

Faculty of Engineering / Science

End Semester Examination May 2025

EN3ES16 / BC3ES08 Basic Electronics Engineering

Programme	:	B.Tech. / B. Sc.	Branch/Specialisation	:	All
Duration	:	3 hours	Maximum Marks	:	60

Note: All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary.
 Notations and symbols have their usual meaning.

Section 1 (Answer all question(s))				Marks CO BL
Q1. In a PN junction, the depletion region is formed due to-				1 1 1
<input type="radio"/> Excess free electrons			1 1 1	<input checked="" type="radio"/> Majority carrier diffusion
<input type="radio"/> Minority carrier accumulation				<input type="radio"/> External voltage application
Q2. A clamper circuit-				1 1 1
<input type="radio"/> Converts AC to DC				<input type="radio"/> Clips the waveform
<input checked="" type="radio"/> Alters the DC level of the waveform				<input type="radio"/> Reduces the amplitude of the waveform
Q3. BJT is-				1 2 1
<input type="radio"/> A voltage-controlled device				<input checked="" type="radio"/> A current-controlled device
<input type="radio"/> A temperature-controlled device				<input type="radio"/> A forward-biased device
Q4. When a transistor is used as a switch, it operates in which of the two regions?				1 2 1
<input type="radio"/> Active and cutoff				<input checked="" type="radio"/> Cutoff and saturation
<input type="radio"/> Active and saturation				<input type="radio"/> Breakdown and cutoff
Q5. Which of the following is an example of a simplex communication system?				1 3 1
<input type="radio"/> Telephone				<input type="radio"/> Walkie-talkie
<input checked="" type="radio"/> Radio broadcasting				<input type="radio"/> Internet chat
Q6. In Pulse Amplitude Modulation (PAM), the information is carried by variations in-				1 3 1
<input type="radio"/> Pulse frequency				<input checked="" type="radio"/> Pulse amplitude
<input type="radio"/> Pulse width				<input type="radio"/> Pulse phase
Q7. What is the octal (base 8) equivalent of $(125)_{10}$?				1 4 1
<input type="radio"/> 157				<input checked="" type="radio"/> 175
<input type="radio"/> 271				<input type="radio"/> 225
Q8. How many AND, OR, and XOR gates are required for the configuration of a full adder?				1 4 1
<input type="radio"/> 2 AND, 1 OR, 3 XOR				<input type="radio"/> 1 AND, 2 OR, 1 XOR
<input type="radio"/> 3 AND, 1 OR, 2 XOR				<input checked="" type="radio"/> 2 AND, 1 OR, 2 XOR
Q9. Voltage can be measured using a CRO by-				1 5 1
<input checked="" type="radio"/> Measuring the vertical displacement of the waveform				<input type="radio"/> Measuring the horizontal displacement of the waveform
<input type="radio"/> Checking the beam brightness				<input type="radio"/> Counting the number of waveforms
Q10. _____ provides different types of waveforms such as sine, triangular, square, and pulse at the output.				1 5 1
<input type="radio"/> CRO				<input type="radio"/> Multimeter
<input type="radio"/> Oscillator				<input checked="" type="radio"/> Signal generator

Section 2 (Answer all question(s))**Marks CO BL****Q11.** Write the diode current equation and explain the terms.

2 1 2

Rubric	Marks
Write the diode current equation-1 M,explain the terms-1 M	2

Q12. Compare a PN junction diode and a Zener diode in terms of construction, working, and applications.

3 1 2

Rubric	Marks
construction-1 M,working-1M,application-1M	3

Q13. (a) Explain half-wave rectifier and full-wave rectifier based on the following points:

5 1 3

- Working and circuit diagram
- Ripple factor, number of diodes, peak inverse voltage (PIV), and efficiency

Rubric	Marks
Working and Circuit Diagram-3M, Ripple Factor, Number of Diodes, Peak Inverse Voltage (PIV), and Efficiency -2	5

(OR)

(b) With a suitable diagram, explain the working of a PN junction diode under zero, forward, and reverse bias conditions with its V-I characteristics.

