D 27019 (Pages 2) Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2006

EE 2K 406—ELECTRICAL ENGINEERING MATERIAL SCIENCE

Time : Three Hours Maximum : 100 Marks

I. (a) Briefly explain the Free Electron theory in metals.

(b) Write a note on "Contact Potential".

(c) How an Electric Resistance is created in a material ?

(d) Discuss about Dielectric polarization.

(e) Discuss the Behaviour of Dielectrics under alternating fields.

(f) Discuss the factors affecting the Dielectric strength.

(g) Give some of the applications of the Inorganic and Organic Insulating materials.

(h) Discuss about the requirement of different coatings.

(8 × 5 = 40 marks)

II. (a) (i) Explain Fermi-Dirac distribution of Free Electron in metal. (5 marks)

(ii) Classify the magnetic materials and compare the properties of all. (10 marks)

Or

(b) (i) Explain about compound semiconductors. (7 marks)

(ii) Explain the concept of magnetic material and explain about the design of permanent and Electromagnets.

(8 marks)

III. (a) (i) Derive and explain the expression for electronic polarization in mono atomic gases.

(10 marks)

(ii) Write a note on "Domain theory". (5 marks)

Or

(b) (i) Derive and explain the expression for polarization in solids. (10 marks)

(ii) Write a note on "Dielectric losses". (5 marks)

IV. (a) (i) Briefly discuss the different theory of Electrical Break-down in solid dielectric materials.

(10 marks)

(ii) Discuss the properties of liquid Insulating materials. (5 marks)

Or

(b) (i) Discuss the factor influencing the dielectric strength. (5 marks)

(ii) Explain some of the properties and application of Organic materials (Insulating). (10 marks)

V. (a) (i) Explain the process of photothermal conversion. (5 marks)

(ii) Discuss on Optical Microscopy. (6 marks)

(iii) Explain the uses of coating for thermal energy collection. (4 marks)

Or

(b) (i) Write a note on solar cells and give some of the materials used in solar cell. (5 marks)

(ii) Write a short note on :

1 Electron spin resonance.

2 Electron microscopy.

(10 marks)

[4 × 15 = 60 marks]