

2 0 1 8

(6th Semester)

PHYSICS

TWELFTH (B) PAPER

(Advanced Electronics)

(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. A Wien bridge oscillator uses _____ feedback.

- (a) only positive ()
- (b) only negative ()
- (c) both positive and negative ()
- (d) zero ()

2. Zener diode is used for

- (a) amplification ()
- (b) rectification ()
- (c) stabilization ()
- (d) producing oscillation in an oscillator ()

3. The phase difference between the input signal and output signal in a common-emitter amplifier is (in radian)
- (a) π ()
- (b) $\frac{\pi}{2}$ ()
- (c) 2π ()
- (d) 0 ()
4. Positive feedback is used in
- (a) amplifier ()
- (b) oscillator ()
- (c) rectifier ()
- (d) filter ()
5. The gate of the JFET is _____ biased.
- (a) reverse ()
- (b) forward ()
- (c) reverse and forward ()
- (d) zero ()

SECTION—B

(Marks : 15)

Give very short answers to the following questions :

3×5=15

1. Distinguish between *n*-type and *p*-type semiconductors on the basis of energy band diagram.
2. Explain the working of a half-wave rectifier using *p-n* junction diode with a suitable diagram.
3. What do you understand by transistor biasing and stabilization circuits?
4. Write three advantages of negative feedback.
5. Explain the UJT used as relaxation oscillator.

(PART : B—DESCRIPTIVE)

(Marks : 35)

The figures in the margin indicate full marks for the questions

1. (a) State and explain Kirchhoff's current and voltage laws. 3
(b) Explain the construction and working of Anderson bridge. 4

OR

- (a) Draw a typical current vs. voltage characteristic curve for a $p-n$ junction diode and explain qualitatively its main features. 4
(b) What are load line and Q -point of a $p-n$ junction diode? Draw the characteristic curve showing Q -point for a basic diode circuit containing one voltage source, a series resistance and a diode. 3

2. (a) Explain the working of an $n-p-n$ transistor and $p-n-p$ transistor. 6
(b) In a transistor, if $I_E = 5$ mA and $I_B = 0.1$ mA, what is the value of β ? 1

OR

Explain the working principle of a full-wave rectifier with a suitable diagram and also calculate the ripple factor of a full-wave rectifier. 7

3. (a) What are power amplifiers? Show that in a class B push-pull amplifier the power efficiency is 78.5%. 1+4=5
(b) Draw the power diagram of transformer-coupled class A power amplifier and locate its Q -point. 2

OR

- (a) What do you understand by hybrid parameters of a transformer? 2
(b) Draw a hybrid equivalent circuit of—
(i) common-emitter transistor;
(ii) common-base transistor.
Deduce an expression for voltage gain in common-emitter transistor. 5

4. (a) With mathematical expression, show how distortion is reduced in an amplifier with the application of negative feedback. 3
- (b) How does the negative feedback bring about change in input impedance of an amplifier? 4

OR

- (a) With a neat diagram, explain the working of monostable multivibrator. 5
- (b) Show that the switching time (time period) of an astable multivibrator is 1.38 times the product of R and C . 2
5. (a) Write two advantages and disadvantages of JFET. Explain in brief the output characteristics of JFET. 2+2=4
- (b) Compare MOSFET with JFET in terms of their characteristics. 3

OR

What do you mean by frequency modulation and demodulation? Using diode detector, explain demodulation of AM wave showing the circuit. 7
