Code No: A109100104 Set No. 2
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I B.Tech. III Mid Examinations, May – 2010
ENGINEERING PHYSICS

Objective Exam
Name: _____ Hall Ticket No. A

Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.

I. Choose the correct alternative:

1. In fiber optic communication system, the preferable source of light is [ ]
(A) LED (B) sodium lamp (C) mercury lamp (D) laser
2. The residential soundproofing aims to eliminate the effects of [ ]
(A) internal noise (B) reverberation (C) absorption (D) external noise
3. The magnetic susceptibility (÷) of a magnetic material is given by [ ]
(A) ÷ = (ìr -1) (B) ÷ = (ìr +1) (C) ÷ = (1 - ìr) (D) ÷ = (ìo -1)
4. The condition for lasing action is [ ]
(A) excitation (B) meta-stable state (C) population inversion (D) emission
5. The reverberation time for an auditorium is the time required for the intensity of sound to drop to
[ ]
(A) 10^{-9} times its initial value (B) 10^{-6} times its initial value
(C) 10^{-3} times its initial value (D) 10^{-8} times its initial value
6. Which of the following is not a stage of sol-gel formation? [ ]
(A) Agglomeration (B) Condensation (C) Hydrolysis (D) Sputtering
7. The relation between magnetic induction (B), magnetic field strength (H) and magnetization (M) is
[ ]
(A) B = H + M (B) B = M + ìoH (C) B = ìo (H + M) (D) M = B + ìoH
8. The material in which spontaneous polarization changes with temperature, is called [ ]
(A) ferroelectric (B) pyroelectric (C) piezoelectric (D) anti-ferromagnetic
9. Nickel zinc ferrites are used as cores in [ ]
(A) radios (B) TV transformers (C) transmitters (D) electromagnets
10. In multimode graded index fiber, light rays travel in different parts of the fiber [ ]
(A) with different speeds (B) with same speed
(C) with minimum speed (D) with maximum speed

II Fill in the blanks

11. The unit of Einstein's coefficient is _____.
12. The synthesizing of nanomaterials from larger pieces of material, is called _____ technique.
13. Ionic Polarization is _____ temperature.
14. The active element in ruby laser is _____.
15. The acceptance angle of a fiber of numerical aperture 0.22, is _____º.
16. A _____ is a device for reducing the amount of noise emitted by a machine.
17. When the radius of a sphere is reduced to 2.0 nm, the surface area to volume ratio becomes
_____ per meter.
18. The unit for measurement of displacement vector is _____.
19. Above Curie temperature, the shape of B-H curve of a ferromagnetic material is in the form of a
_____.

20. The phenomenon of expulsion of magnetic lines from a super-conductor is known as _____.

-oOo-

Code No: A109100104 Set No. 3
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I B.Tech. III Mid Examinations, May – 2010
ENGINEERING PHYSICS

Objective Exam
Name: _____ Hall Ticket No. A

Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.

I. Choose the correct alternative:

1. The magnetic susceptibility (÷) of a magnetic material is given by [ ]
(A) ÷ = (ìr -1) (B) ÷ = (ìr +1) (C) ÷ = (1 - ìr) (D) ÷ = (ìo -1)
2. The condition for lasing action is [ ]
(A) excitation (B) meta-stable state (C) population inversion (D) emission
3. The reverberation time for an auditorium is the time required for the intensity of sound to drop to
[ ]
(A) 10^{-9} times its initial value (B) 10^{-6} times its initial value
(C) 10^{-3} times its initial value (D) 10^{-8} times its initial value
4. Which of the following is not a stage of sol-gel formation? [ ]
(A) Agglomeration (B) Condensation (C) Hydrolysis (D) Sputtering
5. The relation between magnetic induction (B), magnetic field strength (H) and magnetization (M) is
[ ]
(A) B = H + M (B) B = M + ìoH (C) B = ìo (H + M) (D) M = B + ìoH
6. The material in which spontaneous polarization changes with temperature, is called [ ]
(A) ferroelectric (B) pyroelectric (C) piezoelectric (D) anti-ferromagnetic
7. Nickel zinc ferrites are used as cores in [ ]
(A) radios (B) TV transformers (C) transmitters (D) electromagnets
8. In multimode graded index fiber, light rays travel in different parts of the fiber [ ]
(A) with different speeds (B) with same speed
(C) with minimum speed (D) with maximum speed
9. In fiber optic communication system, the preferable source of light is [ ]
(A) LED (B) sodium lamp (C) mercury lamp (D) laser
10. The residential soundproofing aims to eliminate the effects of [ ]
(A) internal noise (B) reverberation (C) absorption (D) external noise

