Subject Code: R13203/R13 **Set No - 1**

I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING PHYSICS

(Common to CE, ME,CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

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PART-A

1.(i) Write a note on colours of thin films.
(ii) Describe the FCC sub lattice and calculate its atomic packing factor.
(iii) Discuss the temperature dependence of magnetic susceptibility in dia, para and ferromagnetic materials.
(iv) How will you measure absorption coefficient of a material?
(v) What are matter waves? Derive the expression for de Broglie's wavelength.
(vi) What are direct and indirect band gap semiconductors?

[4+4+3+3+4+4]

PART-B

2.(a) State and explain Brewster's law.
(b) Define Drift & Diffusion currents and derive Einstein's equation.
(c) For copper density d= 8.92×10^{-8} Kg/m^3, resistivity $\rho = 1.73 \times 10^{-8}$ Ω-m, atomic weight M= 63.5. Calculate the mobility of the electrons in copper, obeying classical laws.

[4+8+4]

3.(a) What is population inversion and how can it be achieved?
(b) Explain the Principle, construction and working of a Nicol prism with neat diagram.
(c) Draw the diagram to show the variation of the Fermi level with temperature and impurity concentration in case of n-type semiconductor.

[4+8+4]

4.(a) Differentiate between soft and hard superconductors.
(b) Explain the three level and four level laser systems. What are the advantages of four level laser system over three level laser system?
(c) In Newton's rings experiment, diameter of the tenth dark ring due to wavelength 6000Å in air is 0.5 cm. Find the radius of curvature of the lens.

[4+8+4]

5.(a) Explain the polarization mechanism in dielectrics.
(b) Explain BCS theory with key note of cooper pairs.
(c) State few applications of laser.

[4+8+4]

6.(a) What are the draw backs of classical free electron theory?
(b) What are the polar and non-polar dielectrics? Derive Clausius-Mosotti equation.
(c) Mention the applications of Josephson's effect.

[4+8+4]

7.(a) Distinguish between n-type and p-type semiconductors.
(b) Derive an expression for electrical conductivity of a conducting material based on quantum mechanical treatment.
(c) The penetration depths for lead at 3 K and 7.1 K are 39.6nm and 173nm respectively. Calculate the critical temperature for lead.

[4+8+4]

Subject Code: R13203/R13 **Set No - 2**

I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING PHYSICS

(Common to CE, ME,CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) What are Newton's rings? Why are they circular?
(ii) Describe the BCC sub lattice and calculate its atomic packing factor.
(iii) Define magnetic susceptibility. Why is it negative for diamagnetic materials?
(iv) What are the necessary conditions of physically acceptable wave function?
(v) Write the Maxwell's electromagnetic equations in differential or integral form.
(vi) How does the Fermi level change with temperature in extrinsic semiconductors?

[4+4+3+3+4+4]

PART-B

2.(a) Distinguish between Fresnel and Fraunhoffer diffractions.
(b) Define Drift & Diffusion currents and derive the expressions for drift and diffusion current densities.
(c) Find the relaxation time of conduction electrons in a metal if its resistivity is $1.54 \times 10^{-8} \Omega m$ and it has 5.8×10^{28} conduction electrons per cubic metre.

[4+8+4]

3.(a) Explain Step Index and Graded index optical fibers.
(b) Give the theory of plane diffraction grating. Obtain the condition for the formation of n^{th} order maximum.
(c) In a Hall coefficient experiment, a current of 0.25A is sent through a metal strip having thickness 0.2mm and width 5mm. The Hall voltage is found to be 0.15mV when a magnetic field of 2000 gauss is used. What is the carrier concentration?

[4+8+4]

4.(a) Derive the relation between polarization vector $\overline{P}$, the electric field $\overline{E}$ and displacement vector $\overline{D}$.
(b) Derive an expression for acceptance angle of fiber in terms of the refractive indices of core and cladding of an optical fiber. What is meant by acceptance cone?
(c) Distinguish between the spectra formed by a prism and a grating.

[4+8+4]

5.(a) How matter waves are different from Electromagnetic waves?
(b) Explain the electronic polarisability and show that electronic polarisability for a monochromatic gas increases as the size of the atoms becomes larger.
(c) Find the numerical aperture and acceptance angle of a fiber of core index 1.4 and fractional index change 0.02.

[4+8+4]

6.(a) What are the basic assumptions of classical free electron theory?
(b) Derive the time dependent Schrodinger wave equation.
(c) Explain the terms 'Dielectric breakdown 'and 'Dielectric strength'.

[4+8+4]

7.(a) State and explain Hall effect.
(b) Derive the expression for the density of energy states and carrier concentration in a metal.
(c) Calculate the de Broglie wavelength of an electron moving with velocity 10^7m/s.

[4+8+4]

Subject Code: R13203/R13 **Set No - 3**

I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING PHYSICS

(Common to CE, ME,CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

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1.(i) Write a note on colours of thin films.
(ii) Describe the FCC sub lattice and calculate its atomic packing factor.
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(v) What are matter waves? Derive the expression for de Broglie's wavelength.
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[4+4+3+3+4+4]

PART-B

2.(a) Distinguish between Fresnel and Fraunhoffer diffractions.
(b) Define Drift & Diffusion currents and derive the expressions for drift and diffusion current densities.
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Subject Code: R13203/R13 **Set No - 4**

I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING PHYSICS

(Common to CE, ME,CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) What are Newton's rings? Why are they circular?
(ii) Describe the BCC sub lattice and calculate its atomic packing factor.
(iii) Define magnetic susceptibility. Why is it negative for diamagnetic materials?
(iv) How will you measure absorption coefficient of a material?
(v) Write the Maxwell's electromagnetic equations in differential or integral form.
(vi) What are direct and indirect band gap semiconductors?

[4+4+3+3+4+4]

PART-B

2.(a) State and explain Brewster's law.
(b) Define Drift & Diffusion currents and derive Einstein's equation.
(c) For copper density d= 8.92×10^{-8} Kg/m^3, resistivity $\rho = 1.73 \times 10^{-8}$ Ω-m, atomic weight M= 63.5. Calculate the mobility of the electrons in copper, obeying classical laws.

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