R20 Regulation *Subject code: 3E2AH*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Regular Examinations, September 2021

SEMI CONDUCTOR DEVICES & CIRCUITS

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

Maximum Marks: 70 Date:13.09.2021 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 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

All the following questions carry equal marks **(10x2M=20 Marks)**

1 Define the cut in voltage of the PN junction diode
2 Why dynamic resistance is preferred over static resistance in V-I characteristics of PN junction diode?
3 Write any two difference with between avalanche and zener diode break down mechanisms
4 Draw the symbol and equivalent circuit of a varactor diode
5 Write any two difference between half wave and bridge rectifier
6 Why filters are used in rectifier circuits?
7 Compare NPN and PNP Transistors.
8 Why base of a transistor made thin and is lightly doped?
9 Derive the relationship between drain resistance (rd), trans conductance(gm)and amplification factor (μ)
10 Why FET is called a voltage-operated device?

Part-B

Answer All the following questions. **(5X10M=50Marks)**

11 a) Compare P-Type and N-Type semiconductors. [5M]
b) With help of a neat sketches, discuss the Current components in a p-n Diode. [5M]

OR

12 Derive the expression for transition capacitance C_T. [10M]

13 a) Discuss the V-I characteristics of Zener diode with neat sketches. [5M]
b) Explain two transistor analogy of SCR. [5M]

OR

14 Explain the characteristics of a tunnel diode with the help of energy band diagrams. [10M]

15 a) Derive the expression for efficiency of a half wave rectifier and bridge rectifier. [5M]
b) Draw the circuit diagram of bridge rectifier. [5M]

OR

16 a) Derive the expression for ripple factor of a half wave rectifier and bridge rectifier[5M]
b) Draw the circuit diagram of full wave center tapped rectifier. [5M]

17 a) With neat sketches describe the Input, output characteristics of CE Configuration, and indicate various regions. [5M]
b) Discuss the current components in a Transistor. [5M]

OR

18 Draw the BJT self-bias circuit and derive the expression for stability factor s. [10M]

19 a) Compare Junction Field Effect Transistor (JFET) and Metal Oxide Field Effect Transistor (MOSFET). [5M]
b) Discuss the Drain and Transfer characteristics of a N-Channel JFET with neat sketches. [5M]

OR

20 a) Compare Bipolar Junction Transistor (BJT) and Field Effect Transistor (FET). [5M]
b) With help of neat diagram, explain the operation of an N-Channel enhancement type MOSFET. [5M]