



BCA/BEL : 105 (O)

2024

(1st Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : BEL : 105 (Old Course)

(Basic Electronics)

Full Marks : 70

Pass Marks : 45%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 45)

*The figures in the margin indicate full marks
for the questions*

1. (a) What is an inductor? Explain different types of inductor. 4
- (b) What is p - n junction diode? Explain the V - I characteristics of forward bias and reverse bias with suitable diagram. 5
- Or
- (c) Explain the mechanism of n -type semiconductor with suitable diagram. 5
- (d) What is a capacitor? Explain different types of capacitor. 4

2. (a) What is light-emitting diode (LED)? Explain the construction and working principle of LED with suitable diagram. 5
- (b) What is half-wave rectifier? Explain the construction and working principle of half-wave rectifier with diagram. 4

Or

- (c) What is full-wave rectifier? Explain the construction and working principle of full-wave rectifier with center-tapped transformer with suitable diagram. 5
- (d) What is a filter? Explain the different types of filter circuit. 4
3. (a) Explain the construction and working principle of JFET with diagram. 6
- (b) Derive the relation between α and β and prove that

$$\alpha = \frac{\beta}{\beta + 1} \quad 3$$

Or

- (c) Explain the construction and working principle of MOSFET with diagram. 6
- (d) Derive the relation between α and β and prove that

$$\beta = \frac{\alpha}{1 - \alpha} \quad 3$$

4. (a) Explain the construction and working of class B amplifier with diagram. 4

(b) What is amplifier? Explain the classification of amplifier. 5

Or

(c) Explain the construction and working of class AB amplifier. 5

(d) Write the differences between class A and class C amplifiers. 4

5. (a) What is an oscillator? Write the classification of oscillator. 4

(b) Explain the construction and working principle of *R-C* phase-shift oscillator with diagram. 5

Or

(c) Explain the working and construction of Hartley oscillator with neat diagram. 5

(d) Explain the construction and working of Colpitts oscillator with neat diagram. 4

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(1st Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : BEL : 105 (Old Course)

(Basic Electronics)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

1. Choose the most appropriate answer from the given options by putting a Tick (✓) mark in the brackets provided :

1×10=10

(a) In an intrinsic semiconductor, there are

- (i) no mobile holes ()
- (ii) no free electrons ()
- (iii) neither free electrons nor mobile holes ()
- (iv) equal number of free electrons and holes ()

(b) When reverse biased, the width of depletion layer in a *p-n* junction diode

- (i) decreases ()
- (ii) remains same ()
- (iii) increases ()
- (iv) reduces to half ()

- (c) State the respective ripple factor and efficiency of a full-wave rectifier.
- (i) 0.40, 80% ()
 - (ii) 1.21, 40.1% ()
 - (iii) 0.81, 48% ()
 - (iv) 0.48, 81.2% ()
- (d) The connection of a Zener diode in a circuit is always
- (i) positively biased ()
 - (ii) reverse biased ()
 - (iii) in series ()
 - (iv) forward biased ()
- (e) *p-n-p* transistors have a majority of charge carriers
- (i) holes ()
 - (ii) electrons ()
 - (iii) Both (i) and (ii) ()
 - (iv) None of the above ()
- (f) The base region of a *p-n-p* transistor is
- (i) very thin and heavily doped with holes ()
 - (ii) very thin and heavily doped with electron ()
 - (iii) very thin and lightly doped with holes ()
 - (iv) very thin and lightly doped with electron ()

(g) Based on the choice of the Q -point on the current-voltage characteristics of the transistor, the amplifiers are classified as

- (i) class I, II, III and IV ()
- (ii) class A, B, C and D ()
- (iii) class A, B, C and AB ()
- (iv) class IA, IB, IIA and IIB ()

(h) Which of the following classes has lowest efficiency?

- (i) Class A ()
- (ii) Class B ()
- (iii) Class C ()
- (iv) Class D ()

(i) As per Barkhausen criterion for oscillation, the magnitude of the loop gain $A\beta$ must be

- (i) less than 1 ()
- (ii) equal to 1 ()
- (iii) greater than 1 ()
- (iv) equal to 1.5 ()

(j) Crystal oscillator uses

- (i) silicon crystal ()
- (ii) germanium crystal ()
- (iii) crystal diode ()
- (iv) piezo-electric quartz crystal ()

2. State whether the following statements are *True (T)* or *False (F)* by putting a Tick (✓) mark : 1×5=5

(a) The process of adding pentavalent and trivalent impurities to a pure semiconductor is called mixing.

(T / F)

(b) Center-tapped transformer is used in full-wave rectifier using two diodes.

(T / F)

(c) Bipolar junction transistor is a current-controlled device.

(T / F)

(d) The purpose of a coupling capacitor in an amplifier is to provide dc isolation between amplifier and load.

(T / F)

(e) An oscillator is an electronic device which converts mechanical energy into electrical energy.

(T / F)

3. Answer the following questions in short : $2 \times 5 = 10$

- (a) Find the value of resistance whose color codings are yellow, violet, orange and silver.

(b) Write a short note on atomic theory.

(c) Write the differences between BJT and MOSFET.

- (d) Write the differences between positive and negative feedback amplifiers.

(e) What is Colpitts oscillator?
