



R22 Regulation

Subject code: 4E3EA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Semester Regular/Supplementary Examinations, December 2024

SEMICONDUCTOR DEVICES AND CIRCUITS

(Common to CSE, CSE(AI&ML) & CSE (DS))

Maximum Marks: 60

Date:04.12.2024

Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A		CO	Bloom Tx
All the following questions carry equal marks (10X1M=10 Marks)			
1.a)	Why are semiconductor diodes non-ohmic?	1	I
b)	Define Fermi energy level.	1	II
c)	Draw the Zener diode symbol.	2	II
d)	Define the Tunnel diode.	2	I
e)	Define Static and dynamic resistances.	3	II
f)	list out the applications varactor diode.	3	II
g)	What is Form factor for FWR?	4	I
h)	What is amplification factor of β .	4	II
i)	List the differences between BJT and FET.	5	I
j)	What stands for MOSFET and FET?	5	I
Part-B		CO	Bloom Tx
Answer All the following questions. (5X10M=50Marks)			
2.	Explain about various current components in a forward biased pn junction diode. [10M]	1	IV
OR			
3.	a) Derive an expression for transition capacitance of a diode. [5M] b) For a Ge diode, the $I_0=2\mu A$ and the voltage of 0.26V is applied. Calculate the forward and reverse dynamic resistance values at room temperature. [5M]	1	IV
4.	Explain about tunnel diode and V-I characteristics. [10M]	2	IV
OR			
5.	In a P-type semiconductor, the Fermi level is 0.3 eV above the valance band at a room temperature of 300 °K. Determine the new position of the Fermi level for temperatures of (a) 350 °K and (b) 400 °K. [10M]	2	IV
6.	Derive the expression for the ripple factor, RMS current and efficiency of FWR. [10M]	3	V
OR			
7.	Explain the operation of HWR and derive its expression for V_{dc} , I_{dc} , I_{rms} , V_{rms} , Ripple factor and efficiency. [10M]	3	V

8.	a) Define a Transistor. Why transistor is considered as current control device? Explain. [5M] b) What are the different configurations of BJT? Explain. [5M]	4	IV
OR			
9.	Explain the operation of transistor CB configuration and its characteristics. [10M]	4	IV
10.	a) Why FET is called unipolar device and is called as voltage operated device? [5M] b) What are the important characteristics of FET? [5M]	5	IV
OR			
11.	What are the types of MOSFET? Explain the construction and working of Depletion MOSFET. [10M]	5	IV