22217

23124

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) State the types of election emission.

b) List any 2 trivalent and any two pentavalent impurities.

c) Define the term resistivity. State its unit.

d) Define:

i) Dark current

ii) Electroluminescence

e) Define permeability. State its unit.

f) State any two applications of microrelays.

g) Define:

i) Drift current

ii) Diffusion current

P.T.O.

Marks

2. Attempt any THREE of the following: **12**

a) Explain ferromagnetic domains.

b) Compare ferrimagnetic and paramagnetic materials on the basis of

i) Dipole moment orientation.

ii) Magnetization

iii) Examples

iv) Dipole moment interaction

c) Explain the working principle of LASER.

d) Explain the concept of piezoelectricity. State any two piezoelectric materials.

3. Attempt any THREE of the following: **12**

a) Explain in detail the following materials for fabrication of semiconductors:

i) Substrates

ii) Capacitance materials

b) Explain seebeck effect. State any two applications of seebeck effect.

c) State one application for the given dielectric material:

i) Paper

ii) Transformer Oil

iii) Porcelain

iv) Poly Vinyl Chloride (PVC)

d) Explain the breakdown process in solid dielectric materials.

Marks

4. Attempt any THREE of the following: **12**

a) Compare insulator and semi conductor on the following points:

i) Energy level

ii) Current conduction

iii) Examples

iv) Value of forbidden gap

b) State any two photoemissive materials. Give the material composition for obtaining RED and GREEN colour LED.

c) Draw and explain the magnetization curve.

d) Classify the following materials as para-magnetic, ferromagnetic, ferrimagnetic and diamagnetic:

i) Manganese ferrite

ii) Platinum

iii) Glass

iv) Iron

e) From the given figures a), b) and c) identify the material with highest conductivity.

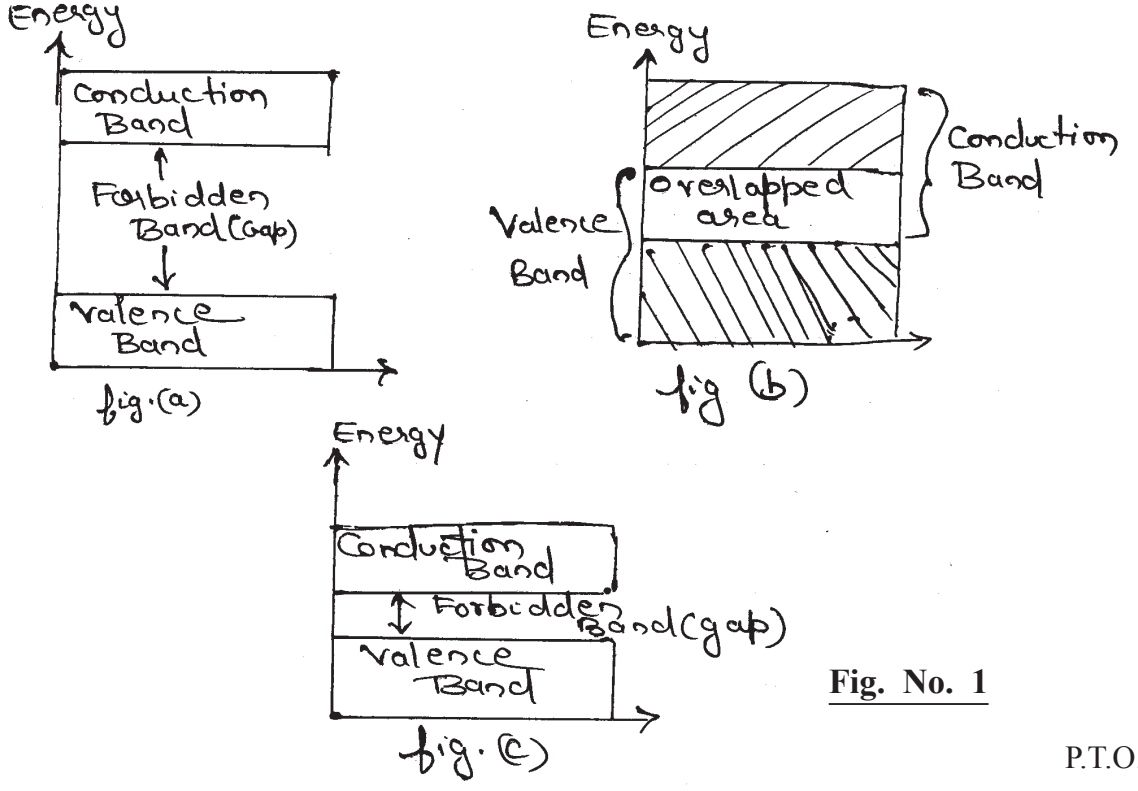

Fig. No. 1

Marks

5. Attempt any TWO of the following: **12**

a) Explain the breakdown process in gaseous dielectrics. State the factors that affect breakdown voltage.

b) State the types of thermoelectric effects. With a neat sketch explain the working principle of thermocouple.

c) Define hysteresis loss. Explain the factors affecting hysteresis loss.

6. Attempt any TWO of the following: **12**

a) i) Define conductivity. State its unit.

ii) Calculate resistivity and conductivity of a copper rod with resistance of 0.03Ω, length of 1.5 cm and cross sectional area of $1mm^2$

b) i) State the formula for finding capacitance of a material.

ii) Explain parallel plate capacitor with vacuum dielectric.

c) Explain secondary emission. Suggest suitable material for

i) Field emission

ii) Thermionic emission and give one application of each.