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Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020



Course Code: EE206

Course Name: MATERIAL SCIENCE (EE)

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks*

- 1 What are the properties of materials utilised in (i) Rheostats  
(ii) Solders? (5)  
Also mention some of the materials used for the above.
- 2 Write a short note on 1) spontaneous polarization and 2) ferroelectric materials  
and its applications (5)
- 3 Explain the testing procedure of transformer oil. (5)
- 4 Write notes on the magnetic materials used in (i) Electrical machines  
(ii) Relays (5)
- 5 Differentiate Type I and Type II superconductors. (5)
- 6 What is the significance of organic solar cells? (5)
- 7 Explain optical microscopy. (5)
- 8 Define nanomaterial. Highlight any two possible a) applications and b) its  
limitations or major challenges. (5)

**PART B**

*Answer any two questions, each carries 10 marks*

- 9 a) Derive Clausius – Mosotti relation. (5)  
b) Define dielectric polarization and write the expression relating polarization P,  
Electric field E and permittivity  $\epsilon_r \epsilon_0$ . Comment on its physical significance. (5)
- 10 Explain a good insulating material in terms of its (10)
  - a) Electrical
  - b) Mechanical
  - c) Thermal.
  - d) Chemical properties.

- 11 a) State properties and applications of any two inorganic insulators. (5)  
b) Obtain the expression for conductivity in intrinsic semiconductors. (5)

**PART C**

*Answer any two questions, each carries 10 marks*

- 12 a) Define Townsend's first and second ionisation coefficients. (4)  
b) Derive the Townsend's criterion for spark (6)
- 13 a) Write short notes on intrinsic breakdown in solid dielectrics. (5)  
b) Explain origin of permanent magnetic dipoles. (5)
- 14 a) How magnetic materials are classified? Explain any four types of them with example. (6)  
b) State Curie –Weiss Law (4)

**PART D**

*Answer any two questions, each carries 10 marks*

- 15 a) Explain the concept of superconductivity. Also draw the magnetic field Vs Temperature characteristics. (5)  
b) Describe the fundamental principle behind atomic absorption spectroscopy. (5)
- 16 a) Why solar selective coatings are required? Give examples. (5)  
b) Explain the fundamentals of  
(i) Photo thermal conversion (5)  
(ii) Photo voltaic conversion
- 17 a) Describe electron microscopy with appropriate schematic diagram. (5)  
b) Explain photo electron spectroscopy. (5)

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