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(6th Semester)

PHYSICS

TWELFTH (B) PAPER

(Advanced Electronics)

(Pre-revised)

Full Marks : 55

Time : 2½ hours

(PART : A—OBJECTIVE)

(*Marks : 20*)

The figures in the margin indicate full marks for the questions

SECTION—A

(*Marks : 5*)

Tick (✓) the correct answer in the brackets provided :

1×5=5

1. If the doping level of a diode is increased, the breakdown voltage

(a) remains the same ()

(b) is increased ()

(c) is decreased ()

(d) becomes zero ()

- 2.** At the base-emitter junction of a transistor, one finds
- (a) a reverse bias ()
 - (b) a wide depletion layer ()
 - (c) low resistance ()
 - (d) high resistance ()
- 3.** If the feedback fraction of an amplifier is 0.01, then the voltage gain with negative feedback is approximately
- (a) 500 ()
 - (b) 100 ()
 - (c) 1000 ()
 - (d) 5000 ()
- 4.** In a phase-shift oscillator, the frequency determining elements are
- (a) L and C ()
 - (b) R , L and C ()
 - (c) R and C ()
 - (d) C only ()
- 5.** As the modulation level is increased, the carrier power
- (a) is increased ()
 - (b) remains the same ()
 - (c) is decreased ()
 - (d) becomes infinite ()

SECTION—B

(Marks : 15)

Give very short answers to the following questions :

3×5=15

1. State and explain Kirchhoff's law.
2. Explain the action of Zener diode as a voltage regulator.
3. Why do we use h -parameters to describe a transistor?
4. What is the impact of negative feedback on noise in circuit?
5. What is the difference between high-level and low-level modulations?

(PART : B—DESCRIPTIVE)

(Marks : 35)

The figures in the margin indicate full marks for the questions

1. Draw the circuit diagram and vector diagram of Anderson bridge. Explain the working principles to obtain the balance condition. 2+5=7

OR

- (a) What are *p*- and *n*-type semiconducting materials? 2
- (b) Explain the working of a *p-n* junction diode under forward bias condition and define static and dynamic resistances. 5

2. Draw a circuit diagram and explain the working of full-wave rectifier using semi-conductor diode. Also calculate the average d.c. current through R_L and r.m.s. value of the current. 3+2+2=7

OR

Explain the working of an *N-P-N* transistor. Deduce the relation between β_{ac} and β_{dc} . 4+3=7

3. (a) Explain class-A power amplifier. How is power distributed in it? 3½
- (b) Discuss class-B amplifier and calculate its overall efficiency. 3½

OR

Derive the two equations for the hybrid equivalent circuit of a common-emitter transistor circuit. 7

4. Draw circuit diagram of Hartley oscillator. Explain how it operates. 7

OR

- (a) What is Barkhausen criterion for oscillation? 2
- (b) Distinguish between sinusoidal and non-sinusoidal oscillators. 2
- (c) What are the impacts of positive and negative feedback on input impedance? 3

5. What is MOSFET? Explain the principle and operation of enhancement MOSFET. 1+6=7

OR

What do you mean by amplitude modulation? Obtain expression for sideband frequencies in AM waves. 1+6=7

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