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Total Pages : 3

**015402**

**August/September 2022**

**B.Tech. (ENC/EEIOT) IVth SEMESTER**

**Analog Electronics Circuits (ECP-402)**

**Time : 3 Hours]**

**[Max. Marks : 75**

**Instructions :**

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

**PART-A**

1. (a) What are the factors affecting stability of operating point of a transistor? (1.5)
- (b) State Barkhausen criteria for sinusoidal oscillators. (1.5)
- (c) Why does gain of amplifier falls off at low frequencies? (1.5)
- (d) What is the basic difference between an FET and a BJT? (1.5)

015402/170/111/297

193 [P.T.O.]

- (e) The RC network of Wein bridge oscillator consists of resistors and capacitors of values  $R = 220 \text{ k}\Omega$  and  $C = 250 \text{ pF}$ . Calculate the frequency of oscillations. (1.5)
- (f) How CMRR influence the performance of an op-amp? (1.5)
- (g) Compare class A and class B amplifier. (1.5)
- (h) An OP-AMP circuit is to have a 10 kHz triangular output waveform with a 12 V peak to peak amplitude. Calculate the OP-AMP minimum SR (Slew Rate). (1.5)
- (i) What do you mean by a clamping circuit? (1.5)
- (j) What is the difference between active and passive filters? (1.5)

### PART-B

2. (a) Draw the circuit diagram of a bridge rectifier and explain its operation with wave-forms. Derive expression for its rectification efficiency and ripple factor. (7.5)
- (b) With the aid of circuit diagram, explain R-C coupled amplifier. (7.5)
3. (a) Describe the voltage divider biasing circuit in detail. Define the stability factor and calculate its value. (7.5)

- (b) The h-parameters of a transistor used in CE circuit are:  $h_{ie} = 1000 \Omega$ ,  $h_{re} = 10^{-4}$ ,  $h_{fe} = 50$  and  $h_{oe} = 10^{-4} \text{ mho}$ . The load resistor for the transistor is  $1000 \Omega$  in collector circuit. The transistor is supplied from a signal source of resistance  $1000 \Omega$ . Find the value of input impedance, output impedance, voltage gain. (7.5)

4. (a) Draw typical drain characteristics curves of a JFET. Explain the shape of these curves qualitatively. (7.5)
- (b) Draw and explain the operation of an op-amp as low pass filter. (7.5)
5. (a) Show that maximum collector efficiency of class A transformer coupled power amplifier is 50%. (7.5)
- (b) Draw schematic block diagram of the basic op-amp. Explain the significance of virtual ground in basic inverting amplifier. How would you explain its existence? (7.5)
6. (a) Explain with the aid of circuit diagram, the working of a transistor RC phase shift oscillator. (7.5)
- (b) Explain how OP-AMP can be used as a zero crossing detector. (7.5)
7. Write a short note on the following :
- (a) Voltage multiplier circuits.
- (b) Wein Bridge oscillator. (15)