R25 Regulation *Subject code:5ES2AR*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Regular Examinations, June 2026

ELECTRONIC DEVICES & CIRCUITS

(Common to CSE(DS) & IT)

Maximum Marks: 60 Date:22.06.2026 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			
All the following questions carry equal marks (5X2M=10Marks)		Marks	CO	BTL
1.a	Define cut-in voltage of a PN junction diode. State its typical values for silicon and germanium diodes.	2M	1	2
b	Why is the emitter region heavily doped in a transistor?	2M	2	3
c	Why is voltage divider bias preferred over fixed bias?	2M	3	3
d	Which transistor amplifier configuration provides the highest voltage gain?	2M	4	3
e	Define holding current in an SCR.	2M	5	2
	Part-B			
Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) Explain the construction and working of a Zener diode. Draw the V-I characteristic curve of a Zener diode. b) Explain the difference between PN junction diode and Zener diode.	7M 3M	1	2
	OR			
3	A Full-wave bridge rectifier is connected to a 230 V, 50 Hz AC supply through a transformer having a secondary voltage of 18 V RMS. Determine: (i) DC output voltage (ii)Ripple frequency (iii)PIV of each diode (iv)Rectification efficiency	10M	1	3
4	a) Derive the relationship between transistor currents IE, IB, and IC. Also derive the relation between current gains α and β. b) A transistor has α=0.98. Calculate: (i) β (ii)Collector current when emitter current is 10 mA.	6M 4M	2	3
	OR			
5	Explain the Common Emitter (CE) configuration with neat diagrams. Draw the input and output characteristics.	10M	2	2

6	Derive the expression for operating point in the Voltage Divider Bias method. Why is it considered the most stable biasing method?	10M	3	3
	OR			
7	A voltage divider bias circuit has: VCC=18 V , R1=56 kΩ ,R2=12 kΩ ,RC=2.2 kΩ ,RE=1 kΩ ,β=120 Determine: (i)Base voltage (ii)Emitter current (iii)Collector current (iv)Collector-emitter voltage.	10M	3	3
8	Using h-parameter analysis, derive the expressions for voltage gain, current gain, and input resistance of a Common Base (CB) amplifier. Discuss the important characteristics and applications of CB amplifiers.	10M	4	3
	OR			
9	Explain the approximate CE amplifier model without emitter bypass capacitor. Derive the expression for voltage gain and discuss the effect of emitter resistance on amplifier performance.	10M	4	3
10	Describe the operation of a Solar Cell. Explain how it converts solar energy into electrical energy.	10M	5	2
	OR			
11	Explain the construction and operation of Enhancement MOSFET and Depletion MOSFET with suitable diagrams. Compare their characteristics and modes of operation.	10M	5	2