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SARDAR PATEL UNIVERSITY

B.Sc. Examination Semester - 3

Subject : PHYSICS (US03CPHY22)

Subject title : Solid State Electronics.

Date : 04/01/2021 Time: 2 pm to 4 pm

N.B. : (i) All the symbols have their usual meanings. TOTAL MARKS : 70

(ii) Figurs at the right side of questions indicate full marks.

Que : 1 Answer the following MCQ with the correct option. (10)

1. For proper amplification, position of operating point on load line should be in _____ region
   (a) Near saturation (b) In cut-off (c) Middle of active (d) Near cut-off
2. The ____ point lies at the intersection of output charecteristics and dc load line.
   (a) junction (b) active (c) operating (d) none of these.
3. _____ h-parameter of CE transistor is measured in ohms.
   (a) h_{oe} (b) h_{ie} (c) h_{fe} (d) h_{re}
4. The unit of current gain is _____ .
   (a) volt (b) unitless (c) farad (d) ampere .
5. Multi – stage amplifier is also known as _____ amplifier.
   (a) mono (b) power (c) cascaded (d) current
6. The process of taking a part of output signal and feeding it back to input circuit is known as _____ .
   (a) feedback (a) buffering (c) modulation (d) amplification.
7. Using negative feedback _____ can be increases.
   (a) gain (b) noise (c) bandwidth (d) harmonic distortion.
8. Which oscillator uses capacitive- divider feedback circuit ?
   (a) Hartley (b) phase shift (c) colpitts (d) crystal
9. A typical JFET usually has _____ input resistane.
   (a) Zero (b) high (c) one (d) none of these.
10. JFET is _____ control device.
    (a) current (b) voltage (c) resistance (d) none of these.

Que : 2 Fill in the blanks. (08)

1. Transistors are used in _____ circuit to amplify the signal.
2. A_v X A_i is known as _____.
3. The circuit that generates an alternative voltage signal is called ____ .
4. The transconductance curve of JFET is a graph of I_D verses _____.

True OR False

5. Voltage divider circuit is also known as" independent of beta biasing circuit".
6. h_{ie} represent input resistance in h-parameters.
7. Feedback factor in phase shift oscillator $\beta = 1$
8. In CMOS , C stands for conductance.

Que : 3 Answer any TEN questions in short. (Each of two marks) (20)

1. What is operating point ? why it shift ?
2. Why fixed bias circuit is seldom used ?
3. Draw the circuit diagram of collector to base bias.
4. Draw single stage CE transistor amplifier circuit.
5. Define voltage gain and current gain .
6. Why multistage amplifier are required ?
7. Write the types of feedback networks.
8. Draw the block diagram of a series – voltage feedback network.
9. State and explain Barkhausen criterion.
10. Draw the transconductance curve of JFET.
11. Write briefly on use of JFET as automatic gain control.
12. Draw the circuit diagram of JFET as analog multiplexer.

Que. : 4 Long Answer questions. Write any FOUR from the following . (32)

1. Explain fixed bias circuit in detail with proper circuit diagram.
2. Explain determination of operating point of a voltage divider biasing circuit using approximate analysis method.
3. What is small signal amplifier ? Draw the circuit of singal stage CE transistor amplifier and the discuss the function of each components.
4. Define multi-stage amplifier circuit.Explain the need of multi-stage amplifier in detail and obtain its voltage gain.
5. State the advantages of negative feedback and discuss the effect of negative feedback on (i) gain and its stability (ii) input impedance.
6. What is an oscillator circuit ? Explain the constraction and working of Hartley oscillator.
7. With the the necessary circuit diagram explain JFET drain curve.
8. Write a note on Enhancement-Mode MOSFET.