II Fill in the blanks

11. Ionic Polarization is _____ temperature.
12. The active element in ruby laser is _____.
13. The acceptance angle of a fiber of numerical aperture 0.22, is _____º.
14. A _____ is a device for reducing the amount of noise emitted by a machine.
15. When the radius of a sphere is reduced to 2.0 nm, the surface area to volume ratio becomes
_____ per meter.
16. The unit for measurement of displacement vector is _____.
17. Above Curie temperature, the shape of B-H curve of a ferromagnetic material is in the form of a
_____.
18. The phenomenon of expulsion of magnetic lines from a super-conductor is known as
_____.

19. The unit of Einstein’s coefficient is _____.
20. The synthesizing of nanomaterials from larger pieces of material, is called _____ technique.

-oOo-

Code No: A109100104 Set No. 4
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I B.Tech. III Mid Examinations, May – 2010
ENGINEERING PHYSICS

Objective Exam
Name: _____ Hall Ticket No. A

Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.

I. Choose the correct alternative:

1. The reverberation time for an auditorium is the time required for the intensity of sound to drop to
[ ]
(A) 10^{-9} times its initial value (B) 10^{-6} times its initial value
(C) 10^{-3} times its initial value (D) 10^{-8} times its initial value

2. Which of the following is not a stage of sol-gel formation? [ ]
(A) Agglomeration (B) Condensation (C) Hydrolysis (D) Sputtering

3. The relation between magnetic induction (B), magnetic field strength (H) and magnetization (M) is
[ ]
(A) B = H + M (B) B = M + $ì_o$H (C) B = $ì_o$ (H + M) (D) M = B + $ì_o$H

4. The material in which spontaneous polarization changes with temperature, is called [ ]
(A) ferroelectric (B) pyroelectric (C) piezoelectric (D) anti-ferromagnetic

5. Nickel zinc ferrites are used as cores in [ ]
(A) radios (B) TV transformers (C) transmitters (D) electromagnets

6. In multimode graded index fiber, light rays travel in different parts of the fiber [ ]
(A) with different speeds (B) with same speed
(C) with minimum speed (D) with maximum speed

7. In fiber optic communication system, the preferable source of light is [ ]
(A) LED (B) sodium lamp (C) mercury lamp (D) laser

8. The residential soundproofing aims to eliminate the effects of [ ]
(A) internal noise (B) reverberation (C) absorption (D) external noise

9. The magnetic susceptibility (÷) of a magnetic material is given by [ ]
(A) ÷ = ($ì_r$ -1) (B) ÷ = ($ì_r$ +1) (C) ÷ = (1 - $ì_r$) (D) ÷ = ($ì_o$ -1)

10. The condition for lasing action is [ ]
(A) excitation (B) meta-stable state (C) population inversion (D) emission

II Fill in the blanks

11. The acceptance angle of a fiber of numerical aperture 0.22, is _____º.
12. A _____ is a device for reducing the amount of noise emitted by a machine.
13. When the radius of a sphere is reduced to 2.0 nm, the surface area to volume ratio becomes
_____ per meter.
14. The unit for measurement of displacement vector is _____.
15. Above Curie temperature, the shape of B-H curve of a ferromagnetic material is in the form of a
_____.
16. The phenomenon of expulsion of magnetic lines from a super-conductor is known as

_____.
17. The unit of Einstein's coefficient is _____.
18. The synthesizing of nanomaterials from larger pieces of material, is called _____ technique.
19. Ionic Polarization is _____ temperature.
20. The active element in ruby laser is _____.

-oOo-

Code No: 09A1BS02 R09 Set No. 2
I B.Tech Regular Examinations,June 2010
ENGINEERING PHYSICS
Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE, E.COMP.E, MMT, ETM, EIE, CSE, ECE, EEE

Time: 3 hours Max Marks: 75
Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is statistical mechanics? Write notes on Bose-Einstein statistics.
(b) Write notes on black body radiation.
(c) Calculate the energies that can be possessed by a particle of mass 8.50 _ 10_31kg which is placed in an in_nite potential box of width 10_9cm. [6+5+4]

2.(a) What is the meaning of nanotechnology? Explain.
(b) Describe the processes of \sol-gel" and \precipitation" in the fabrication Of nano- structures.
(c) Write the applications of nanotechnology in Electronic Industry. [4+7+4]

