



R22 Regulation

Subject code: 405BB

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

**B.Tech V Semester Regular/Supplementary Examinations, November 2025**

## ELECTRICAL ENGINEERING MATERIALS

(EEE)

Maximum Marks: 60

Date: 12.11.2025

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 (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Define dielectric constant and give its significance.	1M	1	1
b)	What is spontaneous polarization?	1M	1	1
c)	Define magnetic anisotropy.	1M	2	1
d)	Differentiate between diamagnetic and ferromagnetic materials.	1M	2	2
e)	What are intrinsic and extrinsic semiconductors?	1M	3	1
f)	What is doping in semiconductors?	1M	3	1
g)	Mention any two materials used for electric contacts.	1M	4	1
h)	What is the effect of moisture on insulation?	1M	4	1
i)	What are refractory materials?	1M	5	1
j)	Why is testing of transformer oil necessary?	1M	5	1

### Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Discuss in detail the mechanism of dielectric breakdown in solids and liquids.	5M	1	6
	b) Describe the structure and applications of piezoelectric and pyroelectric materials.	5M	1	3
OR				
3	A capacitor of capacitance $C_0=100 \text{ pF}$ is filled with a dielectric of relative permittivity $\epsilon_r=5$ . If a voltage of 500V is applied, calculate: (a) Capacitance with dielectric, (b) Energy stored in the dielectric, (c) Electric flux density D if the plate area is $25\text{cm}^2$ .	4M 3M 3M	1	3
4	a) Explain the classification of magnetic materials with examples.	5M	2	2
	b) Discuss the aging process in permanent magnets and methods to reduce its effect.	5M	2	6
OR				

5	Explain magnetic anisotropy and magnetostriction with suitable examples and applications.	10M	2	2
6	Explain the difference between LSI, VLSI, and ULSI techniques in semiconductor fabrication.	10M	3	2
	OR			
7	a) Explain intrinsic and extrinsic semiconductors with energy band diagrams.	5M	3	2
	b) Explain the Hall effect and derive an expression for the Hall coefficient in semiconductors.	5M	3	2
8	Explain the working principle of a thermocouple and list its materials.	10M	4	2
	OR			
9	Explain properties and applications of bimetals and fuses in protection systems.	10M	4	2
10	a) Explain the role of insulating varnishes and coolants in electrical equipment.	5M	5	2
	b) Describe methods of corrosion protection and testing of varnishes.	5M	5	3
	OR			
11	Discuss the various methods used for transformer oil testing.	10M	5	6