B.E./B.TECH. Degree Examination, December 2020

Second Semester

PH16251- Engineering Physics II

(Regulation 2016)

Time: Three hours Maximum : 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. The material with lowest resistivity is
   (a) constantan (b) Silver (c) manganin (d) Nichrome
2. The most important property of nano material is
   (a) Size (b) Polarity (c) Dynamism (d) Cohesinity
3. An Experimental value of the specific heat capacity of a metal is
   (a) 2R (b) 3R (c) 3.5R (d) 4R
4. Not an example for actuator
   (a) Optical fiber (b) shape memory alloys (c) Magneto-strictive material (d) magneto-rheological fluids
5. Sketch a graph between electrical conductivity and temperature of an intrinsic semiconductor.
6. What are the essential features of quantum free electron theory?
7. How does a dielectric material find its application in gas lighters?
8. What are the properties required for a material to be suitable for making electromagnet?

PART B - (4 X16 = 64 marks)

09. (a) (i) Derive the expression for electrical and thermal conductivity of a metal based on classical free electron theory. Discuss how far they were successful in explaining the experimental results. **(12)**

(ii) A 5.8m length and 2.0mm diameter wire carries a current of 750mA current when the applied potential across its ends is 22mV.If the drift velocity of the electrons is $7.2*10^5$m/s, calculate the electrical resistivity of the wire and conduction electron density of the material of the wire. **(4)**

(OR)

(b) (i) Explain Fermi-distribution function and discuss its behavior with respect to temperature. Also represent it graphically. **(10)**

(ii) Assuming the expression for density of energy states, find the expression **(6)**

for conduction electron density in metals. How does it change with temperature?

10. (a) Derive an expression for Fermi energy level in n-type semiconductor. Discuss the variation of Fermi level on temperature along with graphical representation and show that n-type semiconductor behaves as an Intrinsic semiconductor at high temperature. **(16)**

(OR)

(b) (i) Derive an expression for the Lorentz field developed inside a dielectric material when it is placed in a electric field. **(12)**

(ii) Explain any two important dielectric breakdown mechanisms. **(4)**

11. (a) (i) Why ferrites are preferred over ferromagnetic materials as core material for high frequency applications? Analyze the structure of ferrites and its properties. **(8)**

(ii) Classify the magnetic materials based on its Hysteresis proberty with their applications. **(8)**

(OR)

(b) (i) Distinguish Soft and Hard superconducting material. **(8)**

(ii) Explain the formation of cooper pair in superconductor with necessary theory. **(4)**

(iii) Explain with a neat diagram application of Josephson effect in superconductors. **(4)**

12. (a) (i) Explain the characteristic properties exhibited by NiTi alloy. **(8)**

(ii) Describe with a neat diagram, the preparation of Metallic Glasses. **(8)**

(OR)

(b) (i) Explain a method of preparing nano powders with high efficiency and what are the advantages of the method compared to other method? **(8)**

(ii) Describe the applications of biomaterials in the field of orthopedics. **(8)**