3. (a) Write notes on volume defects in crystals.
(b) What is Burger's vector? What is Burger's circuit? Explain.
(c) If the average energy required to create a Frenkel defect in an ionic crystal is 1.35 eV, calculate the ratio of Frenkel defects at 250C and 3500C. [5+6+4]

4. (a) Discuss the band theory of solids and explain the formation of bands and concept of holes.
(b) What is effective mass of an electron? Derive an expression for the e_ective mass of an electron. [9+6]

5. (a) Explain the formation and properties of an ionic crystal, with a suitable ex-
ample.
(b) Derive an expression for the cohesive energy of an ionic crystal. [7+8]

6. (a) What is Meissner e_ect? Explain, in detail.
(b) Distinguish a super-conductor and a normal metal, both maintained at same temperature.
(c) Write notes on magnetic levitation. [5+5+5]

7. (a) Explain the characteristics of a laser beam.

(b) Describe the construction of He-Ne laser and discuss with relevant ELD, the working of He-Ne laser.
(c) What are the di_erences between a laser diode and an LED? [4+7+4]
1
8. (a) Derive an expression for carrier concentration of p-type semiconductors.
(b) Explain Hall e_ect and its importance.
(c) For a semiconductor, the Hall coe_cient is -6.85 _ 10_5 m3/coulomb, and electrical conductivity is 250 m_1_1. Calculate the density and mobility of the charge carriers. [7+4+4]

R09 Set No. 4
I B.Tech Regular Examinations,June 2010
ENGINEERING PHYSICS
Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE, E.COMP.E, MMT, ETM, EIE, CSE, ECE, EEE
Time: 3 hours Max Marks: 75
Answer any FIVE Questions
All Questions carry equal marks

1. (a) Obtain an expression for Fermi energy at T > 0 K.
(b) Derive an expression for density of states of electrons.
(c) Write short notes on:
i. De Broglie wavelength and
ii. Heisenberg's uncertainty principle. [4+7+4]

2. (a) Derive Bragg's law of crystal di_raction.
(b) Describe, in detail, Debye-Scherrer method for the determination of crystal parameter.
(c) A certain crystal reects monochromatic X-rays strongly when Bragg's angle is 210 for the second order di_raction. Calculate the glancing angle for third order spectrum. [4+7+4]

3. (a) What is bonding in solids? Write the list of di_erent types of bonding in solids.
(b) Describe with suitable examples, the formation of covalent and Vander-Waal's
bonds in solids.
(c) What is bonding energy of a molecule? Explain. [4+7+4]

4. (a) Describe the top-down methods by which nanomaterials are fabricated.
(b) Explain how X-ray di_raction can be used to characterize nanoparticles.[9+6]

5. (a) Discuss the propagation mechanism of light waves in optical _bers.
(b) Derive the expression for the numerical aperture of an optical _ber.
(c) A step index _ber has a numerical aperture of 0.16, and core refractive index of 1.45. Calculate the acceptance angle of the _ber and the refractive index of the cladding. [5+6+4]

6. (a) Using Kronig-Penney model show that the energy spectrum of an electron contains a number of allowed energy bands separated by forbidden bands.
(b) De_ne e_ective mass of an electron. Explain its physical signi_cance. [9+6]

7. (a) Show that the application of forward bias voltage across p-n junction causes
an exponential increase in number of charge carriers in opposite regions.
(b) Write notes on \Liquid Crystal Display".
(c) The current in a p-n junction at 270C, is 0.18 _A when a large reverse bias voltage is applied. Calculate the current when a forward bias of 0.98 V is applied. [7+4+4]

8. (a) De_ne the terms magnetic induction (B), magnetization (M) and magnetic _eld (H). Obtain an expression relating to these quantities.
(b) What are ferrites? Prove that ferrites are superior to ferro-magnetic materils. Write the applications of ferrites.
(c) The magnetic susceptibility of aluminum is 2.3 _ 10_5. Find its permeability and relative permeability. [6+5+4]

Code No: 09A1BS02 R09 Set No. 1
I B.Tech Regular Examinations,June 2010
ENGINEERING PHYSICS
Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE, E.COMP.E, MMT, ETM, EIE, CSE, ECE, EEE
Time: 3 hours Max Marks: 75
Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the principle behind the functioning of an optical _bre.
(b) Derive an expression for numerical aperture of an optical _bre.
(c) Write any three applications of optical _bres. [4+7+4]

