

**SESSIONAL EXAMINATION-I
ODD SEM, 2023-2024**

Branch: Computer Science and Engineering	Batch: 2023, Semester: 1st
Course Title	Course Code
ID. No. of Student	Max. Marks
2 3 1 1 9 8 0 1 6 0 9	Max Duration

Instructions:

- Attempt questions in order.
- Students not to write anything on question paper.
- Use of calculator is allowed

Course Learning Outcomes:

CLO-1	Understand basic construction, operation of semiconductor diodes and their applications in various electronic circuits
CLO-2	Understand basic operation of BJT and its different configurations
CLO-3	Acquire the knowledge of Binary arithmetic, logic expressions and logic gates
CLO-4	Understand and recognize the primary functions of IC-555 such as multivibrator/ timer circuit
CLO-5	Familiarize with basic characteristics of IoT devices.

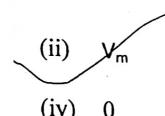
SECTION - A

(All Questions are Compulsory, Each question carries 01 mark) (5x1=5)

Peak Inverse Voltage of bridge wave rectifier is

1. (i) $V_m/2$

(iii) $2V_m$



CLO-1

In a half-wave rectifier, diode conducts current for _____ radian.

2. (i) π

(ii) 2π

(iii) $\pi/2$

(iv) None of these

CLO-1

When the Negative terminal of the battery is connected to cathode and the positive terminal of the battery is connected to Anode, then it is known as

3. (i) Unbiased

(ii) Forward biased

(iii) Reverse biased

(iv) Zer biased

CLO-1



- What level of doping is seen in Zener diode
4. (i) No doping
 (ii) Moderately doped
 (iii) Heavily doped
 (iv) Lightly doped

CLO-1

- Which of the following diode is used to detect the optical signal
5. (i) Zener diode
 (ii) Tunnel diode
 (iii) Varactor diode
 (iv) Photodiode

CLO-1

SECTION - B
(Attempt any 5 questions, each question carries 02 marks) (5x2=10)

Name the component shown in the following figure. Define its working principle using circuit diagram.

6.



CLO-1

7. Draw the V-I characteristics of PN Junction when Reversed biased. CLO-1
8. How to get P-type and N-type Semiconductor on the basis of Covalent bond formation? CLO-1
9. What is the importance of Maximum forward current in a PN junction diode? CLO-1
10. Which diode is known as Varicap and Why? CLO-1
11. Explain majority and minority carriers in a semiconductor. CLO-1

CLO-1

SECTION - C

(Attempt any 3 questions, each question carries 5 marks) (3x5=15)

12. As Avalanche breakdown occurs in PN junction diode while Zener breakdown occurs in Zener diode. What makes both the breakdowns different from each other. Give at least five reasons. CLO-1
13. Demonstrate with the help of circuit diagram how Zener diode helps to regulate the voltage. CLO-1
14. Elaborate the working principle of a centre tap full wave rectifier with the help of a neat and well labelled circuit diagram as well as input/output waveform. CLO-1
15. How does energy band structure of a semiconductor differ from that of a conductor and an insulator? Explain all of them with the help of their energy band diagram CLO-1

CLO-1

SECTION - D

(Attempt any one question, each question carries 10 marks, subparts (if any) carry equal weightage) ($1 \times 10 = 10$)

- In half wave rectifier, the rectifying diode has a forward resistance of $100\ \Omega$ which is conducting during one half of the applied ac voltage of 300 V peak value. A rectifier has a resistive load of $2000\ \Omega$.
16. Calculate: Peak value of current, Average value of current, RMS value of current, DC power and AC input power. CLO-1
17. Show the formation of PN junction diode. Illustrate the working operation of a PN Junction diode under Forward biased condition using relevant circuit diagram. Also explain and draw the V-I Characteristics of a diode under forward bias. CLO-1

SESSIONAL EXAMINATION-II
ODD SEM, 2023-2024

Branch: Computer Science and Engineering	Batch: 2023, Semester: 1st
Course Title	Course Code
ID. No. of Student	Max. Marks
2 3 1 1 9 8 2 8 0 9	Max Duration

Instructions:

- Attempt questions in order.
- Students not to write anything on question paper.
- Use of calculator allowed.

