



R20 Regulation

Subject code:3E2AH

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

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

**B.Tech II Semester Supplementary Examinations, July 2025**

**SEMICONDUCTOR DEVICES AND CIRCUITS**

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

Maximum Marks: 70

Date: 15.07.2025

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)		Marks	CO	BTL
1	What is doping.	2M	1	L1
2	Define static and dynamic forward resistances.	2M	1	L1
3	Write about Avalanche break down mechanism.	2M	2	L1
4	Draw V-I characteristics of SCR.	2M	2	L1
5	Define PIV, Peak factor and Ripple factor of a rectifier.	2M	3	L1
6	Draw the circuit of Bridge rectifier with capacitor filter.	2M	3	L1
7	Define Early effect.	2M	4	L1
8	Define Thermal runaway.	2M	4	L1
9	Write the differences between BJT and FET.	2M	5	L1
10	Draw the symbols of JFET and MOSFET?	2M	5	L1

**Part-B**

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) Derive the expression for transition capacitance $C_T$ of a diode. b) Determine the value of forward current for a pn junction with $I_o = 15\mu A$ , $V_f = 0,6V$ , at $T=300K$ . Assume silicon diode.	5M 5M	1	L2
OR				
12	a) Derive current equation of a diode b) Derive the expression for Dynamic resistance.	5M 5M	1	L2
13	Explain the operation of a Tunnel Diode using Energy band diagrams.	10M	2	L2
OR				
14	Explain the V-I characteristics of Zener diode with neat sketches.	10M	2	L2
15	a) Explain the operation of a Full wave Rectifier. Derive its ripple factor, Efficiency, PIV, and Form Factor . b) A sinusoidal voltage of amplitude 25 volts and frequency 50Hz is applied to a FWR using PN diode. No filter is used and the load resistor is 1000 ohms. The forward resistance $R_f$ of diode is 100ohm. Calculate i) PIV ii) rectifier efficiency iii) ripple factor iv) TUF	5M 5M	3	L2
OR				
16	a) Explain the working of PI Section filter with a neat circuit diagram and with relevant wave forms.	5M	3	L2

	b) A 100microfarad capacitor when used as filter has 10V a.c across it with a terminating load resistor of 2.1kohm. If the filter is a full wave and supply frequency is 50Hz, what is the percentage ripple in the output.	5M		
17	Explain the input and output characteristics of CE configured transistor circuit with a neat circuit diagram.	10M	4	L2
	OR			
18	a) Define $\alpha$ $\beta$ and $\gamma$ . Write relation between $\alpha$ $\beta$ and $\gamma$ . b) Explain the Voltage divider biasing technique of a Transistor and derive its stability factor.	4M 6M	4	L2
19	a) Draw and explain small-signal model of a MOSFET. b) Explain Drain & transfer characteristics of JFET and give the advantages of JFET.	5M 5M	5	L2
	OR			
20	Explain the construction and operation of Enhancement MOSFET and draw its characteristics.	10M	5	L2