B. Tech Degree I & II Semester Examination in Marine Engineering, May 2008

MRE 103 ENGINEERING PHYSICS

Time : 3 Hours   Maximum Marks : 100

I. (a) Obtain the condition for a thin film to appear bright in reflected light.   (10)
    (b) Explain colours of thin films.   (5)
    (c) A parallel beam of light $\lambda = 5890 \overset{o}{A}$, is incident on a glass plate $(\mu = 1.5)$ such that angle of refraction into the plate is 60°. Calculate the smallest thickness of the plate which will make it appear dark by reflection where λ is the wave length of light used and μ the refractive index of glass.   (5)

OR

II. (a) Discuss the phenomenon of interference on a wedge shaped film.   (10)
    (b) Describe an experiment to determine the diameter of a thin wire using interference method. (5)
    (c) How can we test the flatness of a surface?   (5)

III. (a) What is a plane diffraction grating? Obtains the expression $(a+b)\sin\theta = n\lambda$. (10)
     (b) Explain dispersive power and resolving power.   (5)
     (c) A diffraction grating used at normal incidence gives a green line $5400\overset{o}{A}$ in a certain order super imposed on the violet line $4050\overset{o}{A}$ of the next higher order if the angle of incidence is 30°. How many lines per cm are there on the grating?   (5)

OR

IV. (a) Describe the construction, working and uses of a Nicol prism.   (10)
    (b) Explain positive and negative crystals.   (5)
    (c) What are the uses of polarized light?   (5)

V. (a) Explain the structure and working of He – Ne laser.   (10)
    (b) Explain spontaneous emission and stimulated emission.   (5)
    (c) Explain the applications of lasers.   (5)

OR

VI. (a) Describe the production of ultrasonic waves by (i) magnetostriction method and (ii) piezoelectric method.   (10)
    (b) Explain the uses of ultrasonics.   (5)
    (c) What are the advantages of holograms over ordinary photographs?   (5)

(Turn Over)

VII.	(a)	Derive an expression for Numerical aperture of an optical fibre.	(10)
	(b)	Explain the following terms :	
		(i) Acceptance angle	
		(ii) Acceptance Cone	
		(iii) Fractional refractive index change	(6)
	(c)	Calculate the Numerical Aperture and Acceptance angle of an optical fibre from the following data :	

$$\mu_1(core) = 1.60 \quad and \quad \mu_2(cladding) = 1.59 \qquad (4)$$

OR

VIII.	(a)	Differentiate between step index single mode and step index multimode optical fibres.	(5)
	(b)	Explain the working of optical fibre sensors.	(10)
	(c)	Write a note on integrated optics.	(5)

IX.	(a)	Explain a.c and d.c Josephson effect.	(10)
	(b)	Write a note on SQUIDS.	(5)
	(c)	What is SONAR? Discuss its principle and working.	(5)

OR

X.	(a)	Explain Meissner effect and isotope effect.	(6)
	(b)	Differentiate between type I and type II superconductors.	(8)
	(c)	Write notes on applications of superconductivity.	(6)

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