Course Learning Outcomes:

CLO-1	Understand basic construction, operation of semiconductor diodes and their applications in various electronic circuits
CLO-2	Understand basic operation of BJT and its different configurations
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SECTION - A

(All Questions are Compulsory, Each question carries 01 mark) (5x1=5)

1. Which of the following is a Universal gate? (ii) AND CLO-3
 (i) OR
 (iii) NAND (iv) XOR
2. Transistor acts as an amplifier when emitter base junction is _____ biased and Collector base junction is _____ biased. (ii) Forward, forward CLO-2
 (i) Reverse, reverse
 (iii) Reverse, forward (iv) Forward, reverse
3. Conduction in bipolar junction transistor occurs due to _____ (ii) Minority carriers CLO-2
 (i) Majority carriers
 (iii) Majority and minority carriers (iv) none
4. Base of hexadecimal number system is _____ (ii) 8 CLO-3
 (i) 2
 (iii) 10 (iv) 16
5. Minimum number of bits required to represent 13 decimal in binary are (ii) 3 CLO-3
 (i) 2
 (iii) 4 (iv) 5

SECTION - B

(Attempt any 5 questions, each question carries 02 marks) (5x2=10)

6. Transistor is termed as bipolar junction transistor. What is the significance of the word Bipolar? CLO-2
7. Compare the universal gates on the basis of their logic symbol, Boolean expression and truth table. CLO-3
8. Transistor has different regions of operation according to the biasing done at emitter base and collector base junction. Justify this statement. CLO-2
9. Perform the binary addition $1011011 + 1011101$. CLO-3
10. A safety system uses three inputs to a logic circuit. An alarm, X, sounds if input A represents ON and input B represents OFF; or if input C represents OFF. Predict the Boolean expression and a logic circuit to show the conditions which cause the output X to be 1. CLO-3
11. Subtract 1010 from 1111 using 1's complement method. Show direct subtraction for comparison. CLO-3

SECTION - C

(Attempt any 3 questions, each question carries 5 marks) (3x5=15)

12. Draw and explain the working of a Bridge Rectifier with the help of circuit diagram. Also draw the input and output waveform. CLO-1
13. What are the three types of transistor amplifier Configurations? Draw the circuit diagrams with proper labelling for common base and common collector configuration for NPN transistor. CLO-2
14. Three binary numbers given are: 1110101, 1011110, 1010011
 Evaluate the following statements on the basis of data given above
 - (a) Add the two smaller numbers
 - (b) Add the two larger numbers
 - (c) Take the smallest number away from the largest number
 - (d) Add together all three numbers
 CLO-3
15. Implement the given Boolean expression using basic logic gates
 1. $F = ABC + A'BC + A'B'C'$
 2. $F = A'B'CD + BCD$
 CLO-3

SECTION - D

(Attempt any one question, each question carries 10 marks, subparts (if any) carry equal weightage) (1x10=10)

16. Investigate the regions of operation for a NPN transistor amplifier if the emitter terminal of the transistor is grounded, base terminal is used for input and the collector terminal is used as output. With the help of a proper well labelled biasing circuit diagram, plot the input and output characteristics of transistor amplifier. CLO-2
17. Determine the following:
 - a. $11011011 - 10110100$ using 2's compliment. Show direct subtraction for comparison.
 - b. 10010010×10001001
 - c. $(111011010111)_2 = (\underline{\hspace{2cm}})_8 = (\underline{\hspace{2cm}})_{16} = (\underline{\hspace{2cm}})_{10}$
 - d. $(7F6D)_{16} = (\underline{\hspace{2cm}})_8 = (\underline{\hspace{2cm}})_2 = (\underline{\hspace{2cm}})_{10}$
 CLO-3

SESSIONAL EXAMINATION-III
ODD SEM, 2023-2024

Branch: Computer Science and Engineering	Batch: 2023, Sem: 1st
Course Title	Course Code
ID. No. of Student	Max. Marks
2 3 1 1 9 8 1 6 0 9	Max Duration
	90 Minutes

Instructions:

- Attempt questions in order.
- Students not to write anything on question paper.
- Use of calculator allowed.

