

EX-402(N)

B. E. (Fourth Semester) EXAMINATION, June, 2010

(New Scheme)

(Electrical & Electronics Engg. Branch)

ELECTRICAL AND ELECTRONICS MATERIALS

[EX-402(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt total five questions. One question from each Unit is compulsory. All questions carry equal marks.

Unit - I

1. (a) Enumerate the characteristics of conductor materials for overhead lines. 10
- (b) Calculate the resistance of a wire at 50°C which is 300 m long and has an area of cross-section of 25 mm². The wire is made of aluminium. Resistivity of aluminium at 15°C is 2.7 ohm-m. Temperature coefficient of aluminium is 0.004 ohm/degree C at 0°C. 10

Or

2. (a) What are the thermodynamic properties of superconductors ? Give the relevant theory. 10

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- (b) A copper conductor of cross-sectional area $2.1 \times 10^{-6} \text{ m}^2$ has a current of 20 amperes. Find the mean velocity of electron flow in the conductor. Assume that there are 8.5×10^{28} electrons per cubic metre of copper material. 10

Unit - II

3. (a) What is Polarization ? Explain all the types of polarization in detail with the help of necessary sketches and derivations. 10
- (b) Explain the electrical, mechanical and thermal properties of PVC, varnish and adhesive tapes. 10

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Or

4. (a) Describe the effect of temperature on dielectric constant. What is dielectric loss ? Derive the formula used. 10
- (b) A piezoelectric crystal having a thickness of 2 mm and voltage sensitivity of 0.055 V-m/N is subjected to pressure of 1.25 MN/m². Calculate the voltage output. If the permittivity of the material is $40.6 \times 10^{-12} \text{ F/m}$, calculate its charge sensitivity. 10

Unit - III

5. (a) Describe the concepts of electron charge density and hole charge density. How do these theories help in design of *n*-type and *p*-type semiconductors ? 10
- (b) What is Hall Effect ? How will you determine carrier density with the help of Hall coefficient ? 10

Or

6. (a) Distinguish between intrinsic and extrinsic semiconductor. What do you mean by Zener and Avalanche breakdown ? 10
- (b) Explain impurity type semiconductor. 10

Unit – IV

7. (a) What is Curie temperature ? Explain the molecular field theory of ferromagnetism. 10
- (b) What is Hysteresis ? Explain the behaviour of hard magnetic material and soft magnetic material with the help of B-H curve. **RGPVONLINE.COM** 10

Or

8. (a) What is Ferromagnetism ? Explain general electric and magnetic properties of ferrites. 10
- (b) What are permanent and high permeability magnetic materials ? Discuss their outstanding characteristics. 10

Unit – V

9. (a) Explain the fabrication techniques of the following devices : 10
FET, CMOS
- (b) Explain various processes in the manufacturing of Integrated circuits. 10

Or

10. (a) Explain how isolation between components is obtained in an IC. 10
- (b) Explain hybrid IC technology. 10