2020-21

Time - 3 hours
Full Marks – 60

*Answer **all groups** as per instructions.*
Figures in the right hand margin indicate marks.
Candidates are required to answer
in their own words as far as practicable.

Group-A

1. Answer all questions. [1x8]

   a) The temperature coefficient of resistance of semiconductor is_____.

   b) The potential difference across the depletion region is known as _____ potential.

   c) A Zener diode is always _____ biased.

   d) Define cut off point.

   e) Which type of feedback in amplifier reduces output noise?

   f) The LED is _____ power device.

   g) An oscillator is _____ converter.

   h) The average input signal is known as _____ signal.

Group-B

2. Answer any eight of the following questions within two or three sentences each. [$1\frac{1}{2}$x8]

   a) What is step junction?

   b) Find the reactance of capacitor to the direct current.

   c) What is ripple factor?

   d) Draw the wave form of Input A.C. voltage and output D.C. voltage for a full wave rectifier.

   e) Find value of α if β=γ=20.

   f) Find emitter current in a transistor if β = 60 and I_b= 20 mA.

g) Name the different methods of biasing a transistor.

h) The gain of an amplifier is 200. If positive feedback is applied, gain increases to 500. Find the feedback fraction.

i) Determine the frequency of oscillation in an LC oscillator circuit if L = 60 μH and c = 200 PF.

j) What is an inverter?

GROUP-C

3. Write notes on any eight of the followings within 75 words: [2x8]

a) Explain the mechanism of current conduction in p-type semiconductor.

b) Find static resistance of a junction diode if 50 mA current flows through it for a forward voltage 2 Vat 300 K.

c) Find output DC voltage, if an input A.C. voltage 220 V is applied to a half wave rectifier through a transformer of transformer ratio 0.4.

d) What is Zener diode? Draw the equivalent circuit of an ideal Zener diode.

e) Establish the relation

$$I_c = \alpha I_E + I_{CBO}$$ for CB connection of transistor.

f) Find zero signal value of I_C for a germanium transistor with β=50 and R_B=250 kΩ in fixed bias method, Given V_{cc} = 12 V.

g) Discuss the advantages and disadvantages of RC coupled amplifier.

h) Prove that negative feedback improves the stability of gain.

i) Discuss the frequency response of an operational amplifier.

GROUP- D

4. Answer <u>any four</u> questions within 500 words each. [6x4]

a) What is LED? Explain the working of LED. Discuss the applications of LED.

b) Derive expression for barrier potential for a step junction.

c) Draw CE output characteristic and D.C. load line of a transistor Explain saturation point, cut off point and active region in CE output characteristic.

d) Discuss about construction and working of RC coupled two stage transistor amplifier.

e) Explain with the help of block diagram, the working of negative voltage series feedback amplifier. Discuss how negative feedback increases circuit stability.

f) With a neat circuit diagram, explain the working of Hartley oscillator. Derive the condition for sustained oscillation.

g) Discuss the operation of OP-AMP as –

   i) Integrator

   ii) Subtractor.

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