



Regulation R20

Subject code: 3E2AH

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

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

**B.Tech II Semester Supplementary Examinations, September 2023**

**SEMICONDUCTOR DEVICES AND CIRCUITS**

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

**Maximum Marks: 70**

Date: 20.09.2023 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 Why doping is need?
- 2 Define static and dynamic forward resistances.
- 3 Define Zener breakdown.
- 4 Write about Avalanche break down mechanism.
- 5 Write the difference between HWR and FWR.
- 6 Define PIV, Peak factor and Ripple factor of a rectifier.
- 7 Explain Thermal runaway.
- 8 Define stability factor & derive expression for stability factor 'S'.
- 9 Draw the symbols of JFET and MOSFET?
- 10 Write the differences between BJT and FET.

Part-B

Answer All the following questions.

(10M X 5=50Marks)

11. Explain how depletion layer is formed in P-N junction Diode with neat diagrams. (10M)  
OR
12. Write down the PN diode applications and derive the Diode current equation of a PN junction diode. (10M)
13. Write down the Zener diode applications and explain V-I characteristics of Zener diode with neat diagrams. (10M)  
OR
14. Explain the V-I characteristics of a Tunnel Diode using Energy band diagrams. (10M)
15. Explain the operation of a Full wave Rectifier. Derive its ripple factor, Efficiency, PIV, and Form Factor. (10M)

OR

16. Explain the operation of a Bridge Rectifier with neat waveforms. (10M)
17. Explain the input and output characteristics of CB configured transistor circuit with a neat circuit diagram. (10M)

OR

18. Determine the operating point for a fixed bias circuit whose  $V_{cc}=10V$ ,  $R_c=2K\Omega$ ,  $R_b=930K\Omega$ ,  $\beta=50$  for a silicon transistor. (10M)
19. Explain the following terms & derive the relation among them. (3+3+4)
- i. Drain resistance      ii. Transconductance      iii. Amplification factor

OR

20. Explain the construction and operation of a Depletion MOSFET and draw its characteristics. (10M)