Code No: RR10103 **Set No. 1**

I B.Tech Supplimentary Examinations, Aug/Sep 2007
ENGINEERING PHYSICS
(Common to Civil Engineering, Mechanical Engineering, Chemical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Describe the interference pattern obtained due to the superposition of coherent waves.
   (b) Explain Young's double slit experiment in interference of light.
   (c) Two sinusoidal waves of equal amplitudes are ¼ wavelength out of phase. What is the amplitude of the resultant? [6+6+4]

2. (a) What is grating? How the diffraction takes place in grating?
   (b) Give the theory of plane diffraction grating with suitable ray diagram. [8+8]

3. (a) Explain the following:
      i. Polarized light
      ii. Double refraction
      iii. Non-destructive testing
   (b) Calculate the thickness of a quarter wave plate for a monochromatic light of wavelength 600 nm if the refractive indices of ordinary and extra-ordinary rays in the medium are 1.5442 and 1.5533 respectively. [12+4]

4. (a) Give the various pumping mechanisms that are adopted in lasers.
   (b) Discuss the essential features of a laser beam.
   (c) Explain the uses of lasers in various fields. [6+6+4]

5. (a) Explain thermal expansion of solids using the curve of potential energy versus interatomic distance.
   (b) Derive an expression for thermal conductivity of a solid by applying classical theory. [8+8]

6. (a) Explain, in detail, the different polarization mechanisms in dielectrics.
   (b) If the permittivity of a dielectric medium is 44.27×10^{-12} F/m, find the electric susceptibility of the medium. [12+4]

7. Write notes on the following:
   (a) Diamagnetic materials
   (b) Paramagnetic materials

(c) Ferromagnetic materials

(d) Antiferromagnetic materials. [4×4]

8. Write notes on the following:

(a) High temperature materials

(b) Thermal Protection

(c) Structural materials [6+5+5]

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Code No: RR10103 **Set No. 2**

I B.Tech Supplimentary Examinations, Aug/Sep 2007
ENGINEERING PHYSICS
(Common to Civil Engineering, Mechanical Engineering, Chemical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Give the theory of interference and obtain the condition for constructive and destructive interference.
   (b) Light waves of wavelength 650 nm and 500 nm produce interference fringes on a screen at a distance of 1 m from a double slit of separation 0.5 mm. Find the least distance of a point from the central maximum where bright fringe due to both coincide. [12+4]
2. (a) What is meant by diffraction of light? Explain it on the basis of Huygen's wave theory.
   (b) What are the types of diffraction and give the difference between them.
   (c) What is the difference between Interference and Diffraction? [6+6+4]
3. (a) What is meant by polarization of light?
   (b) Describe an experiment that shows light is not propagated as longitudinal waves.
   (c) What is plane of vibration? [6+6+4]
4. (a) With necessary theory and energy level diagram, explain the working of a Helium-Neon gas laser.
   (b) Mention some important applications of lasers. [10+6]
5. (a) Write notes on
      i. Thermo-gravimetric analysis and
      ii. Thermo-mechanical analysis.
   (b) The junctions of a thermo-couple are maintained at the ice point and steam point. Calculate
      i. thermo-e.m.f.,
      ii. thermo-electric power,
      iii. neutral temperature and
      iv. inversion temperature,

      if the variation of the thermo-e.m.f. (E) with temperature difference between the junctions (t), is given by $E = (35.6 \times 10^{-6})t - (0.145 \times 10^{-6})t^2$. [10+6]
6. (a) How are the dielectric materials classified?

(b) Write short notes on "Glass". [10+6]

7. (a) What is ferromagnetism? What are the distinguishing features of ferromagnetism?

   (b) What are ferrites? Explain the magnetic properties of ferrites and mention their industrial applications. [8+8]

8. (a) What is meant by hardness?

   (b) Explain the significance of hardness in materials.

   (c) What is meant by creep?

