[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
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1337

B. Tech 3rd Semester Examination

Electrical Engineering Materials and Applications (N.S.)

EE-213

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, select one question from each sections A, B, C and D. Section E (Question No. 9) is compulsory.

SECTION - A

1. (a) Comment on statement, "Physical behaviour of an electrical material is characterized by a set of macroscopic measureable quantities". **(8)**

   (b) How electrical engineering materials can be classified on the basis of electrical conduction? Name at least three such materials in respect of each such classification. **(12)**

2. (a) What do you mean by super conductors? Explain role of variation of operating temperature on the electrical conduction properties of super conductor. **(10)**

   (b) Give the properties engineering applications in respect of following materials:

   (i) Steel

   (ii) Brass **(6)**

   (c) Which material is preffered for use in electrical machine winding and why? **(4)**

SECTION - B

3. (a) Why chemical properties of electrical insulations are evaluated in electrical applications? **(5)**

   (b) How following insulation materials find applications in several equipments and systems?

   (i) Rubber (ii) Paper (iii) Tapes (iv) Wax **(12)**

   (c) What are thermosetting insulations? **(3)**

4. (a) Why mineral insulation oils play a vital role in electrical bulb power transformation process and heavy power transformers? **(10)**

   (b) Discuss salient features of insulating gases. Name two equipments that utilize such insulating gases for electrical operation. **(10)**

SECTION - C

5. (a) What is practical significance of magnetic moment? **(5)**

   (b) Classify various magnetic materials. Name at least 3 magnetic substances that find applications in engineering systems. **(12)**

   (c) What do you mean by curie point? **(3)**

6. (a) How magnetostriction affects the performance of an electrical equipment? Explain. **(5)**

   (b) Explain salient features of following magnetic materials.

   (i) Alnico (ii) Carbon steel (iii) Nickel-iron alloy (iv) Grain oriented sheet steel (v) Soft ferrite. **(15)**

SECTION - D

7. (a) What do you mean by P-type and N-type semi conducting materials? **(10)**

(b) How silicon and Germanium find applications in semi-conducting device manufacturing technologies? **(10)**

8. (a) Explain operating principle of temperature sensitive resistor as a transducer. **(7)**

(b) What is Hall effect Generator? State its applications. **(5)**

(c) Compare NPN and PNP transistor with regard to signal amplification applications. **(8)**

SECTION - E

9. (a) Why mica is used in commutator of DC machine?

(b) What do you mean by Fermi dirac functions in insulations.

(c) What is practical significance of power factor in an insulator? What is its ideal value for perfect insulator?

(d) What is eddy current loss?

(e) What is donor or Acceptor in atomic bond hypothesis?

(f) Is magnetic susceptibility dependent on temperature variations?

(g) What kind of materials are normally used in power cables?

(h) What is composition of porcelain insulations?

(i) What kind of resistive material is used in heater wires?

(j) Why silicon is preffered over Germanium in developing solid state devices? **(10×2=20)**