COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.TECH. DEGREE I SEMESTER REGULAR/SUPPLEMENTARY EXAMINATION IN MARINE ENGINEERING MAY 2021

19-208-0102 ENGINEERING PHYSICS

(*2019 Scheme*)

Time: 30 Minutes [for Answering and Scanning/Uploading the page of the Answer Sheet] per module
Max. Marks: 9 per module

INSTRUCTIONS

1. You have to be available in Google Meet Video Camera throughout the examination hours.
2. Those students who are not present through Google Meet Video Camera will not be permitted to write the online examination.
3. You have to share your '**live location**' to the faculty before uploading the answer sheet.
4. You have to answer only one question per module.
5. You have to write register number, subject code and module/group number (as given in the question paper) in each page.
6. Answer may not exceed one page of an A4 size paper in a standard handwriting, as far as possible.
7. If at all an answer goes beyond one page, (due to your handwriting) another page can also be used. In such a situation, the page number should be given as 1/2, 2/2.
8. You have to put the Question Number correctly.
9. After answering the question, you have to scan in pdf format and upload the answer page in a format of <reg. no.><module/group no.><question no.>.pdf.

MODULE - I

(Answer ***ANY ONE*** question)

I(1).	(a)	Explain how X-rays are produced using Coolidge tube.	(2)
	(b)	Derive an expression for the radius of n^{th} dark ring in Newton's rings.	(4)
	(c)	Interference fringes are produced using monochromatic light of wavelength 600 nm falling normally on a wedge shaped film of refractive index 1.4. If the fringe width is 1.2 mm, calculate the angle of the wedge.	(3)

OR

I(2).	(a)	Explain the interference method for testing the optical plainness of a glass plate.	(2)
	(b)	What are continuous and characteristic X-rays? Explain their origin.	(4)
	(c)	Second order Bragg's reflection is found to occur at an angle 30° from the crystal planes having inter-planar spacing 1.6 Å. Determine the wavelength of X-rays.	(3)

MODULE - II

(Answer ***ANY ONE*** question)

II(1). (a) Explain the construction and working of a Nicol's prism. (2)

(b) Explain the phenomenon of diffraction of light. Distinguish between Fresnel and Fraunhofer diffraction. (4)

(c) Calculate the grating element of a grating which will just resolve the sodium lines 5890 Å and 5896 Å, in the second order of spectrum. (3)

OR

II(2). (a) What are the differences between positive and negative crystals? (2)

(b) What is meant by resolving power of a plane diffraction grating? Obtain an expression for the resolving power of a grating. (4)

(c) Find the thickness of a quarter wave plate when the wavelength of light used is 5893 nm. Refractive index for ordinary light and extra ordinary light are 1.55 and 1.54 respectively. (3)

MODULE - III

(Answer ***ANY ONE*** question)

III(1). (a) How is sound recorded and reproduced using magnetic tape? (2)

(b) With necessary diagrams, explain the structure and working of He-Ne laser. (4)

(c) What are the applications of laser? (3)

OR

III(2). (a) Explain spontaneous emission and stimulated emission. (2)

(b) What is holography? Write a note on the recording and reconstruction of the hologram. (4)

(c) Explain the terms spatial coherence and temporal coherence. (3)

MODULE - IV

(Answer ***ANY ONE*** question)

IV(1). (a) Explain the propagation of light through an optical fiber. (2)

(b) What are the applications of optical fiber? (4)

(c) Calculate the maximum value of the angle of incidence that a ray can make with the axis of a step index fiber placed in air, such that it gets guided through the fiber for the following fiber parameters: $n_1 = 1.6$, $n_2 = 1.5$. (3)

OR

IV(2). (a) Write a short note on fiber optic sensors. (2)

(b) Obtain an expression for the numerical aperture of an optical fiber. (4)

(c) A step index fiber has the following parameters: $n_1 = 1.68$, $n_2 = 1.44$. Calculate the numerical aperture, acceptance angle and critical angle. (3)

MODULE - V

(Answer ***ANY ONE*** question)

V(1). (a) Differentiate between type I and type II superconductors. (2)

(b) Describe the magnetostriction method of producing ultrasonic waves. (4)

(c) Explain any two applications of ultrasonic waves. (3)

OR

V(2). (a) Explain the Meissner effect. (2)

(b) What is superconductivity? Give the BCS theory of superconductivity. (4)

(c) What is a gyroscope? (3)

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