

2021

B.E. (Electronics and Communication Engineering)

Third Semester

EC-307: Electronic Devices and Circuits

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section. Use of scientific calculator is allowed.

x-x-x

Q1. Answer the following:-

- (a) What is Fermi level? (1)
- (b) What do you mean by thermal-runaway in a transistor? (1)
- (c) What are the applications of CB configuration? (1)
- (d) Discuss the importance of class AB amplifiers along with their applications. (1)
- (e) Why is it preferred to locate the Q point at the centre of the active region for amplification purpose? (1)
- (f) What is the frequency of oscillation of a Wein bridge oscillator? (1)
- (g) Mention the significance of h-parameters. (1)
- (h) What is the voltage gain of dual input balanced output differential amplifier? (1)
- (i) Why the transistor circuit require stabilization? (1)
- (j) In which region n-channel E-MOSFET will operate, if $V_{GS} = 5V$, $V_{T0} = 1V$ and $V_{DS} = 4V$? (1)

SECTION A

- Q2. (a) Define stability factor. Explain with circuit diagram of potential divider method of biasing in transistors. (5)
- (b) A transistor connected in CE configuration has the following h-parameters $h_{ic} = 2000\Omega$; $h_{re} = 1.6 \times 10^{-4}$; $h_{fe} = 50$; $h_{oc} = 50\mu A/V$. Determine: (5)
 - a) Input resistance b) current gain c) voltage gain
 The load resistance is $12k\Omega$ and source resistance is 500Ω .
- Q3. (a). Define stability factor. Explain with circuit diagram of potential divider method of biasing in transistors. (5)
- (b) Sketch and explain the CE output characteristic of NPN transistor. (5)
- Q4. (a) Derive the expressions for the operating point in terms of circuit parameters. (5)
- (b) Design a summing amplifier to add three dc input voltages. The output of this circuit must be equal to two times the negative sum of the inputs. (5)

SECTION B

- Q5. An amplifier with a negative feedback provides an output voltage of 5V with an input voltage of 0.2V. On removal of feedback, it needs only 0.1V input to give the same output. Find the following. (10)
 - a) Gain without feedback.
 - b) Gain with feedback.
 - c) Feedback ratio.
- Q6. (a) Draw the circuit diagram of a push-pull amplifier. Explain its operation. Discuss advantages and disadvantages. (5)
- (b) Draw the circuit of a common source FET amplifier. With the help of small signal equivalent circuit, analyze the amplifier for voltage gain and input admittance. (5)
- Q7. (a) Explain the principle of working of transistor Colpitts oscillator. Draw circuit diagram and briefly function of each component. (5)
- (b) Discuss the effect of emitter by-pass capacitor and shunt capacitor on frequency response of an amplifier. (5)

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