College of Engineering, Pune

(An Aoutonomus Institute of Government of Maharashtra, Pune- 411005.)

End Semester Examination

(AS102) Applied Science - I

Semester- I

Year: Branch: F.Y.B.Tech (common)

Academic Year: 2006- 07 Date: 24/11/2006

Duration: 2 Hours. Max. Marks. 60

Instructions : 1) All Questions are compulsory
2) Figure to the right indicates max. marks.
3) Answers to section I & II should be written in separate answerbooks.

SECTION - I

Q.1

(a) Explain the construction and working of Nicol Prism. (6)

OR

(a) Explain the construction and working of Ruby laser. (6)

(b) Discuss the various ways in which electromagnetic radiation can be absorbed by a molecule. (6)

OR

(b) Draw a neat labeled diagram of a typical hysterisis loop. Explain the terms (i) coercive field, (ii) remanence with reference to the diagram. (6)

(c) Two pin holes 2 mm apart are placed in front of a source of light of wavelength 6000 angstrom and seen through a telescope. The distance between the telescope and the pin holes is 900 cm. What should be the diameter of the telescope objective to just resolve the two pin holes? (3)

OR

(c) In a Newton's rings experiment, the diameters of the 4^{th} and 12^{th} dark rings are 0.400 cm and 0.700 cm. Find the radius of curvature of the planoconvex lens if the wavelength of light used is 500 nm. (3)

Q.2

(a) Write down the general expression for intensity on the screen for a single slit diffraction pattern, explaining the terms used in the expression. Hence discuss the conditions for maxima and minima. (5)

(b) Explain the difference between positive and negative crystals. Calculate the thickness of a half wave plate of quartz for a wavelength of 500 nm. Here, extraordinary and ordinary refractive indices are 1.533 and 1.544 respectively. (5)

(c) Discuss the difference between paramagnetic, ferromagnetic and ferrimagnetic materials. (5)

Section II

Q. 4 Suggest the most suitable material/s for the following applications with proper justification (10)

1 Security devices like burglar alarm or intruder alerts
2 Low impact floorings like dance floor or gymnasium floor
3 An alloy for costume jewellary or coins
4 An alloy for cutting blades and nozzles

Q. 5 **Solve any two** (10)

a) Explain the mechanism of free radical polymerization with suitable example
b) Water molecule strongly absorbs IR radiation
c) Explain practical method of verification of Beer's law.

Q. 6 a) Complete Following reactions: **any two** (6)

1] Bisphenol A + 2 Epichlorohydrine ---------- ------→ ?

2] Styrene + ? --------?------→ SBR rubber

3] BaO + TiO_2 -------?--> ?

b) Comment on following properties of crystalline solids : density, macrostructure, electrical conductivity. (4)