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JC Bose University of Science and Technology, YMCA Faridabad

BTech (ECE), Semester I

Sessional 1 (Waves & Optics)

MM 15 **Time 1hr 30 min**

Attempt all questions

Q1 (a) Why is the central spot in Newton's rings seen in reflected light dark? 2

(b) When a thin film of glass of refractive index 1.5 is interposed in the path of one of the interfering beams of the Michelson's interferometer, a shift of 30 fringes of sodium light is observed across the field of view. If the thickness of the air film is 0.018mm, calculate the wavelength of the light used. 2

(c) Explain the effect of increase in number of lines and width of the ruled space on the spectrum formed by diffraction grating. 2

Q2: Discuss the phenomena of Fraunhoffer diffraction at a single slit and show that the relative intensities of successive maxima are nearly 3

$$1 : 4/9\pi^2 : 4/25\pi^2 : 4/49\pi^2$$

Q3 Define the following terms: (i) Population inversion (ii) Pumping (iii) Stimulated emission. 3

Q4: Describe the construction and working of Nd:YAG laser. Also write the important applications of it. 3