

Code No: R07A1BS03

SET 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

I B. Tech. Regular Examinations June – 2009

ENGINEERING PHYSICS

(Common to CE, ME, CHEM, MCT, MMT, MEP, AE, AME)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions.
All Questions carries equal marks.

1. a) What is the difference between interference and diffraction? [6]
b) Describe Young's double slit experiment and obtain an expression for fringe width. [6]
c) In Young's double slit experiment, a source of light of wave length $4200\text{\AA}$ is used to obtain interference fringes of width $0.64 \times 10^{-2}\text{m}$. What should be the wavelength of light source to obtain fringes $0.46 \times 10^{-2}\text{m}$ wide, if the distance between screen and the slit is reduced to half the initial value? [4]
2. a) Mention some important properties of ultrasonic wave [4]
b) Describe ultrasonic testing system and the methods involved in non destructive testing of materials. [8]
c) What are the basic requirements of acoustically good hall? [4]
3. a) Write a short notes on classification magnetic materials [6]
b) Explain hysteresis curve in detail. [4]
c) Discuss about hard and soft magnetic materials. [6]
4. a) Show that FCC crystals are closely packed than simple cubic and body centered cubic crystals. [12]
b) Copper has FCC structure and its atomic radius is 0.1278nm . Calculate its density. Take the atomic weight of copper as 63.5a.m.u [4]
5. a) Explain characteristics of laser [4]
b) Describe the construction and working of ruby laser [8]
c) Mention applications of lasers in industry, scientific and medical fields. [4]
6. a) Explain the basic principal of an optical fiber. [4]
b) Explain numerical aperture and derive an expression for it. [8]
c) Calculate the angle of acceptance angle of the given optical fiber, if the refractive indices of the core and cladding are 1.563 and 1.498 respectively. [4]
7. a) What are dielectric materials? And explain their properties. [6]
b) Describe different types of polarization. [6]
c) Explain the important requirements of dielectrics [4]

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SET 1

8. Give short notes on

- a) Types of polarization b) Reverberation and time of reverberation
- c) Specific heat of solids d) basic principal of holography

4X4=16

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SET 2

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ENGINEERING PHYSICS

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions.

All Questions carries equal marks.

1. a) What is interference? What are the conditions necessary for obtaining interference Fringes? [5]
b) What are Newton's rings? Obtain an expression for the radius of the n^{th} dark ring in the case of Newton's rings. [6]
c) In Newton's ring experiment, the diameters of the 4^{th} and 12^{th} dark rings are 0.400cm and 0.700cm respectively. Find the diameter of the 20^{th} dark ring. [5]
2. a) Write down the sabine's formula .Explain the terms involved in it and describe the units of the each of them. State the limitations of the formula. [8]
b) Explain how the reverberation time of hall is affected by i) its size ii) nature of its wall surface iii) audience. [8]
3. a) What is the concept of the superconductivity 4X4=16
b) Write a note on
i) Meissner effect
ii) Type-I and Type-II superconductors
iii) Flux quantization
iv) d.c and a.c Josephson's effect
4. a) Explain the terms i) basis ii)space lattice iii)unit cell iv) primitive cell [6]
b) Describe the seven crystals with diagrams [6]
c) Copper has FCC structure and its atomic radius is 0.1278nm.Calculate its density. Take the atomic weight of copper as 63.5a.m.u [4]
5. a) Explain characteristics of laser [4]
b) Describe the construction and working of He-Ne laser [8]
c) Mention applications of lasers in industry, scientific and medical fields. [4]
6. a) What are the advantages of an optic fiber communication system over the conventional ones? [4]
b) Explain how optical fibers are classified. Discuss their characteristic in detail with the help of neat diagram. [8]
c) Calculate the angle of acceptance angle of the given optical fiber, if the refractive indices of the core and cladding are 1.553 and 1.428 respectively. [4]

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SET 2

7. a) Certain molecules possess permanent electric dipole moment even in the absence of an applied electric field, Explain. [6]
b) Explain the electric break down in solid dielectrics. [6]
c) Find the relative dielectric constant of sulphur using the following data. Atomic weight=32, Density=2.08gm/cm³, electronic polarizability=3.28X10⁻⁴⁰F/m². [4]
8. Write short notes on
a) Double refraction b) Einstein model 4X4=16
c) Ferro and piezo electricity. d) Population inversion

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SET 3

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions.

