

B.N.BANDODKAR COLLEGE OF SCIENCE, THANE.

S.Y.B.Sc A.T.K.T. AUG. 2011

PHYSICS - I

DURATION: 3Hr

MARKS: 90

- N.B.**
- 1) All Question Are Compulsory.
 - 2) Figures To The Right Indicate Marks.
 - 3) Use Of Non –Programmeble Calculator Is Allowed

Section-I

- Q1. A Answer any one of the following. 8**
- 1) Setup the equation of motion of a damped harmonic oscillator. Solve the equation for the displacement.
 - 2) What is compound pendulum? Set up the equation of motion of compound pendulum and obtain an expression for its period.
- B A thin circular metal ring of radius 25cm is suspended from a knife edge and made to oscillate. Find its period, $g = 980\text{cm/sec}^2$. 4**
- C What is amplitude resonance? 3**
- Q2. A Answer any one of the following. 8**
- 1) Describe normal distribution; hence obtain expression for Gaussian function.
 - 2) Distinguish between systematic errors and random errors giving some examples.
- B The measurement of the length of the table yields the following data $l_1=135.0$ $l_2=136.5$, $l_3=134.0$, $l_4=134.5$ (all readings in cm).calculate the average value and the precision index. How does the precision index compare with the possible error? 4**
- C A number 2.145(obtained by calculation) has relative error of 0.0021.Find the number of correct figures. 3**
- Q3. A Answer any one of the following. 8**
- 1) For the Fresnel diffraction of cylindrical wave front at straight edge obtain the expressions for the distance of n^{th} bright band from the edge of the geometrical shadow.
 - 2) What is plane diffraction grating? Give the necessary theory.
- B A fabric with 600threads/cm is illuminated by a light of wavelength 6000 \AA Find the angle between the central image of a light and its first order diffracted image. 4**
- C Distinguish between interference and diffraction. 3**

Section -II

- Q4. A Answer any one of the following. 8**
- 1) Discuss the Searl's method for determination of Young's modulus 'Y' and Modulus of rigidity 'η'.
 - 2) What is cantilever? Derive an expression for the depression produced at the free end, when it is loaded. Ignore the mass of the cantilever.
- B 4**
- A wire of 0.2 cm radius is bent to form a circular arc of radius 1 m .Calculate the maximum stress and maximum strain if $Y = 10^{10} \text{N/m}^2$
- C 3**
- What are the basic assumptions in developing the theory of beams?
- Q5. A Answer any one of the following. 8**
- 1) Give necessary mathematical treatment to show that elliptically and circularly polarized light are special cases of linearly polarized light.
 - 2) What do you understand by 'Double refraction'? Explain the production of linearly polarized light through Nicol prism.
- B 4**
- For a calcite crystal $\mu_o = 1.55$ and $\mu_e = 1.45$.Find the thickness of a half wave plate, for the light of wavelength 5000 \AA .
- C 3**
- What are quarter wave plate and half wave plate?
- Q6. A Answer any one of the following. 8**
- 1) Describe the principle, construction and working of Michelson Interferometer.
 - 2) What is Resolving power of optical instrument? Derive an expression for the resolving power of prism
- B 4**
- Determine the wavelength of the light used, when the mirror of the Michelson interferometer is moved through a distance of 0.044197 mm. During this move 150 fringes get displaced.
- C 3**
- State the applications of Fabry –parrot interferometer.

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