Reg. No. : ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

Question Paper Code : 75527

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

First Semester

Computer Technology

XCS 113/10677 SW 103 — APPLIED PHYSICS

(Common to 5 Year M.Sc. Information Technology/M.Sc. Software Engineering)

(Regulation 2003/2010)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. The length of a wire increases by 1 mm under a load of 1 kg. What will be the increase in length if the same wire is under a load of 2 kg?

2. Define viscosity of liquids. Give any two applications.

3. What is the intensity level in decibels of a sound wave whose intensity is 10^{-10} Watt/cm^2? Take standard zero level of sound intensity as 10^{-12} Watt/m^2.

4. Give any four important applications of ultrasound.

5. A Carnot engine absorbs 1000 J of heat energy from a reservoir at 127 °C and rejects 600 J of heat energy during each cycle. Calculate the temperature of the sink and the efficiency of the engine.

6. Why is felt used for thermal insulation in preference to air?

7. What is the working principle of scanning electron microscope?

8. What is antireflection coating? Give its applications.

9. How does a fibre optic displacement sensor work?

10. What is the working principle of semiconductor diode laser?

PART B — (5 × 16 = 80 marks)

11. (a) Derive an expression for couple per unit twist on a thin cylinder. Show that hollow shaft is better that a solid shaft. Which materials are preferred for making shaft? (8 + 6 + 2)

Or

(b) Explain the principle of vacuum pumps and pressure gauges. Describe how diffusion pump works in producing very low pressure. Also explain how Penning gauge is used for measuring low pressure. (4 + 6 + 6)

12. (a) What is reverberation and how it is created? Derive an expression for standard reverberation time. (2 + 14)

Or

(b) (i) What is magnetostriction effect? Explain how this effect can be used for the generation of ultrasound. (12)

(ii) A hall has a volume of 1500 m^3. Its total absorption is equivalent to 100 m^2 of open window. What will be the effect on the reverberation time, if the audience fills the hall and thereby increase the absorption by 100 m^2 of open window. (4)

13. (a) Derive an expression for rate of flow of heat radially across a cylindrical tube. Using this expression describe how thermal conductivity of rubber can be determined. (8 + 8)

Or

(b) Explain the various strokes of Otto engine with neat diagram. Derive an expression for its efficiency. Compare with Diesel engine. (12 + 4)

14. (a) Describe Michelson interferometer and explain formation of fringes in it. Explain how this interferometer is used for determination of wavelength of monochromatic source of light. (10 + 6)

Or

(b) (i) Describe the construction and working of Lummer-Brodhum photometer. (8)

(ii) Describe the construction of Sextant and explain how it is used to measure the height of buildings. (8)

15. (a) (i) Explain the construction and working of He-Ne laser with energy level diagram. (8)

(ii) Explain how optical fibres are classified based on the mode of propagation and refractive index profile. (8)

Or

(b) (i) Explain the principle and propagation of light through optical fibre. Derive an expression for numerical aperture of optical fibre. (12)

(ii) What are spontaneous and stimulated emission of radiation. Explain how stimulated emission process lead to amplification of light. (4)

———————————