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S.Y.B.Sc ATKT EXAMINATION, **FEB-2011**.

Subject : PHYSICS

PAPER-1

Duration : 3 hrs **Total Marks : 90**

N.B. : 1) All questions are compulsory

2) Figures to the right indicate full marks.

3) Symbols have their usual meanings.

4) Use of non-programmable calculator is allowed.

Q.1.	**a)**	Attempt any **ONE**. **i)** Set up the equation of motion of lightly damped harmonic oscillator. Solve the equation for the displacement. **ii)**What is the compound pendulum? Set up equation of motion of a compound pendulum and obtain an expression of its time period.	**8**
	b)	A thin circular metal ring of radius 25cm is suspended from aknifeedge and made to oscillate. Find its period. g=980 cm/s^2.	**4**
	c)	What is meant by over-damping, under-damping and critical damping?.	**3**
Q.2.	**a)**	Attempt any **ONE**. **i)** Describe normal distribution, hence obtain an expression for Gaussian function. **ii)** Obtain the expression for Peter's formula. When it should not be used.	**8**
	b)	What are significant digits? state general rules to determine significant digits?	**4**
	c)	Round off the following numbers i) 0.7925 to 2 digits ii) 1.996×10^4 to 5 digits.	**3**
Q.3.	**a)**	Attempt any **ONE.** **i)** In case of Fresnel's diffraction at a straight edge, show that the diffraction bands produced are not equally spaced. **ii)** Explain the Fraunhofer diffraction at a single slit. Derive an expression for the central maxima.	**8**
	b)	Determine the number of lines in 1 cm. of the grating surface. When a plane transmission grating diffracts second order through 30^0 for incident light of wavelength 5000 A^0.	**4**
	c)	DISTINGUSH between Fresnel & Fraunhofer diffraction.	**3**
Q.4.	**a)**	Attempt any **ONE**. **i)**. What is a cantilever? Derive an expression for the depression produced at the free end when it is loaded. Ignore the mass of the cantilever **ii)** Discuss the Searle's method for determination of Y and η.	**8**

	b)	A cantilever loaded at its free end, shows a depression of 1cm. at its free end. Find the depression at the midpoint of the cantilever?	**4**
	c)	Define collision. What is the difference between elastic and inelastic scattering?	**3**
Q.5.	**a)**	Attempt any **ONE**. **i)** Describe in brief any two methods for producing plane polarized light. **ii)**Discuss superposition of two linearly polarized waves mutually perpendicular to each other.	**8**
	b)	State and explain the law of Malus.	**4**
	c)	For calcite crystal μ_0=1.55, and μ_e=1.45.Find the thickness of a half-wave plate for light of wave length 5000 A^0.	**3**
Q.6.	**a)**	Attempt any **ONE**. **i)** Explain the formation of circular fringes in Michelson-Interferometer. Obtain expression for an optical path difference for it. **ii)** Derive an expression for the resolving power of a telescope. Comment on the result.	**8**
	b)	Determine the wavelength of the light used, when the mirror of a Michelson-Interferometer is moved through a distance of 0.044197 mm. During this move 150 fringes get displaced.	**4**
	c)	Calculated the minimum plate separation in a Fabry –Parot Interferometer to obtain a free spectral range of 0.05 A^0 in the wave length region 6000 A^0.	**3**

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