All Questions carries equal marks.

1. a) Explain in detail fraunhofer diffraction due to single slit. [6]
b) Obtain an expression for the width of central maxima in fraunhofer diffraction. [6]
c) In fraunhofer double slit diffraction, the slit width is 0.06mm and the separation between the slit is 0.3mm. The diffraction pattern is observed on the screen at a distance of 150cm from the slits. If the fringes separation is 0.3cm, find the wavelength of light? [4]
2. a) Derive Sabine's formula for reverberation time. [6]
b) What are the factors affecting the acoustically good hall. [6]
c) The intensity of sound produced by thunder is 0.1 Wm^{-2} . Calculate intensity level of in decibel. [4]
3. a) What are superconductors? Explain the occurrence of superconductivity. What are the different types of superconductors? Explain them in detail. [6]
b) What is BCS theory? Enumerate the important results of BCS theory. [6]
c) Prove that super conductors are perfect diamagnetic. [4]
4. a) Derive Bragg's law of X-ray diffraction. [6]
b) Explain the powder method and Laue method of X ray diffraction [10]
- 5) a) Write a short notes on [6]
i) coherence ii) absorption iii) Stimulated emission
b) Explain the purpose of active medium in a resonator in a laser. [6]
c) A matter wave propagating with a velocity $3 \times 10^3 \text{ m/s}$ and its wavelength 600nm. Calculate matter wave energy. [4]
- 6) a) Explain briefly the basic principal of an optical fiber [4]
b) Describe structure of optical fiber. Write short notes on Step index fiber and graded index fiber [8]
c) An optical fiber acceptance angle 26.80° , then calculate its numerical aperture. [4]
7. a) Define specific heat of solids. What are the factors that affect the specific heat of solid dielectric materials? Explain their properties. [8]
b) What is thermal conductivity? Explain the origin of thermal conductivities. [8]

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SET 3

8. Write short notes on

4x4=16

- a) Phonons
- b) Numerical aperture
- c) Semi conductor laser
- d) Hysteresis curve

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SET 4

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions.

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1. a) Distinguish between polarized and unpolarized light. [4]
b) Describe the process of production of plan polarized light by reflection. [4]
c) Explain double refraction and Nicol prism. [6]
2. a) What are the piezoelectric and magnetostriction method explain in detail. [8]
b) Discuss the advantages and disadvantages of these two methods. [4]
c) An ultrasonic source of 0.07MHz sends down a pulse towards the seabed which returns after 0.65 sec. The velocity of sound in sea is 1700m/s. Calculate the depth of sea and the wave length of pulse. [4]
3. Explain the terms [4x4]
i) penetration depth ii) BCS theory
iii) Type-I and Type-II superconductors IV) DC and AC Josephson effect
4. a) Deduce the relation between inter planer distance 'd' and the Miller indices of the planes for the cubic crystal. [8]
b) What are the Miller indices? How are they determined? [4]
c) The Bragg angle corresponding to the first order reflection from plane (111) in a crystal is 30° when X-ray of wave length $1.75\text{\AA}$ are used. Calculate the inter atomic spacing. [4]
5. a) Explain the terms [10]
i) Temporal coherence ii) spatial coherence iii) Population inversion iv) pumping
v) meta stable state
b) What do you understand by a resonant cavity? Explain. [6]
6. a) Explain the basic principle of the holography. [4]
b) Write notes on Construction of hologram and reconstruction of image. [8]
c) What are the applications of holography? [4]
7. a) Discuss the merits and demerits of Einstein's quantum theory of specific heat of solids. [8]
b) Derive and discuss one dimensional lattice vibrations in solids. [8]

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SET 4

8.) Write short notes on

a) Dulong and Petit's law

c) Origin of magnetic moment

b) Sabine's formula for reverberation

d) Ferro and piezo electricity

4x4