2. (a) Distinguish between intrinsic and extrinsic semicondutors.
(b) Derive an expression for the density of holes in the valence band of an intrinsic
semiconductor. [7+8]

3. (a) What is bonding in solids? Write the list of di_erent types of bonding in solids.
(b) Describe with suitable examples, the formation of ionic and covalent bonds in
solids.
(c) What is cohesive energy of a molecule? Explain. [4+7+4]

4. (a) What is Bloch theorem? Explain.
(b) Write the conclusions given by Kronig-Penney model.
(c) For an electron under motion in a periodic potential, plot the curve between the e_ective mass of the electron and wave number, and explain. [5+5+5]

5. (a) Describe any three processes by which nanomaterials are fabricated.
(b) Describe the important applications of nanotechnology. [9+6]

6. (a) De_ne magnetic moment. What is Bohr magneton? Explain.
(b) What are the characteristics of diamagnetic, paramagnetic and ferromagnetic substances? Explain their behavior with the help of examples.
(c) If a magnetic _eld of strength 300 amp/metre produces a magnetization of 4200 A/m in a ferromagnetic material, _nd the relative permeability of the material. [3+9+3]

7. (a) Explain the concept of dual nature of the light.
(b) Describe the experimental veri_cation of matter waves using Davisson-Germer
experiment.
(c) Calculate the wavelength of matter wave associated with a neutron whose kinetic energy is 1.5 times the rest mass of electron.
(Given that Mass of neutron = 1.676 _ 10_27 kg, Mass of electron = 9.1 _ 10_31 kg, Planck's constant = 6.62 _ 10_34 J-sec, Velocity of light = 3 _ 108 m/s). [4+7+4]

8. (a) Write notes on Bragg's law.
(b) Describe Bragg's X-ray spectrometer method in the determination crystal structure.
(c) Calculate the glancing angle of (1 1 1) plane of a cubic crystal having axial length 0.19 nm corresponding to the second order di_raction maximum for the X-rays of wavelength 0.058 nm. [4+7+4]

Code No: 09A1BS02 R09 Set No. 3
I B.Tech Regular Examinations,June 2010
ENGINEERING PHYSICS
Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE, E.COMP.E, MMT, ETM, EIE, CSE, ECE, EEE
Time: 3 hours Max Marks: 75
Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain Fermi-Dirac distribution function. Illustrate the e_ect of temperature
on the distribution.
(b) Derive an expression for density of states of an atom. [8+7]

2. (a) Derive the expressions for:
i. Acceptance angle and
ii. Numerical aperture of an optical _ber.
(b) Describe the di_erent types of _bers by giving the refractive index pro_les and
propagation details. [8+7]

3. (a) What are Brillouin zones? Explain using E-K diagram.

(b) De_ne e_ective mass of an electron. Explain its physical signi_cance.
(c) What is a hole? List out the properties of a hole. [5+5+5]

4. (a) Write notes on `point defects' in crystals..
(b) Derive the expression for the density of Frenkel defects in a metallic crystal.
(c) What is Burgers vector? Explain. [5+5+5]

5. (a) Describe the di_erent methods of acoustic quieting.
(b) Describe various method to achieve soundproo_ng. [7+8]

6. (a) Explain the terms:
i. Magnetic induction,
ii. Magnetic susceptibility,
iii. Permeability of a medium and
iv. Intensity of magnetization.
(b) What are hard and soft magnetic materials? Give their characteristic properties and applications.
(c) A paramagnetic material has a magnetic _eld intensity of 104 amp/m. If the susceptibility of the material at room temperature is 3.7 _ 10_3. Calculate the magnetization and ux density of the material. [6+5+4]

7. (a) What do you understand by Miller indices of a crystal plane?
(b) Show that in a cubic crystal the spacing (d) between consecutive parallel planes of Miller indices (h k l) is given by d = a (h2 + k2 + l2)_1=2.
(c) NaCl crystals have FCC structure. The density of NaCl is 2.18 gm/cm2. Calculate the distance between two adjacent atoms. (Molecular weight of NaCl = 58.5). [4+7+4]

8. (a) Derive an expression for density of electrons in intrinsic semiconductors.
(b) Explain the variation of Fermi level with temperature in the case of p-type semiconductors.
(c) If the e_ective mass of holes in a semiconductor is 5 times that of electrons, at
what temperature would the Fermi level be shifted by 15% from the middle of the forbidden energy gap? [Given that the energy gap for the semiconductor is 1.20 eV]. [7+4+4]

ALL

THE

BEST…..

Dept of physics

www.jntuworld.com