

1E2003

Roll No. : _____

Total Printed Pages : **4****1E2003**

B. Tech. (Sem. I) (Main/Back) Examination, December - 2013
103 - Engg. Physics - I

Time : **3 Hours**][Total Marks : **80**[Min. Passing Marks : **26 (Main)**Min. Passing Marks : **24 (Back)***Attempt any five questions.**Selecting one question from each unit.*

Use of following supporting material is permitted during examination.
 (Mentioned in form No. 205)

1. NIL2. NIL**UNIT - I**

- ✓ 1 (1) Draw a Labelled diagram of Michelson's Interferometer.
 How shall we use this device to determine the
 wavelength of Monochromatic light.

4+6=10

- ✓ (2) What will be the effect on Newton's rings :
- (i) if, a little oil ($\mu = 1.65$) is introduced between the lens
 ($\mu = 1.5$) and a glass plate ($\mu = 1.75$).
- (ii) if, we use a plane Mirror in place of plane glass plate.

3+3=6**OR**

- 1 (1) Show that the diameter of n^{th} dark ring in reflected light
 in Newton's ring experiment is directly proportional to
 square root of Natural numbers.

6

- (2) What are the conditions for obtaining
- (i) Circular fringes
- (ii) St. line fringes in Michelson's interferometer

6

- (3) Write a short note on Interference filters.

4

UNIT - II

- 2 (1) Describe the construction and working of QW plate and HW plate. 6
- (2) State and prove Malus law. 6
- (3) Unpolarized light falls on a polarizer and the resulting plane polarized light falls on a second polarizer, whose axis is inclined at an angle of 30° with first polarizer. The emerging light then falls on another polarizer whose axis is inclined at 60° with the first polarizer. Compute the resulting intensity. 4

OR

- 2 (1) What is Optical Activity ? Write the laws of optical activity of optical active solution. 2+4=6
- (2) Describe the construction and working of Laurents Half shade polarimeter. How it is used to determine the specific rotation of sugar solution. 10

UNIT - III

- 3 (1) Show that the intensity at a point in Fraunhofer's diffraction due to single slit is given by

$$I = I_0 \left(\frac{\sin \alpha}{\alpha} \right)^2$$

where symbols have their usual meanings. 8

- (2) Derive an expression for angular width of n^{th} principal maxima of plane transmission grating. 8

OR

- 3 (1) Derive an expression for the resultant intensity due to N' slits for plane transmission grating. 8



- (2) Sodium light consists of two lines of wavelength 5890 \AA and 5896 \AA . Find the minimum number of lines that grating must have in order to resolve these lines in the first order. 4
- (3) Write a short note on 'Resolving Power'. 4

UNIT - IV

- 4 (1) Describe nature and origin of various forces existing between atoms of solid crystal and explain the formation of covalent and metallic bonding in solids. 4+4=8
- (2) Obtain an expression for conductivity of intrinsic type of semiconductor. 8

OR

- (1) What is x-ray diffraction ? Deduce Bragg's law for the diffraction of x-ray in a crystal, how Bragg's spectrometer is used to determine the wavelength of Monochromatic x-rays ? 2+4+4=10
- (2) Explain Hall effect. Obtain the expression for hall coefficient, Hall voltage, Hall angle and Hall Mobility. 2+4=6

UNIT - V

- 5 (1) What are the two postulates of Einstein's special theory of Relativity ? Deduce Lorentz transformations for space and time coordinates. 6
- (2) Explain the terms "Contracted Length" and "Time dilation" in special theory of Relativity. 6
- (3) Show that $x^2 + y^2 + z^2 - c^2 t^2$ remains invariant under lorentz transformation. 4

OR



5 (1) Using Principle of special theory of Relativity derive Mass-Energy Relation. 6

(2) Deduce Relativistic Energy-Momentum Relation

$$E^2 = p^2 c^2 + m_0^2 c^4$$

where symbols have their usual meanings. 6

(3) A particle of rest mass m_0 is moving with a speed $c/\sqrt{2}$. Calculate its momentum, total energy and kinetic energy. 4

OR

