Subject Code: R13103/R13 **Set No - 1**

I B. Tech I Semester Supplementary Examinations Sept. - 2014
ENGINEERING PHYSICS
(Common to ECE, EEE, EIE, Bio-Tech, E Com E and Agri. 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) Derive an expression for the dispersive power of a plane diffraction grating.
(ii) What are the characteristics of a LASER beam?
(iii) Explain orientation polarization in dielectrics and discuss the effect of temperature on it.
(iv) State and explain Fermi distribution function.
(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 the Principle of superposition of waves.
(b) Derive the expression for Fermi energy in intrinsic semiconductor.
(c) Explain the concept of Effective mass and derive the expression for it.

[4+8+4]

3.(a) Explain the terms 'Acceptance angle' and 'Acceptance cone'.
(b) Explain the formation of Newton's rings and obtain an expression for the diameter of the dark rings in reflected system.
(c) Mention some applications of Hall effect.

[4+8+4]

4.(a) Explain the important magnetic properties of ferro magnetic materials.
(b) Classify the fibers on the basis of refractive index profile, modes and materials.
(c) Newton's rings are formed with sodium light in an experiment. What is the order of the dark ring, which has double the diameter of the fourth dark ring?

[4+8+4]

5.(a) What are the properties of Matter waves?
(b) What is meant by Hysteresis? Explain ferro magnetic hysteresis on the basis of domain theory.
(c) An optical fiber has a core and cladding materials of refractive indices of 1.55 and 1.50 respectively. The light is launched into the fiber from air. Calculate its numerical aperture.

[4+8+4]

6.(a) Define valence band, conduction band and forbidden energy gap in the energy band structure.
(b) Show that the solution of Schrodinger wave equation for a particle in an infinite potential well leads to the concept of quantization of energy.
(c) Find the relative permeability of a ferro magnetic material if field of strength 220A/m produces a magnetization of 3300A/m in it.

[4+8+4]

7.(a) Distinguish between Intrinsic and Extrinsic semiconductors.
(b) Explain the Kronig-penny model of solids and show that it leads to energy band structure.
(c) An electron beam is accelerated from rest through a potential difference of 200V. Calculate the associated wavelength.

[4+8+4]

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Subject Code: R13103/R13 **Set No - 2**

I B. Tech I Semester Supplementary Examinations Sept. - 2014

ENGINEERING PHYSICS

(Common to ECE, EEE, EIE, Bio-Tech, E Com E and Agri. 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) What is a half wave plate? Deduce an expression for its thickness.
(ii) Distinguish between spontaneous and stimulated emissions.
(iii) Define dielectric susceptibility and polarisability of a dielectric. Write a relation connecting the two.
(iv) How will you measure the absorption coefficient of a material?
(v) Describe the formation of energy bands in a crystalline solid.
(vi) How does the Fermi level change with temperature in extrinsic semiconductors?

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

PART-B

2.(a) What are the necessary conditions to get clear and distinct interference fringes?
(b) Explain Hall effect and derive an expression for Hall coefficient. Give any two of its applications.
(c) For the metal having $6.5x10^{28}$ conduction electrons per m^3 find the relaxation time of conduction electrons if the metal has resistivity $1.43x10^{-8}\Omega m$.

[4+8+4]

3.(a) Distinguish between crystalline solids and amorphous solids.
(b) Derive the conditions for path difference for interference in thin parallel film due to reflected light.
(c) An electric field of 100 V/m is applied to a sample of n-type semiconductor whose Hall coefficient is $-0.0125m^3/C$. Determine the current density in the sample assuming $\mu_e=0.6m^2/V.s$.

[4+8+4]

4.(a) State and explain Meissner effect.
(b) Derive the expression for inter planar distance between consecutive planes described by Miller indices (hkl).
(c) A half wave plate is designed from a crystal for $\lambda=600nm$. If $(\mu_0 - \mu_e)=0.0057$, calculate the thickness of the plate.

[4+8+4]

5.(a) What are polar and non-polar dielectrics?
(b) Explain a.c. and d.c. Josephson's effect with theory.
(c) Silver has FCC structure and its atomic radius is 1.441Å. Find the spacing of (220) planes.

[4+8+4]

6.(a) Explain the terms 'Drift velocity' and 'Carrier mobility'.
(b) Derive an expression for internal field seen by an atom in a dielectric material subjected to an electric field.
(c) Give any four applications of superconductors.

