Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering / Science

End Sem Examination May-2023

EN3ES16 / BC3ES08 Basic Electronics Engineering

Programme: B.Tech. Branch/Specialisation: All / B.Sc.

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. The simple PN junction has _____ types of bias. **1**

(a) One (b) Two (c) Three (d) Four

ii. The temperature coefficient in Zener breakdown is _____. **1**

(a) Positive (b) Negative

(c) Both (a) and (b) (d) Always positive

iii. A MOSFET has terminals. **1**

(a) Two (b) Five (c) Four (d) Three

iv. The value of input impedance of common base configuration of BJT is _____? **1**

(a) High (b) Zero (c) Medium (d) Low

v. _____ is an example of full-duplex system. **1**

(a) The keyboard (b) CB radio

(c) The telephone network (d) The repeater

vi. In modulation, carrier frequency is _____ than message signal. **1**

(a) Lower (b) Medium (c) Higher (d) None of these

vii. Which of the following codes are used for the labelling the cells of Karnaugh map? **1**

(a) Hexadecimal (b) 8421 binary

(c) Octal (d) Gray

viii. The logic gate which produces a 0 or low-level output when one or both of the inputs are 1 is called _____ gate. **1**

(a) AND (b) OR (c) NOR (d) NAND

ix. Cathode Ray oscilloscope cannot be used to measure _____. **1**

(a) Frequency (b) Phase (c) Power (d) Voltage

P.T.O.

x. An ideal voltmeter should have _____. **1**

(a) Zero resistance (b) Low resistance

(c) Infinite resistance (d) Moderate resistance

Q.2 i. Why is Zener diode highly doped? **2**

ii. Write down any three key differences between centre-tapped and bridge rectifier. **3**

iii. Discuss diode clipper circuit with suitable example. **5**

OR iv. Derive the expression of the following: **5**

(a) Ripple factor for a Half-wave rectifier

(b) Efficiency of a Full-wave rectifier

Q.3 i. In a bipolar transistor which region is wider and which region is thinner? Why? **2**

ii. Answer the following:

(a) If a transistor has its collector-base junction forward biased and the other junction reverse biased, will it work? Explain. **8**

(b) How must the two transistor junctions be biased for proper transistor amplifier operation?

(c) The beta of a transistor is 100. If the collector current is 50 mA, find the value of base current.

OR iii. What are the advantages of the FET over a conventional bipolar junction transistor? Define pinch-off voltage, amplification factor and drain resistance of FET. Explain the drain characteristics of JFET. **8**

Q.4 i. Define simplex and duplex modes of data transmission with suitable diagram and example. **3**

ii. Discuss the necessity of modulation and types of modulation. Compare amplitude modulation, frequency modulation and phase modulation. **7**

OR iii. State sampling theorem with its types and applications. Discuss For a continuous time signal $v(t) = 3\cos(100\pi t)$ determine the minimum sampling rate to avoid aliasing. **7**

Q.5 i. (a) $(11011.011)_2 = (\ )_{16}$ **4**

(b) $(1E7B)_{16} = (\ )_8$

(c) What is the Gray code of the 100101 binary code?

(d) $(1110)_2$ - $(1111)_2$ using 2's complement subtraction.

ii. Prove that NAND gate is a universal gate. **6**

OR iii. Using Boolean algebra techniques, simplify the following expressions **6**

$F = AB + A(B+C) + B(B+C)$

$F = [AB'(C+BD) + (AB)']C$

$F = AB + A(B+C) + B(B+C)$

Q.6 Attempt any two:

i. Write a detailed note on function generator. **5**

ii. Discuss the working of voltmeter and ammeter in detail. **5**

iii. Draw & explain block diagram of CRO. **5**

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Marking Scheme

BC3ES08 / EN3ES16 Basic Electronics Engineering

Q.1	i)	B) two	**1**
	ii)	B) Negative	**1**
	iii)	D) three C) FOUR	**1**
	iv)	D) Low	**1**
	v)	C) The telephone network	**1**
	vi)	C) Higher	**1**
	vii)	D) Gray	**1**
	viii)	C) NOR	**1**
	ix)	C) power	**1**
	x)	C) infinite resistance	**1**
Q.2	i.	Reason	**2**
	ii.	Three key differences between centre-tapped and bridge rectifier.	**3**
	iii.	Discussion of diode clipper circuit	**2.5**
		Suitable example and explanation.	**2.5**
OR	iv.	a) Ripple factor for a Half-wave rectifier with diagram	**2.5**
		b) Efficiency of a Full-wave rectifier with diagram	**2.5**
Q.3	i.	Answer of - In a bipolar transistor which region is wider and which region is thinner?	**1**
		Reason	**1**
	ii.	a) Answer of - If a transistor has its collector-base junction forward biased and the other junction reverse biased, will it work?	**1**
		Explanation.	**2**
		b) Explanation and Amplifier diagram	**2+1**
		c) Formula, Base current = 0.5 mA	**1+1**
OR	iii.	Four key advantages of the FET over a conventional bipolar junction transistor?	**2**
		Definition of pinch-ff voltage, amplification factor and drain resistance of FET.	**(1+1+1)**
		Diagram of the drain characteristics of JFE	**(1+2)**
		Explanation the drain characteristics of JFET	
Q.4	i.	Definition of Simplex and duplex modes of data transmission with suitable diagram	**(0.5+0.5+0.5+0.5)**
		Example	**(0.5+0.5)**

	ii.	Any four key points of necessity of modulation	**2**
		Types of modulation	**1**
		At least four key differences among amplitude modulation, frequency modulation and phase modulation.	**4**
OR	iii.	Importance of prealias filter and antialiasing filter	
		Statement of sampling theorem	**2**
		Types of sampling and applications	**1+2**
		Determination of the minimum sampling rate to avoid aliasing. $v(t) = 3\cos(100\pi t)$	**(0.5+1.5)**
		$v(t) = A\cos(2\pi f_m t)$, $f_m = 50$ Hz,	
		Minimum sampling rate to avoid aliasing $f_s = 2f_m$ =100Hz Ans.	
Q.5	i.	a) $(11011.011)_2 = (1B.6)_{16}$	**1**
		b) $(1E7B)_{16} = (17173)_8$	**1**
		c) Gray code = 110111	**1**
		d) $(1110)_2 - (1111)_2 = -(0001)_2$	**1**
	ii.	Realization of AND OR, NOT, EXOR and EX-NOR gates using NAND gate	**(1+1+1+1+1+1)**
OR	iii.	AB + A(B+C)+ B(B+C) = (B+AC)	**3**
		[AB'(C+BD)+(AB)']C = C(B'+A')	**3**
Q.6			
	i.	Detailed note on function generator.	**5**
		Diagram-2, Explanation-3	
	ii.	Discussion of the working of voltmeter and ammeter in detail.	**2.5+2.5**
	iii.	Discussion of function generator in detail.	**5**
		CRO Diagram-2, Explanation-3	

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