



R25 Regulation

Subject code:5ES1AM

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech I Semester Regular Examinations, January 2026

ELECTRONICS DEVICES AND CIRCUITS

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

Maximum Marks: 60

Date:23.01.2026

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	Explain Avalanche and Zener Breakdowns.	2M	1	L1
b	List any two differences between Common Emitter (CE) and Common Base (CB) configurations.	2M	2	L1
c	Why is biasing necessary in a BJT amplifier?	2M	3	L1
d	Compare the signal phase relationship between input and output in CE, CB, and CC amplifiers and justify the reason for phase inversion or absence of it.	2M	4	L1
e	Justify why FinFETs offer better control over short-channel effects compared to planar MOSFETs.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) Why we need the Clippers and clampers circuits. Explain different clippers with neat diagram with input and output waveforms. 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 5M	1	L3
OR				
3	a) Explain the operation of Full Wave Rectifier and derive the equation for rectifier and efficiency. b) A diode whose internal resistance is 20Ω is to supply power to a 100Ω load from 110V (R.M.S) source of supply. Calculate: i) Peak Load Current ii) DC Load Current iii) AC Load Current iv) % Regulation from No load to given load.	5M 5M	1	L3
4	Explain the current components in a BJT and derive the relation between emitter current, base current, and collector current.	10M	2	L2
OR				

5	In a CB transistor, the collector current increases from 6 mA to 6.3 mA when the emitter current increases from 6.2 mA to 6.5 mA at constant collector-base voltage. a) Determine the CB current gain (α). b) Identify the operating region of the transistor	5M 5M	2	L3
6	a) What is Biasing? Explain the need of it. List out different types of biasing methods. b) In a Silicon transistor circuit with a fixed bias, $V_{CC}=9V$, $R_C=3K\Omega$, $R_B=8K\Omega$, $\beta=50$, $V_{BE}=0.7V$. Find the operating point and Stability factor.	5M 5M	3	L2
OR				
7	a) Derive the expression for stability factor of Voltage divider bias circuit. b) Explain in detail about Thermal Runaway and Thermal Resistance.	6M 4M	3	L2
8	Draw the circuit diagram of CC amplifier using hybrid parameters and derive expressions for A_I , A_V , R_i , R_o .	10M	4	L3
OR				
9	Using h-parameters, analyze a CB amplifier. Derive expressions for current gain, voltage gain, and input resistance.	10M	4	L3
10	Compare CMOS, FinFET, and CNTFET technologies with respect to: (i) Device structure (ii) Power consumption (iii) Scaling capability (iv) Speed (v) Fabrication complexity.	10M	5	L2
OR				
11	Explain the structure, operation, and drain characteristics of a JFET. Define pinch-off voltage and transconductance.	10M	5	L2