A) Remains constant (B) Exhibit variations

(C) Gives zero feedback (D) Gives infinite poles

(iv) How is the sinusoidal transfer function obtained from the system transfer function in frequency domain in pole-zero diagram ?

(A) Replacement of 'jω' by 's'

(B) Replacement of 's' by 'jω'

(C) Replacement of 's' by 'ω'

(D) Replacement of 'ω' by 's'

(v) In class C operation the Q point on dc load line is located

(A) approximately at the centre

(B) near cut off

(C) beyond cut off

(D) between cut off and centre

(vi) In an amplifying system a power amplifier forms the

(A) input stage (B) intermediate stage

(C) output stage (D) dc power supply

(vii) Which of the following statement/ statements is/ are correct for an Op-amp ?

(i) Its open loop gain is very high.

(ii) It is a non-linear circuit.

(A) (i) only (B) (ii) only

(C) (i) and (ii) both (D) None

(viii) Input for an oscillator circuit is obtained from

(A) an external source (B) a feedback network

(C) an amplifier (D) None