Course Learning Outcomes:

CLO-1	Understand basic construction, operation of semiconductor diodes and their applications in various electronic circuits
CLO-2	Understand basic operation of BJT and its different configurations
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CLO-4	Understand and recognize the primary functions of IC-555 such as multivibrator/ timer circuit
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SECTION - A

(All Questions are Compulsory, Each question carries 01 mark) (5x1=5)

1. The energy bandgap of silicon material is CLO-1
 (i) 0.3 eV
 (ii) 0.7 eV
 (iii) 1.12 eV
 (iv) 0.72 eV
2. Barrier potential in a PN junction is caused by CLO-1
 (i) Diffusion of majority carriers across the junction
 (ii) Thermally generated carriers
 (iii) Flow of drift current
 (iv) Migration of minority carriers across the junction
3. 2's complement of $(101100)_2$ is _____ CLO-3
 (i) 010011
 (ii) 010101
 (iii) 010100
 (iv) 010010

4. On the basis of De Morgan's Theorems which expression is correct?
 (i) $(B'+C)' = B + C$ (ii) $(B'+C)' = B' + C$
 (iii) $(B'+C)' = B \cdot C$ (iv) $(B'+C)' = B \cdot C'$
5. Identify, which of the following is the 6th pin of IC-555
 (i) Control Voltage (ii) Reset
 (iii) Threshold (iv) Output

CLO-4

SECTION - B
(Attempt any 5 questions, each question carries 02 marks) (5x2=10)

CLO-1

6. Name the component shown in the following figure. Define its working principle using biasing diagram.



CLO-3

7. Underline the names of logic gates which give HIGH output when logic levels at their two inputs are not same.

- a. NAND gate
- b. NOR gate
- c. XOR gate
- d. XNOR gate

8. Outline the significance of knee voltage for a PN-junction diode. Write the value of knee voltage for both Silicon and Germanium diodes.

CLO-1

9. Draw logic diagram using basic gates for the following expression.

CLO-3

$$Y = (A' B) + (B' + C)$$

10. Compare CB and CE configurations of transistor on the basis of current gain and voltage gain.

CLO-2

11. Write the definition of IoT and its two key characteristics.

CLO-5

SECTION - C

(Attempt any 3 questions, each question carries 5 marks) (3x5=15)

12. Separate Emitter, base & Collector regions of transistor on the basis of doping level and construction size. Describe the working of PNP transistor by showing currents in the biasing diagram.

CLO-2

13. Solve the following conversions:

- i. $(2A7)_{16} = (\quad)_{10} = (\quad)_8$
- ii. $(110111)_2 = (\quad)_{10} = (\quad)_{16} = (\quad)_2$

CLO-3

14. A Silicon diode is connected in Reverse Bias and with the increase of R.B voltage, junction breakdown occurs. How comparison can be made between Zener and Avalanche breakdown for R.B diode. CLO-1
15. A speaker is producing a continuous beep in a project based on IC-555. Select the mode of operation out of following in which project is working. CLO-4
- Astable
 - Monostable
 - Bistable

Elaborate the working of IC-555 in above selected mode using functional block diagram.

SECTION - D

- (Attempt any one question, each question carries 10 marks, subparts (if any) carry equal weightage) ($1 \times 10 = 10$)
16. (a) A project engineer wants to make choice between center-tapped and bridge rectifiers for his project. Which rectifier he should prefer and why? Write two advantages. Outline detailed working of suggested rectifier using its circuit diagram and input-output waveforms. CLO-1 (Marks-7)
- (b) Calculate the values of peak, average and rms current for a half-wave rectifier when 320 V peak alternating voltage is applied to the circuit. Resistive load of $500\ \Omega$ is connected with Silicon diode in the circuit. (Marks-3)
17. A transistor is working in Saturation and Cut-off regions. Examine the biasing combination of its two junctions for both the regions. Draw labelled active biasing circuit diagrams of NPN transistor in CB and CE configurations and plot input and output characteristics in CE configuration. CLO-3

END TERM EXAMINATIONS
ODD SEM, AY: 2023-2024

School/Branch	SOET/CSE	Batch: 2023, Semester: Ist	
Course Code	23EC001/EC101	Course Title	Basics of Electronics Engineering
ID. No. of Student	8 3 1 1 9 8 1 6 1 9	Max. Marks	60
		Max Duration	3 Hours

Instructions:

- Attempt questions in order.
- Students not to write anything on question paper.
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Course Learning Outcomes:

CLO-1	Understand basic construction, operation of semiconductor diodes and their applications in various electronic circuits.
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SECTION – A

(Questions 1 to 5 has four choices, out of which only one is correct, no negative marking for incorrect answer, each question carries 01 mark) (5x1=5)