Rubric	Marks
working of a PN junction diode under forward and reverse biasing conditions.-3M, V-I characteristics -2M	5

Section 3 (Answer all question(s))**Marks CO BL****Q14.** Discuss the BJT under the following points:

4 2 1

- Types of BJTs with their symbolic representation
- Names of BJT configurations
- Names of BJT modes of operation

Rubric	Marks
Types of BJTs with their symbolic representation -2M, Names of BJT configurations -1M, Names of BJT modes of operation -1M	4

Q15. (a) Explain the NPN common-base configuration in active mode. Draw its circuit diagram showing the flow of current, and sketch the input and output characteristics, indicating all regions.

6 2 2

Rubric	Marks
Explain the NPN common-base configuration in active mode -3M, Draw its circuit diagram showing the flow of the current -2M, sketch the input and output characteristics, indicating the active, cutoff, and saturation regions -1M	6

(OR)

(b) Explain N-channel JFETs, including their construction, working, charge carrier, and symbolic representation.

Rubric	Marks
construction and working -4M, charge carriers, and symbolic representation -2M.	6

Section 4 (Answer all question(s))**Marks CO BL**

Q16. Why is modulation necessary in communication systems? Explain any four reasons.

4 3 2

Rubric	Marks
four reasons -4M	4

Q17. (a) Draw and explain the block schematic of a basic communication system. Also, differentiate between half-duplex and full-duplex communication with suitable applications.

6 3 3

Rubric	Marks
Draw -1M, explain the block schematic of a basic communication system -3M, differentiate between half-duplex and full-duplex communication with suitable applications -2M.	6

(OR)

- (b)** Compare Amplitude Modulation (AM), Frequency Modulation (FM), and Phase Modulation (PM) based on principle (with diagram), bandwidth, and modulation index. Also, state and explain the sampling theorem.

Rubric	Marks
Compare Amplitude Modulation (AM), Frequency Modulation (FM), and Phase Modulation (PM) based on principle (with diagram), bandwidth, and modulation index -4M, state and explain the Sampling Theorem. -2M.	6

Section 5 (Answer all question(s))

Marks CO BL

Q18. Compare BCD, excess-3, and gray code with suitable examples. Simplify: $A+AB+A'+B$ using Boolean laws.

4 4 2

Rubric	Marks
Compare BCD, Excess-3, and Gray Code with the example -2M, Simplify: $A+AB+A'+B$ using Boolean laws -2M.	4

Q19. (a) Design and explain the working of a half adder and a full adder using logic diagrams and truth tables.

6 4 3

Rubric	Marks
working of a half adder using logic diagrams and truth tables -2M, working of a full adder using logic diagrams and truth tables -4M.	6

(OR)

- (b)** Simplify the Boolean function $F(A, B, C, D) = \Sigma(0,1,2,5,6,9,10,13,14)$ using a 4-variable Karnaugh Map (K-map). Draw the minimized expression using logic gates.

Rubric	Marks
Boolean function $F(A, B, C, D) = \Sigma(0,1,2,5,6,9,10,13,14)$ using a 4-variable Karnaugh Map -4M, Draw the minimized expression using logic gates -2M.	6

Section 6 (Answer any 2 question(s))

Marks CO BL

Q20. Draw and explain the block diagram of a cathode ray oscilloscope (CRO).

5 5 2

Rubric	Marks
Draw -2M, explain the block diagram -3M.	5

Q21. What is a multimeter? Explain its working principle and describe how a multimeter can measure voltage, current, and resistance. What precautions should be taken while using it? **5 5 2**

Rubric	Marks
What is a multimeter? Explain its working principle -3M, Describe how a multimeter can measure voltage, current, and resistance -1M, What precautions should be taken while using it? -1M.	5

Q22. Describe the construction and working of a cathode ray tube (CRT) in a CRO with a diagram. **5 5 2**

Rubric	Marks
Describe the construction and working of a Cathode Ray Tube (CRT) -3M, CRT in a CRO with a diagram -2M.	5
