JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Supplementary Examination- 2026

B.Tech-I Semester (BT/BI)

COURSE CODE(CREDITS): 25B11PH112 (04) MAX. MARKS: 75

COURSE NAME: Basic Engineering Physics

COURSE INSTRUCTORS:Dr. Ragini Raj Singh MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*
(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems
(c) Calculators allowed

Q.No	Question	CO	Marks
Q1	**(a)** What are the conditions to obtain a sustained interference pattern? **(b)** Why do the diameters of Newton's rings not increase in the same proportion as the order of the ring? **(c)** Write the conditions for interference maxima and minima. **(d)** Differentiate between spontaneous and stimulated emission. **(e)** What is Reynolds number? State its significance.	1	**5 x 2=10**
Q2	**(a)** **(i)**Derive the relation to determine the thickness of a thin glass sheet using the method of lateral displacement of fringes. **(ii)** Explain why circular and elliptically polarized light is obtained under specific phase conditions. **(b)** **(i)** Explain the basic criteria for diffraction. **(ii)** Classify diffraction and state key conclusions of single-slit diffraction. **(c)** **(i)** Discuss the polarimeter under the following heads: **(1)** Diagram and function of each component **(2)** Determination of specific rotation **(ii)** Factors affecting angle of rotation	1	**3 x 4= 12**
Q3	**(a)** **(i)** Discuss population inversion in LASERs with necessary equations. **(ii)** Mention two applications each of LASERs in medical treatment and diagnosis. **(b)** **(i)** Discuss types of optical fibers based on **(1)** material and	2	**5** **5**

	(2) modes of propagation. **(ii)** Explain any one attenuation mechanism in optical fibers. **(c)** **(i)** Derive expressions for the dispersive power and resolving power of a diffraction grating. **(ii)** What are the conditions for absent spectra in a transmission diffraction grating? Discuss the highest possible order of principal maxima.		**6**
Q4	**(a)** **(i)** Explain Newton's Rings experiment with theory and derive expressions for ring diameters. **(ii)** Discuss the effect of introducing a liquid between the lens and plate on ring pattern. **(b)** **(i)** Explain excess pressure inside a liquid drop and derive the required expression. **(ii)** Describe any one method of measuring surface tension along with its advantages and limitations. **(c)** **(i)** Explain different types of fluid flow. Derive Reynolds number and state its critical values for various flows. **(ii)** Define dynamic and kinematic viscosity. State and explain Stokes' law.	**3**	**5** **5** **6**
Q5	**(a)** The path difference between two interfering waves is $\lambda/4$. Find the ratio of intensity at this point to that at the centre of a bright fringe. **(b)** In Newton's rings experiment, the diameters of the 4th and 13th dark rings are 0.4 cm and 0.7 cm respectively. Find the diameter of the 20th dark ring. **(c)** Light of wavelength 6000 Å is incident on a slit of width 0.3 mm. The screen is placed 1.2 m away. Find: (i) Position of first dark fringe (ii) Width of the central maximum **(d)** In a single-slit diffraction experiment, the first minimum for $\lambda_1 = 450$ nm coincides with the first maximum of λ_2. Calculate λ_2. **(e)** Ten water droplets each of radius 0.4 mm coalesce to form a single drop. Calculate the change in surface energy. *(Surface tension = 0.072 N/m)* **(f)** The optical power transmitted through a fiber of length 2 km is reduced to 25% of its initial value. Calculate the fiber loss in dB/km.	**4**	**7 x 3=21**