[4+8+4]

7.(a) Write a notes on drift and diffusion currents.
(b) Based on classical free electron theory, derive an expression for electrical conductivity of metals.
(c) Write notes on Flux quantization.

[4+8+4]

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Subject Code: R13103/R13 **Set No - 3**

I B. Tech I Semester Supplementary Examinations Sept. - 2014

ENGINEERING PHYSICS

(Common to ECE, EEE, EIE, Bio-Tech, E Com E and Agri. 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) Derive an expression for the dispersive power of a plane diffraction grating.
(ii) What are the characteristics of a LASER beam?
(iii) Explain orientation polarization in dielectrics and discuss the effect of temperature on it.
(iv) State and explain Fermi distribution function.
(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) What are the necessary conditions to get clear and distinct interference fringes?
(b) Explain Hall Effect and derive an expression for Hall coefficient. Give any two of its applications.
(c) For the metal having 6.5×10^{28} conduction electrons per m^3 find the relaxation time of conduction electrons if the metal has resistivity $1.43 \times 10^{-8} \Omega m$.

[4+8+4]

3.(a) Explain the terms 'Acceptance angle' and 'Acceptance cone'.
(b) Explain the formation of Newton's rings and obtain an expression for the diameter of the dark rings in reflected system.
(c) Mention some applications of Hall effect.

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4.(a) State and explain Meissner effect.
(b) Derive the expression for inter planar distance between consecutive planes described by Miller indices (hkl).
(c) A half wave plate is designed from a crystal for λ=600nm. If $(\mu_0 - \mu_e)$=0.0057, calculate the thickness of the plate.

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5.(a) What are the properties of Matter waves?
(b) What is meant by Hysteresis? Explain ferro magnetic hysteresis on the on the basis of domain theory.
(c) An optical fiber has a core and cladding materials of refractive indices of 1.55 and 1.50 respectively. The light is launched into the fiber from air. Calculate its numerical aperture.

[4+8+4]

6.(a) Explain the terms 'Drift velocity' and 'Carrier mobility'.
(b) Derive an expression for internal field seen by an atom in a dielectric material subjected to an electric field.
(c) Give any four applications of superconductors.

[4+8+4]

7.(a) Distinguish between Intrinsic and Extrinsic semiconductors.
(b) Explain the Kronig-penny model of solids and show that it leads to energy band structure.
(c) An electron beam is accelerated from rest through a potential difference of 200V. Calculate the associated wavelength.

[4+8+4]

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Subject Code: R13103/R13 **Set No - 4**

I B. Tech I Semester Supplementary Examinations Sept. - 2014

ENGINEERING PHYSICS

(Common to ECE, EEE, EIE, Bio-Tech, E Com E and Agri. 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 is a half wave plate? Deduce an expression for its thickness.
(ii) Distinguish between spontaneous and stimulated emissions.
(iii) Define dielectric susceptibility and polarisability of a dielectric. Write a relation connecting the two.
(iv) How will you measure the absorption coefficient of a material?
(v) Explain the origin of magnetism in materials.
(vi) How does the Fermi level change with temperature in extrinsic semiconductors?

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

PART-B

2.(a) State and explain the Principle of superposition of waves.
(b) Derive the expression for Fermi energy in intrinsic semiconductor.
(c) Explain the concept of Effective mass and derive the expression for it.

[4+8+4]

3.(a) Distinguish between crystalline solids and amorphous solids.
(b) Derive the conditions for path difference for interference in thin parallel film due to reflected light.
(c) An electric field of 100 V/m is applied to a sample of n-type semiconductor whose Hall coefficient is $-0.0125 m^3/C$. Determine the current density in the sample assuming $\mu_e = 0.6 m^2/V.s$.

[4+8+4]

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(b) Classify the fibers on the basis of refractive index profile, modes and materials.
(c) Newton's rings are formed with sodium light in an experiment. What is the order of the dark ring, which has double the diameter of the fourth dark ring?

[4+8+4]

5.(a) What are polar and non-polar dielectrics?
(b) Explain a.c. and d.c. Josephson's effect with theory.
(c) Silver has FCC structure and its atomic radius is 1.441Å. Find the spacing of (220) planes.

[4+8+4]

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(c) Find the relative permeability of a ferro magnetic material if field of strength 220A/m produces a magnetization of 3300A/m in it.

[4+8+4]

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