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Question Paper Code: 32003

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Second Semester

Civil Engineering

01UPH203- MATERIAL SCIENCE

(Common to Mechanical Engineering)

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. State Wiedemann-franz Law.
2. Find the Fermi function value, if the energy of a state ' E ' is equal to Fermi energy ' E_F '.
3. What is Hall Effect.
4. What are compound semiconductors? Give examples.
5. What is Bohr magnetron? Give its value.
6. Define Cooper pairs?
7. Define dielectric constant.
8. What is dielectric loss?
9. State some applications of shape memory alloys.
10. Name the three structures of carbon nano tubes.

PART - B (5 x 16 = 80 Marks)

11. (a) Derive an expression for electrical conductivity and thermal conductivity of a conductor and hence obtain wiedemann - Franz law. (16)

Or

(b) What is Fermi distribution function? Derive an expression for the effect of temperature on Fermi distribution function. (16)

12.(a) Obtain an expression for the intrinsic charge density of an intrinsic semiconductor. (16)

Or

(b) What is Hall effect? Derive an equation for Hall coefficient and explain an experiment to determine it. (16)

13. (a) Explain the domain theory of ferromagnetism. Using that theory, explain the formation of hysteresis in ferromagnetic materials. (16)

Or

(b) Explain the preparation, structure, properties and applications of high temperature superconductors. (16)

14. (a) (i) What is polarization? Derive an expression for the polarisability in electronic polarization. (10)

(ii) Explain the dependency of polarization on frequency and temperature. (6)

Or

(b) Describe various breakdown mechanisms takes place in dielectrics. (16)

15. (a) What are nano materials? How nano materials are synthesised by sol gel and ball milling technique. (16)

Or

(b) Briefly explain about

(i) Impact (4)

(ii) Fracture (6)

(iii) Fatigue (6)