

R16

Code No: 132AF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, May/June - 2017

APPLIED PHYSICS

(Common to CE, ME, MCT, MMT, ME, CEE, MSNT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

- 1.a) Define stress and mention its types. [2]
- b) What is young's modulus? [3]
- c) What is meant by acoustics of building? [2]
- d) What are the factors affecting the acoustics quality of the building? [3]
- e) Distinguish between audible, infrasonic and ultrasonic waves. [2]
- f) Define piezoelectric effect. [3]
- g) What is meant by polarization in a dielectric material? [2]
- h) What is meant by dielectric loss? [3]
- i) Define magnetic dipole and magnetic flux density. [2]
- j) What are different types of magnetic materials? [3]

PART-B

(50 Marks)

- 2.a) Explain various kinds of moduli of elasticity.
- b) Find the amount of work done in twisting the steel wire of radius 2mm and length 50cm through an angle 45° . The rigidity modulus of steel is $8 \times 10^8 \text{ Nm}^{-2}$. [5+5]

OR

- 3.a) Derive the rigidity modulus of the wire using Torsional pendulum.
- b) How much force is required to stretch a steel wire to double its length when its area of cross section is 2 sq cm and Young's modulus is $2 \times 10^{11} \text{ N/m}^2$. [5+5]

- 4.a) What are the basic requirements of an acoustically good hall?
- b) Explain the various factors that affect architectural acoustics and suggest their remedies? [5+5]

OR

- 5.a) Define and explain the sound absorption coefficient of materials.
- b) Derive Sabine's mathematical relation for reverberation time. [5+5]

- 6.a) Explain the construction and production of ultrasonic waves using magnetostriction method. [5+5]
b) Write notes on applications of ultrasonic waves. [5+5]

OR

- 7.a) Explain the construction and production of ultrasonic waves using piezoelectric method. [5+5]
b) How are ultrasonic waves used in non-destructive testing of materials? [5+5]

- 8.a) What is orientation polarization? Derive an expression for the mean dipole moment when a polar material is subjected to an external field.
b) The dielectric constant of helium, measured at 0°C and 1 atmosphere is $\epsilon_r = 1.0000684$. Under these conditions the gas contains 2.7×10^{25} atoms/ m^3 . Calculate the radius of the electron cloud. Also calculate the displacement when a helium atom is subjected to an electric field of 10^6 V/m? [5+5]

OR

- 9.a) Discuss in detail the origin of ferroelectricity in barium titanate.
b) If the relative permittivity of sulphur is 4.0. Calculate its atomic polarizability. [Given that sulphur in cubic form has a density of 2.08×10^3 kg/ m^3 and its atomic weight is 32]. [5+5]

- 10.a) Explain in detail domain theory of ferromagnetism.
b) The saturation magnetic induction of nickel is 0.65 wb/ m^2 . If the density of nickel is 8906 kg/ m^3 and its atomic weight is 58.7, calculate the magnetic moment of the nickel atom in Bohr magneton. [5+5]

OR

- 11.a) What is Meissner effect? Explain. [5+5]
b) Write applications of superconductivity. [5+5]

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