Name: Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2023

Course: Waves & Optics | **Semester : II**
Program: B.Sc (H) Physics | **Time : 03 hrs**
Course Code: PHYS 1014 | **Max. Marks: 100**

Instructions:
- All questions are compulsory (**Q.No. 9** and **Q.No. 11** has an internal choice)
- Scientific calculators can be used for calculations

SECTION A
(5Q x 4M = 20 Marks)

- All questions are compulsory, Each Question carries **4 Marks**
- Write very Short Answers/ Solve

Q. No.	Statement of question	Marks	CO
1	Define amplitude, periodic time, frequency and phase.	4	CO1
2	50 tuning forks are arranged in an order of increasing frequency and any two successive forks give 5 beats per second when sounded together. If the last fork gives an octave of the first, calculate the frequency of the latter.	4	CO2
3	Two coherent sources whose intensity ratio is $81:1$ produce interference fringes. Deduce the ratio of maximum to minimum intensity.	4	CO2
4	What is coherence? Explain different cases for the sources to be the coherent sources.	4	CO1
5	Distinguish between Interference and Diffraction.	4	CO1

SECTION B
(4Q x 10M = 40 Marks)

- All questions are compulsory, **Q.No. 9** has an internal choice, Each Question carries **10 Marks**
- Write Short/ Brief notes/ Derive/ Solve

Q. No.	Statement of question	Marks	CO
6	Show that the velocity of transverse waves along a stretched string is $v = \sqrt{\frac{T}{m}}$, where T is the tension applied to the string and m is linear density.	10	CO3
7	**(a)** Derive an expression for the cosine law due to the reflected system. **(5)** **(b)** Find the thickness of a soap film $\mu = 1.33$ which gives constructive second order interference of reflected light of $\lambda = 700\ m\mu$ **(5)**	10	CO2
8	**(a)** Calculate the number of lines per cm in a 2.5 cm wide grating which will resolve the Sodium lines of wavelength in the second order. **(5)**	10	CO1

	(b) A zone plate has a focal length of 60 cm for wavelength of 5893 Å, find the radii of first and hundredth circles of the zone plate. **(5)**		
9	**(a)** Write about the change of phase on reflection from the boundary between two media. Draw a neat diagram. **(10)** **(OR)** **(b)** Explain the working of the Melde's experiment with a neat diagram. Determine the frequency of vibration in transverse mode. **(10)**	10	CO2

SECTION-C

(2Q x 20M = 40 Marks)

- All questions are compulsory, **Q.No. 11** has an internal choice, Each Question carries **20 Marks**
- Write long answer/ Derive/ Solve

Q. No	Statement of question	Marks	CO
10	**(a)** Describe Young's double slit experiment and derive an expression for fringe width. **(10)** **(b)** What are standing waves? Derive an expression for the equation defining the standing waves. **(10)**	20	CO3
11	**(a)** With a neat sketch, describe an arrangement to observe Newton's rings in a reflected systemObtain an expression for the wavelength of the light used. **(15)** **(b)** A beam of monochromatic light of wavelength 5.82×10^{-7} m falls normally on a glass wedge of 20 sec of an arc. If the refractive index of glass is 1.5, find the number of dark fringes per cm of glass wedge. **(5)** **(OR)** Describe Fraunhofer diffraction at a single slit and deduce the positions of central maximum, principal minima and secondar maxima. Draw the representative graph of the intensity distribution. **(20)**	20	CO4