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

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

ME3EM02 Electronics Devices & Circuits

Programme: B.Tech. Branch/Specialisation: ME

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. The electrons in the conduction band are known as _____. **1**

(a) Bound electrons (b) Valence electrons

(c) Free electrons (d) None of these

ii. When a pentavalent impurity is added to a pure semiconductor, it becomes _____. **1**

(a) An insulator (b) An intrinsic semiconductor

(c) p-type semiconductor (d) n-type semiconductor

iii. The leakage current in a crystal diode is due to _____. **1**

(a) Minority carriers (b) Majority carriers

(c) Junction capacitance (d) None of these

iv. A Zener diode is always _____ connected. **1**

(a) Reverse (b) Forward

(c) Either reverse or forward (d) None of these

v. The ripple factor of a half-wave rectifier is_____. **1**

(a) 2 (b) 1.21 (c) 2.5 (d) 0.48

vi. The input impedance of a transistor is_____. **1**

(a) High (b) Low (c) Very high (d) Almost zero

vii. The disadvantage of voltage divider bias is that it has_____. **1**

(a) High stability factor (b) Low base current

(c) Many resistors (d) None of these

viii. The gate of a JFET is _____ biased. **1**

(a) Reverse (b) Forward

(c) Reverse as well as forward (d) None of these

ix. Positive feedback is also known as- **1**

(a) Regenerative feedback (b) Degenerative feedback

(c) Loop feedback (d) Return feedback

P.T.O.

x. With negative feedback, the linearity of operation of the amplifier circuit- **1**

(a) Deteriorates (b) Improves

(c) Remain same (d) None of these

Q.2 i. Explain the semiconductor material and its types. **3**

ii. Explain the hall effect and derive the expression for hall voltage. **7**

OR iii. With the help of necessary equations, explain the term drift current and diffusion current. **7**

Q.3 i. What is doping? What are the majority and minority charge carriers in semiconductor? **3**

ii. Describe the action of PN junction diode under forward bias and reverse bias. **7**

OR iii. Define and explain the working of tunnel diode. **7**

Q.4 i. What is a clipper? Also describe the following: **3**

(a) Positive clipper (b) Biased clipper

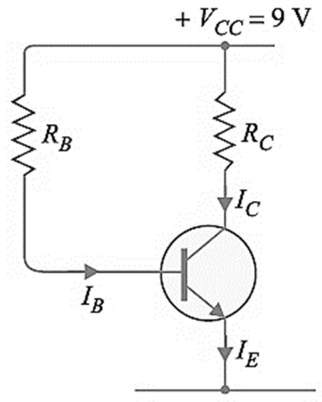
ii. Define and explain the working principle of a PNP transistor. **7**

OR iii. With a neat sketch, explain the working of the following: **7**

(a) Centre-tap full-wave rectifier (b) Full-wave bridge rectifier.

Q.5 i. Define the transistor biasing. **3**

ii. The figure shown below shows biasing by base resistor method. If it is required to set the operating point at 1mA, 6 V, find the values of R_C and R_B. Given $\beta = 150$, $V_{BE} = 0.3$ V. **7**



OR iii. Write the comparison between JFET and MOSFET. **7**

Q.6 Attempt any two:

i. Define feedback amplifier. Explain the working principle of feedback amplifier. **5**

ii. Draw and explain the circuit diagram of Hartley Oscillator. **5**

iii. Draw and explain the working of Colpitts Oscillator. **5**

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Scheme of Marking

Faculty of Engineering

End Sem (Odd) Examination Dec-2020

Electronics Device and Circuit (T) - ME3EM02

Programme: B.Tech. Branch/Specialisation: ME

Q.1	i)	The electrons in the conduction band are known as..... (c) free electrons	1
	ii)	When a pentavalent impurity is added to a pure semiconductor, it becomes..... (d) n-type semiconductor	1
	iii)	The leakage current in a crystal diode is due to..... (a) minority carriers	1
	iv)	A zener diode is always ..... connected. (a) reverse	1
	v)	The ripple factor of a half-wave rectifier is..... (d) 0.48 b) 1.21	1
	vi)	The input impedance of a transistor is..... (b) low	1
	vii)	The disadvantage of voltage divider bias is that it has..... (c) many resistors	1
	viii)	The gate of a JFET is ..... biased. (a) reverse	1
	ix)	Positive feedback is also known as (a) regenerative feedback	1
	x)	With negative feedback, the linearity of operation of the amplifier circuit (b) improves	1
Q.2	i.	Explain the semiconductor material and its types. Semiconductor material - 1Mark Forward Biasing - 1 Mark Reverse Biasing - 1 Mark	3
	ii.	Explain the Hall Effect and derive the expression for Hall Voltage. Hall Effect - 2 Marks Expression for Hall Voltage - 5 Marks	7
OR	iii.	With the help of necessary equations, Explain the term Drift Current and Diffusion Current. Drift Current and equation - 3.5 Marks Diffusion Current and equation - 3.5 Marks	7
Q.3	i.	What is doping? What are the majority and minority charge carriers in semiconductor? Doping - 1 Mark Majority Charge Carrier - 1 Mark Minority Charge Carrier - 1 Mark	3
	ii.	Describe the action of PN junction diode under forward bias and reverse bias. Forward Biasing - 3 Marks Reveres Biasing - 4 Marks	7
OR	iii.	Define and explain the working of Tunnel Diode. Definition - 2 Marks Working - 5 Marks	7
Q.4	i.	What is a clipper? Describe (i) positive clipper (ii) biased clipper Clipper - 1 Mark Positive Clipper - 1 Mark Biased Clipper - 1 Mark	3
	ii.	Define and explain the working principle of a PNP transistor. PNP Transistor - 2 Marks Working Principle - 5 Marks	7
OR	iii.	With a neat sketch, explain the working of (a) Centre-tap full-wave rectifier (b) Full-wave bridge rectifier. Diagram of Centre-Tap - 1 Mark Working of Centre-Tap - 3 Marks Diagram of Full Wave bridge - 1 Mark Working of Full Wave bridge - 2 Marks	7
Q.5	i.	Define the transistor biasing. Transistor Biasing - 3 Marks	3
	ii.	The figure shown below shows biasing by base resistor method. If it is required to set the operating point at 1mA, 6 V, find the values of R_C and R_B. Given β =150, V_{BE} = 0.3 V. Solution: R_C = 3 kΩ, - 3 Marks R_B = ~~0.3 MΩ~~ 1.31 MΩ - 4 Marks	7
OR	iii.	Write the comparison between JFET and MOSFET.	7

Q.6 Attempt any two:

i. Define feedback amplifier. Explain the working principle of feedback amplifier. **5**

Feedback Amplifier - 2 Marks
Working - 3 Marks

ii. Draw and explain the diagram of Hartley Oscillator. **5**

Diagram - 2 Marks
Explanation - 3 Marks

iii. Draw and explain the diagram of Colpitts Oscillator. **5**

Diagram - 2 Marks
Explanation - 3 Marks

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