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

I B. Tech II Semester Supplementary Examinations Feb. - 2015

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) How diffraction is different from interference?
(ii) Describe the BCC sub lattice and calculate its atomic packing factor.
(iii) Josephson junction has a voltage of 8.50 μV across its terminals. Then calculate the energy and frequency of the generating electro-magnetic waves.
(iv) What are the conditions to produce total internal reflection in optical fiber?
(v) Explain the concept of hole.
(vi) Write notes on Direct and Indirect band gap semiconductors.

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

PART-B

2.(a) What is meant by Diffraction of light? Explain it on the basis of Huygen's wave theory.
(b) Explain with necessary theory, the Fraunhofer diffraction due to 'n' slits.
(c) Calculate the maximum number of orders possible for a plane diffraction grating

[5+8+3]

3.(a) Define Acceptance angle and derive expression for it.
(b) Calculate the Numerical Aperture and Acceptance angle for an optical fiber with core and cladding refractive indices being 1.48 & 1.45 respectively.
(c) Explain the importance of optical cavity resonator in a laser.

[8+4+4]

4.(a) What is ferromagnetism? Explain the properties of ferromagnetic materials.
(b) Explain the Hysteresis curve in magnetism on the basis of domains.
(c) Distinguish between Soft and Hard magnetic materials.

[6+6+4]

5.(a) Explain the terms 'Reverberation' and 'Reverberation time'.
(b) Derive Sabine's formula for 'Reverberation time.

[4+12]

6.(a) Show that for a quantum particle confined to an infinite deep potential box with finite length, the energy levels are quantized.
(b) Explain the Fermi-Dirac distribution function of electrons. Explain the effect of temperature on the distribution.

[10+6]

7.(a) State Hall effect.
(b) Derive expression for Hall coefficient.
(c) The R_H of a specimen is 3.66×10^{-4} m^3 c^{-1}. Its resistivity is 8.93×10^{-3} Ωm. Find mobility and charge carrier concentration.

[4+8+4]

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

I B. Tech II Semester Supplementary Examinations Feb. - 2015

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) How many orders will be visible, if the wavelength of light is 5000Å. Given that the number of lines per centimeter on the grating is 6655.
(ii) Identify whether unit cells of SC, BCC and FCC lattices are primitive or not. Explain with reason.
(iii) The radius of the superconducting ring is 0.02m and its critical magnetic field is 2 x $10^3 Am^{-1}$ at 5K. What is value of its critical current?
(iv) Distinguish between Spontaneous and Stimulated emissions.
(v) What are the necessary conditions of physically acceptable wave function?
(vi) Write notes on Direct and Indirect band gap semiconductors.

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

PART-B

2.(a) What are the necessary conditions to get clear and distinct interference fringes?
(b) Account for the circular shape of 'Newton's rings' in interference pattern. Obtain an expression for the diameter of the n^{th} dark ring in the case of Newton's rings.
(c) In Newton's rings experiment, the diameter of the 5^{th} and 25^{th} rings is 0.3cm and 0.8cm respectively. If the radius of curvature of the plano-convex lense is 10cm, find the wavelength of the incident light.

[4+8+4]

3.(a) What are Miller Indices? How are they obtained?
(b) Derive expression for interplanar spacing between two adjacent planes of Miller indices (h,k,l) and lattice constant á'.
(c) Explain stimulated emission and why the radiation emitted in this process has more importance than spontaneous emission.

[4+7+5]

4.(a) Explain the origin of different kinds of polarization in dielectrics.
(b) Derive an expression for internal field in dielectrics.

[6+10]

5.(a) State and explain Stoke's theorem in its calculus form.
(b) Explain in detail the flux quantization in a Superconducting ring.
(c) Write notes on Rayleigh's Criterion.

[6+4+6]

6.(a) Derive an expression for the electrical conductivity of a material in terms of mobility of the electron using classical free electron theory.
(b) What are the draw backs of classical free electron theory?
(c) An electron is confined to a one dimensional potential box of length 2 Å. Calculate the energies corresponding to the second and fourth quantum states in eV.