1. Which of the following diode conducts in forward bias condition only?

a) Varactor diode	b) Light emitting diode	CLO-1
c) Zener diode	d) Photo diode	
2. In _____ almost all the electrons are in the valence band and the conduction band is almost empty.

a) Conductor	b) Semiconductor	CLO-1
c) Insulator	d) None of these	
3. In bipolar junction transistor, the operation depends on the interaction of _____ carriers.

a) Majority	b) Minority	CLO-2
c) Both majority and minority	d) Only electrons	
4. The base or radix of octal number system is _____.

a) 2	b) 8	CLO-3
c) 10	d) 16	
5. Which of the following logic gate is a universal gate?

a) OR	b) AND	CLO-3
c) XOR	d) NOR	

SECTION - B

- (Attempt any 5 questions, each question carries 02 marks) (5x2=10)
6. Draw the energy band diagram for conductor, insulator and semiconductor, clearly depicting the forbidden energy gap. CLO-1
 7. Bipolar junction transistor is a three terminal electronic device. What is the significance of the word bipolar in it? CLO-2
 8. Logic gates are the basic building blocks of any digital circuit. Draw the symbol and truth table of a gate which gives **high** at the output when both the inputs are same otherwise **low**. Also write its Boolean expression. CLO-3
 9. Perform $11001101 - 10010110$, using 2's compliment CLO-3
 10. Draw a well labelled I-V plot for a forward biased PN junction diode clearly depicting the knee or threshold voltage. CLO-1
 11. Multiply 1011011×1110110 CLO-3

SECTION - C

(Attempt any 5 question, each question carries 05 marks, subparts (if any) carry equal weightage) (5x5=25)

12. Doping is the process by which the conduction capability of intrinsic material is increased at room temperature. Based on doping material, what are the different types of extrinsic materials formed? Also draw the covalent bond formation and charged carriers. CLO-1
13. Determine the input and output characteristics of a well labelled BJT amplifier configuration in which emitter is grounded, base is the input terminal and the collector is the output terminal. CLO-2
14. For an electronic application, pulsating dc is required but the user is available with input ac supply voltage. Which circuit is to be designed for the conversion with a single diode only? Draw the circuit diagram and show how the output waveform is obtained. CLO-1
15. Realise the following logic expression using basic logic gates
 - a. $X = B'C' + A'C' + A'B'$
 - b. $X = (A+B)(A'+C)(B+D)$
 CLO-3
16. When a PN junction is reverse biased, the depletion region width increases or decreases according to the reverse voltage applied. Mention the diode which implements this property for its operation of tuning the frequency in electronic communication devices. Draw the symbol and well labelled characteristics of this diode. CLO-1
17. Draw a well labelled generic block diagram of an IoT enabled electronic device. CLO-5

SECTION - D

(Attempt any 2 question, each question carries 10 marks, subparts (if any) carry equal weightage) (2x10=20)

18. A 320 V, 80 Hz voltage is applied to the primary of 6:1 step down, centre tap transformer used in a full wave rectifier having a load of $1000\ \Omega$. If the diode resistance and secondary coil resistance together has a resistance of $200\ \Omega$. Determine the following:
 - a. Dc voltage across the load
 - b. Dc current flowing through the load
 - c. Dc power delivered to the load
 - d. PIV across each diode
 - e. Ripple voltage and its frequency
 CLO-1

Draw the 8 PIN DIP configuration of 555 IC (Integrated circuit). Mention the importance of each pin in working of 555 as a timer IC. CLO-4

20.

Perform the following conversions:

- a. $(725)_8 = (\underline{\hspace{2cm}})_2 = (\underline{\hspace{2cm}})_{16} = (\underline{\hspace{2cm}})_{10}$
- b. $(10111000101)_2 = (\underline{\hspace{2cm}})_8 = (\underline{\hspace{2cm}})_{16} = (\underline{\hspace{2cm}})_{10}$
- c. $(ADE9)_{16} = (\underline{\hspace{2cm}})_2 = (\underline{\hspace{2cm}})_8 = (\underline{\hspace{2cm}})_{10}$
- d. $(985)_{10} = (\underline{\hspace{2cm}})_2 = (\underline{\hspace{2cm}})_8 = (\underline{\hspace{2cm}})_{16}$

CLO-3