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

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2022

EN3ES12 Principle of Electronics

Programme: B.Tech. Branch/Specialisation: CSBS

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.

Q.1 i. N-type silicon is obtained by doping silicon with- **1**

(a) Germanium (b) Aluminum

(c) Boron (d) Phosphorus

ii. If the fermi level lies midway between the conduction band and valence band, then the semiconductor is- **1**

(a) Intrinsic (b) Extrinsic (c) N-Type (d) P-Type

iii. When diode is reverse bias, a small current develops which is known as- **1**

(a) Forward current (b) Diffusion current

(c) Reverse saturation current (d) Active current

iv. In a full wave rectifier input frequency is 50Hz, then what will be the ripple frequency? **1**

(a) 100 Hz (b) 50 Hz (c) 25 Hz (d) 500 Hz

v. In which following mode BJT works as an amplifier- **1**

(a) Cut-off mode (b) Active Mode

(c) Saturation Mode (d) Reserve Active Mode

vi. The alpha α and beta β of a transistor are related to each other as- **1**

(a) $\alpha = \frac{1+\beta}{\beta}$ (b) $\beta = \frac{\alpha}{\alpha+1}$ (c) $\beta = \frac{1+\alpha}{\alpha}$ (d) $\alpha = \frac{\beta}{\beta+1}$

vii. MOSFET can be used as- **1**

(a) Current controlled capacitor (b) Voltage controlled capacitor

(c) Current controlled inductor (d) Voltage controlled inductor

P.T.O.

viii. Which one is the types of MOSFET devices available? **1**
(a) P-type enhancement type MOSFET
(b) N-type enhancement type MOSFET
(c) Depletion type MOSFET
(d) All of these

ix. Which of the following electrical characteristics is not exhibited by an ideal op-amp? **1**
(a) Infinite voltage gain (b) Infinite bandwidth
(c) Infinite output resistance (d) Infinite slew rate

x. What is Barkhausen criterion for oscillation? **1**
A-> gain of amplifier and ß-> transfer ratio.
(a) Aß > 1 (b) Aß < 1 (c) Aß = 1 (d) Aß ≠ 1

Q.2 i. Write difference between drift and diffusion current in semiconductor device. **2**

ii. What are intrinsic and extrinsic semiconductors give examples? **3**

iii. What is energy band? Differentiate conductor, insulator, and semiconductor on the basis of energy band diagram. **5**

OR iv. Explain how p-type and N-type semiconductors are formed. **5**

Q.3 i. What is the difference between the Zener breakdown and avalanche breakdown? **2**

ii. Compare the full wave bridge rectifier, centre tap rectifier, and half wave rectifier based on different parameters and circuit diagram? **8**

OR iii. Explain light emitting diode, Zener diode, varactor diode, photo diode based on following point: **8**
(a) Working of Diode (b) V-I characteristic of diode
(c) Application of Diode

Q.4 i. Draw and Explain how BJT works as an amplifier. **3**

ii. What is BJT? Describe the formation depletion layer of NPN transistor with the suitable diagram. **7**

OR iii. Compare the CB, CC, CE configuration of BJT based on different parameters and circuit diagram. **7**

Q.5 i. Write difference between BJT and FET. **4**

ii. Draw and explain the construction and working of a JFET with input output Characteristic. **6**

OR iii. What is CMOS? Draw inverter using the CMOS. **6**

Q.6 Attempt any two:

i. What is operational amplifier? Write down all the characteristic of ideal OPAMP in detail. **5**

ii. How is an integrator made using op-amp? Write its equations. **5**

iii. (a) Write down difference between the analog and digital signals. **5**
(b) What is Flip-Flop?

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Marking Scheme
EN3ES12 Principle of Electronics

Q.1	i.	N-type silicon is obtained by doping silicon with- (d) Phosphorus	**1**
	ii.	If the fermi level lies midway between the conduction band and valence band, then the semiconductor is- (a) Intrinsic	**1**
	iii.	When diode is reverse bias, a small current develops which is known as- (c) Reverse saturation current	**1**
	iv.	In a full wave rectifier input frequency is 50Hz, then what will be the ripple frequency? (a) 100 Hz	**1**
	v.	In which following mode BJT works as an amplifier- (b) Active Mode	**1**
	vi.	The alpha α and beta β of a transistor are related to each other as- (d) $\alpha = \frac{\beta}{\beta+1}$	**1**
	vii.	MOSFET can be used as- (b) Voltage controlled capacitor	**1**
	viii.	Which one is the types of MOSFET devices available? (d) All of these	**1**
	ix.	Which of the following electrical characteristics is not exhibited by an ideal op-amp? (c) Infinite output resistance	**1**
	x.	What is Barkhausen criterion for oscillation? A-> gain of amplifier and ß-> transfer ratio. (c) Aß = 1	**1**

Q.2	i.	Differences	2 marks	**2**
	ii.	Definition	2 marks	**3**
		Example	1 mark	
	iii.	Definition of energy band	2 marks	**5**
		Diagram	1 mark each	
OR	iv.	Explanation	3 marks	**5**
		Diagram	2 marks	
Q.3	i.	Differences	2 marks	**2**
	ii.	Comparison on each parameter	2 marks each	**8**
OR	iii.	Explanation of each diode	2 marks each	**8**
Q.4	i.	Explanation	2 marks	**3**
		Diagram	1 mark	
	ii.	Definition	2 marks	**7**
		Diagram	2 marks	
		Explanation	3 marks	
OR	iii.	Explanation	4 marks	**7**
		Circuit diagrams	1 mark each	
Q.5	i.	Any four differences	(1 mark * 4)	**4**
	ii.	Structure	2 marks	**6**
		Working	2 marks	
		Characteristic	2 marks	
OR	iii.	Definition	2 marks	**6**
		Inverter	4 marks	
Q.6		Attempt any two:		
	i.	Definition	1 mark	**5**
		Diagram	1 mark	
		Characteristic	3 marks	
	ii.	Explanation and Diagram	3 marks	**5**
		Equations	2 marks	
	iii.	(a) Difference	2.5 marks	**5**
		(b) Flip-Flop	2.5 marks	

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