[8+4+4]

7.(a) Distinguish between n-type and p-type semiconductors.
(b) Define Drift & Diffusion currents and derive Einstein's equation.
(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]

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

I B. Tech II Semester Supplementary Examinations Feb. - 2015

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) What is the quarter wave plate? Derive the expression for its thickness.
(ii) Whether unit cells of SC, BCC and FCC lattices are primitive or not. Explain with reason.
(iii) Josephson junction has a voltage of 8.50 μV across its terminals. Then calculate the energy and frequency of the generating electro-magnetic waves.
(iv) Distinguish between Spontaneous and Stimulated emissions.
(v) What are the necessary conditions of physically acceptable wave function?
(vi) Explain the effect of temperature and impurity on the Fermi level in p-type semiconductor.

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

PART-B

2.(a) What is meant by Diffraction of light? Explain it on the basis of Huygen's wave theory.
(b) Explain with necessary theory, the Fraunhofer diffraction due to 'n' slits.
(c) Calculate the maximum number of orders possible for a plane diffraction grating

[5+8+3]

3.(a) What are Miller Indices? How are they obtained?
(b) Derive expression for interplanar spacing between two adjacent planes of Miller indices (h,k,l) and lattice constant á'.
(c) Draw the (001) and (120) planes of a cubic cell.

[4+8+4]

4.(a) What do you understand by dielectric constant? Define dielectric susceptibility. Derive the relation between dielectric constant and dielectric susceptibility.
(b) Explain electronic polarisability and show that electronic polarisability for a mono atomic gas increases as the size of the atom becomes larger.

[6+10]

5.(a) Explain the terms 'Reverberation' and 'Reverberation time'.
(b) Derive Sabine's formula for 'Reverberation time.

[4+12]

6.(a) Show that for a quantum particle confined to an infinite deep potential box with finite length, the energy levels are quantized.
(b) Explain the Fermi-Dirac distribution function of electrons. Explain the effect of temperature on the distribution.

[10+6]

7.(a) State and explain Hall effect.
(b) Define Drift & Diffusion currents and derive Einstein's equation.
(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]

Subject Code: R13203/R13 **Set No - 4**

I B. Tech II Semester Supplementary Examinations Feb. - 2015

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 is the quarter wave plate? Derive the expression for its thickness.
(ii) Describe the FCC sub lattice and calculate its atomic packing factor.
(iii) The radius of the superconducting ring is 0.02m and its critical magnetic field is 2 x $10^3 Am^{-1}$ at 5K. What is value of its critical current?
(iv) What are the conditions to produce total internal reflection in optical fiber?
(v) Explain the concept of hole.
(vi) Explain the electronic transport mechanism for Photo Conductors.

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

PART-B

2.(a) What are the necessary conditions to get clear and distinct interference fringes?
(b) Account for the circular shape of 'Newton's rings' in interference pattern. Obtain an expression for the diameter of the n^{th} dark ring in the case of Newton's rings.
(c) In Newton's rings experiment, the diameter of the 5^{th} and 25^{th} rings is 0.3cm and 0.8cm respectively. If the radius of curvature of the plano-convex lense is 10cm, find the wavelength of the incident light.

[4+8+4]

3.(a) Explain the principle of Optical fiber.
(b) Derive expressions for Acceptance angle and Numerical Aperture of an Optical fiber.
(c) Explain stimulated emission and why the radiation emitted in this process has more importance than spontaneous emission.

[3+8+5]

4.(a) What is Superconductivity? Discuss the parameters that destruct the Superconductivity.
(b) Derive London's equations and also derive the expression for London penetration depth

[8+8]

5.(a) State and explain Stoke's theorem in its calculus form.
(b) Explain in detail the flux quantization in a Superconducting ring.
(c) Write notes on Rayleigh's Criterion.

[6+4+6]

6.(a) Derive an expression for the electrical conductivity of a material in terms of mobility of the electron using classical free electron theory.
(b) What are the draw backs of classical free electron theory?
(c) An electron is confined to a one dimensional potential box of length 2 Å. Calculate the energies corresponding to the second and fourth quantum states in eV.

[8+4+4]

7.(a) Distinguish between n-type and p-type semiconductors.
(b) Define Drift & Diffusion currents and derive Einstein's equation.
(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]