BT MRE-I(R/S)-11-23-3001 Reg. No. | | | | | | | | |

C

B.Tech. Degree I Semester Regular/Supplementary Examination in Marine Engineering November 2023

19-208-0102 ENGINEERING PHYSICS

(*2019 Scheme*)

Time: 3 Hours Maximum Marks: 60

Course Outcome

On successful completion of the course, the students will be able to:

CO1: Understand interference of light and its applications and applications of X- rays.
CO2: Grasp the basics of diffraction and their applications.
CO3: Understand many modern devices and technologies based on lasers and sound recording.
CO4: Have a fundamental knowledge of fiber optics and their applications.
CO5: Have an understanding of different marine equipment the characteristics and applications and superconducting materials.

Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create

PI – Programme Indicators

Answer ***ALL*** questions (5 × 15 = 75)

			Marks	BL	CO	PI
I.	(a)	Describe the formation of Newton's rings. Discuss with theory how to obtain the wavelength of a monochromatic light, using Newton's rings arrangement.	12	L4	1	1
	(b)	Two optically plane glass plates of length 0.15 m are placed one over the other with a thin wire at one end separating the two. The fringes formed with light of wavelength 5893 A° have a width of 2.5 mm. Calculate the radius of the wire.	3	L5	1	2
		OR				
II.	(a)	What is the significance of Mosleys law? Explain an experimental arrangement to produce X-rays. Describe the working principle and apparatus of Braggs spectrometer.	12	L4	1	1
	(b)	If 12 kV potential difference is applied across an X-ray tube producing a current of 115 mA, calculate the velocity of electrons at which they strike the target.	3	L5	1	2
III.	(a)	Explain the Rayleigh's criterion of resolution. What is a plane diffraction grating? Discuss the theory of a plane transmission grating.	12	L4	2	1
	(b)	Light of wavelength 589.5 nm is incident normally on a grating having 6000 rulings per cm. Find the angular separation between the first and second order spectra.	3	L5	2	2
		OR				
IV.	(a)	Explain the phenomenon of double refraction. Define specific rotation of an optically active substance. Describe an experiment to determine specific rotation by using half shade polarimeter.	12	L4	2	1
	(b)	Calculate the thickness of a calcite plate that converts linearly polarized light into elliptically polarized light. Given that refractive indices for ordinary and extra ordinary rays are 1.485 and 1.656 respectively and wavelength of light 589 nm.	3	L5	2	2

(P.T.O.)

			Marks	BL	CO	PI
V.	(a)	Give four differences between spontaneous and stimulated emissions. Discuss the construction and working of a Nd-YAG Laser with diagrams.	12	L3	3	1
	(b)	Explain the principle, recording and reconstruction process in holography.	3	L1	3	1
		OR				
VI.	(a)	What are the properties and applications of electronic waves? Describe the method of recording and reproducing sound signals.	12	L2	3	1
	(b)	How is sound recorded in cine films?	3	L1	3	1
VII.	(a)	Describe the propagation technique in step index and graded index fibres. Draw figures wherever required. Discuss the fibre optic communication system.	12	L2	4	1
	(b)	Calculate the maximum fibre acceptance angle of a step index fibre having refractive indices, n1 = 1.45, n2 = 1.35.	3	L5	4	2
		OR				
VIII.	(a)	Explain the single mode and multimode fibres. Obtain an expression for the numerical aperture of an optical fiber.	12	L2	4	1
	(b)	If the maximum angle of incidence is 45 degree for a fibre placed in air, calculate the numerical aperture and acceptance angle.	3	L5	4	2
IX.	(a)	Explain the working and applications of echo sounder. Describe the production, properties and uses of ultrasonic waves.	12	L3	5	1
	(b)	Give a description of gyroscope.	3	L2	5	1
		OR				
X.	(a)	Differentiate between type II and type I superconductors. What is Josephson effect and give two of its applications?	12	L3	5	1
	(b)	Prove that a material in the superconducting state is a perfect diamagnet.	3	L2	5	1

Bloom's Taxonomy Levels
L1 = 4%, L2 = 28%, L3 = 24%, L4 = 32%, L5 = 12%.

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