B. N. BANDODKAR COLLEGE OF SCIENCE, THANE - 400 601.

FIRST TERM EXAMINATION OCT. - 2010

S. Y. B. Sc.

TIME : 2 Hrs.

SUBJECT : PHYSICS - I **MARKS :** 60

N. B. : 1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of non programmable calculators is allowed.

Q.1 a) Attempt ANY THREE of the following : [12]

i) Define logarithmic decrement. Express it in terms of damping coefficient.

ii) What is resonance ? State the condition for resonance. Give one example.

iii) Find the trust worthy digits in $(2.38)^4$ if the number 2.38 is correct up to its last digit.

iv) What is the maximum order of diffraction that can be observed when a light of wavelength 7500 A.U. is used ? Grating has 15000 lines per inch.

v) Distinguish between Fresnel and Fraunhofer diffractions.

b) Determine the best estimate of the measurement of the resistance of a coil, if the measurements are 5.235, 5.324, 5.435, 5,123, 5.231, 5.312, 5.345, 5.453, 5.534, 5.135 ohms. [3]

Q.2 a) Attempt ANY ONE of the following : [8]

i) Write down the differential equation for the damped oscillator and solve it. Assume damping to be proportional to velocity. State the three special cases.

ii) Derive an expression for the time period of compound of physical pendulum.

b) A damped oscillator loses half its initial energy in one second. If the damped frequency of the oscillator is 50 Hz, find its Q value. [4]

c) Define the quality factor, Q, of a damped oscillator. [3]

P.T.O.

Q.3 a) Attempt ANY ONE of the following : [8]

i) Describe normal distribution, hence obtain an expression for Gaussian function.

ii) Give various kinds of errors with proper examples. Differentiate between personal errors, instrumental errors and random errors.

b) A measure of diameter of a rod gives following readings in mm. Find the most probable value of diameter in mm and error in it. [4]
10.65, 10.55, 10.66, 10.45, 10.44, 10.49, 10.54, 10.70, 10.64, 10.58

c) What are significant figures ? Round off the length of an object measured as 2.987654321 in an experiment up to 4 significant digits. [3]

Q.4 a) Attempt ANY ONE of the following : [8]

i) Explain the phenomenon of diffraction at a straight edge. Explain also the intensity distribution at a point inside and outside a geometric shadow.

ii) What is plane diffraction grating ? Give the necessary theory of grating.

b) Diffraction grating has 10000 lines per cm. The diffracted second order spectral line is observed at 65^0. Calculate the wavelength of radiation. [4]

c) Explain the basic difference between interference and diffraction. [3]