

**Total Pages—4**

**(Set-R<sub>1</sub>)**

**B.Tech-4th**  
**Electronics Circuits**

**Full Marks : 70**

**Time : 3 hours**

**Answer any six questions including Q. No. 1  
which is compulsory**

*The figures in the right-hand margin indicate marks*

1. Answer the following questions : 2×10
- (a) Draw a comparator circuit. How does such a circuit differ from a clipping circuit ?
  - (b) What is meant by the inverted mode of operation of a transistor ?
  - (c) Explain what is trans-conductance ' $g_m$ ' and amplification factor ' $\mu$ ' of a FET.
  - (d) Sketch the frequency response magnitude characteristics of an amplifier.
  - (e) State the Nyquist criterion for stability.

( Turn Over )

- (f) Define  $h$ -parameter of a transistor in a small signal amplifier. What are the benefits of  $h$ -parameters ?
  - (g) State Miller's theorem.
  - (h) What are the ideal characteristics of a basic operational amplifier ?
  - (i) For a particular op-amp, the input offset current is 20 nA while input bias current is 60 nA. Calculate the values of two input bias currents.
  - (j) Explain about common mode gain of the differential amplifier. State its ideal value.
2. (a) Draw and explain the equivalent circuit of BJT for CE configuration using  $h$  parameter model. 5
- (b) Find the voltage gain, current gain, input resistance and output resistance of CE configuration using  $h$  parameter. 5



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3. (a) Compare and contrast the four topologies of a feedback amplifier with respect to their characteristics and advantages. 5
- (b) Derive the expression for voltage gain of a voltage series feedback amplifier. 5
4. (a) Explain with a neat sketch about two stage RC coupled amplifier. 5
- (b) Differentiate the various types of amplifiers with their circuit diagrams. 5
5. (a) With a neat sketch, explain the working principle of transformer coupled class B power amplifier. 5
- (b) Explain the operation of series fed class A amplifier with resistive load. 5
6. (a) Enumerate Barkhausen criteria. 5
- (b) Draw and explain RC phase shift oscillator. Derive the expression for frequency of oscillations. 5

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7. (a) Sketch the small signal model of an FET and explain the significance of each element. 5
- (b) Draw a common-source  $n$ -channel JFET amplifier. Draw its small-signal equivalent circuit and explain why  $V_{DD}$  does not appear in the circuit. 5
8. (a) Explain the working of an op-amp using as a Schmitt trigger and mention its applications. 5
- (b) What is an integrator circuit with op-amp? Explain in detail. 5