   (d) Explain the various factors which affect the creep. [2+6+2+6]

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Code No: RR10103 **Set No. 3**

I B.Tech Supplimentary Examinations, Aug/Sep 2007
ENGINEERING PHYSICS
(Common to Civil Engineering, Mechanical Engineering, Chemical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the importance of coherent sources in interference phenomenon.
   (b) Derive an expression for fringe width of bright fringes produced in Young's double slit experiment.
   (c) A light source emits light of wavelength 5100 A.U. is exposed to a double slit. A screen is placed at 2 meters from the slits. Find the distance between the slits if overall separation of 10 fringes on the screen is 2 cm from its center. [6+6+4]

2. (a) Differentiate between interference and diffraction.
   (b) Explain Rayliegh's criterion for resolving power of a telescope.
   (c) A plane transmission grating having 6000 lines/cm is used to obtain a spectrum of light from a sodium lamp in the second order. Calculate the angular separation between two sodium lines D_1 and D_2 of wavelengths 5890 A.U. and 5896 A.U. [6+6+4]

3. (a) What is meant by polarization of light?
   (b) Describe an experiment that shows light is not propagated as longitudinal waves.
   (c) What is plane of vibration? [6+6+4]

4. (a) Explain the principle behind the functioning of an optical fibre.
   (b) Derive an expression for acceptance angle for an optical fibre. How it is related to numerical aperture?
   (c) An optical fibre has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Find the acceptance angle for the fibre in water which has a refractive index of 1.33. [4+8+4]

5. (a) What is Seebeck effect? How can it be utilized in thermometry?
   (b) Define Seebeck, Peltier and Thomson Coefficients, and derive a relation between them. [6+10]

6. (a) How are the dielectric materials classified?
   (b) Write short notes on "Glass". [10+6]

7. (a) What is meant by hysteresis in magnetic materials?
   (b) What are magnetic domains? Explain hysteresis basing on domain theory. [8+8]

8. (a) Why is the airborne pressure vessels are required in aerospace?
   (b) Explain the various properties of the materials used for airborne vessels along with their salient feature.
   (c) Why is the magnesium alloy is not used for the airborne vessels? [6+8+2]

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Code No: RR10103 **Set No. 4**

I B.Tech Supplimentary Examinations, Aug/Sep 2007
ENGINEERING PHYSICS
(Common to Civil Engineering, Mechanical Engineering, Chemical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the superposition of two harmonic disturbances and show that the resultant intensity is dependent on the phase different between them.
   (b) Give an account of colours of thin films.
   (c) A water film in air is 3200 A.U. thick. If the refractive index of the film is 1.33, find the colors appear in the reflected spectrum when exposed to white light at normal incidence. [6+6+4]

2. (a) What is meant by diffraction of light? Explain it on the basis of Huygen's wave theory.
   (b) What are the types of diffraction and give the difference between them.
   (c) What is the difference between Interference and Diffraction? [6+6+4]

3. (a) Explain the following:
      i. Polarization by selective absorption
      ii. Polarization by scattering.
   (b) Prove that if the angle of incidence corresponds to the Brewster's angle, then the angle between reflected and refracted beams is 90^o. [10+6]

4. (a) Explain the characteristics of a laser beam.
   (b) What is population inversion?
   (c) With a neat sketch explain the construction and working of a ruby laser. [6+4+6]

5. (a) Give an example of engineering application in which you would use a material with a low value of specific heat and a high value of specific heat.
   (b) Discuss the variation of thermal conductivity of a solid with temperature.
   (c) Explain the terms:
      i. drift velocity
      ii. relaxation time
      iii. collision time and
      iv. mean free path. [4+4+8]

6. (a) How are the dielectric materials classified?

(b) Write short notes on "Porcelain". [10+6]

7. (a) Draw and explain B-H curve for a ferromagnetic material placed in a magnetic field.

   (b) Discuss the theory of paramagnetism.

   (c) State the properties of diamagnetic materials. [6+6+4]

8. (a) Compare the relative merits of the various aircraft materials with suitable example.

   (b) Explain in brief the general system requirements for a spacecraft. [8+8]

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