

I B. Tech I Semester Supplementary Examinations, May/June - 2019
ENGINEERING PHYSICS-I
(Com. to All Branches)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

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1. a) Show that the fringe width of bright and dark fringes in Young's double slit experiment is same. (10M)  
b) Two slits separated by a distance of 0.2 mm are illuminated by a monochromatic light of wavelength 5.5 nm. Calculate the fringe width on the screen at a distance of 1 m from the slits. (5M)
2. a) Explain the theory of plane transmission grating and derive equations for maxima and minima. (10M)  
b) Find the number of lines a grating should have in order to resolve the second order doublet having a wavelength difference of  $6 \times 10^{-10} \text{ m}$  at  $5893 \times 10^{-10} \text{ m}$ . (5M)
3. a) Explain the construction and working of a quarter wave plate and a half wave plate. (10M)  
b) Discuss various types of polarized light. (5M)
4. a) What do you understand by space lattice? Enumerate the seven crystal systems with their salient features. (10M)  
b) Calculate the number of atoms per unit cell, coordination number and packing factor for FCC and BCC structures. (5M)
5. a) Deduce the relation between interplanar distance "d" and Miller indices (h k l) of the planes for a cubic system. (10M)  
b) Calculate the interplanar spacing for (110) and (111) planes in a simple cubic lattice whose lattice constant is 0.424 nm. Also sketch these planes. (5M)
6. a) Explain Einstein's theory of stimulated emission and derive an expression for the ratio between spontaneous emission and stimulated emission. (10M)  
b) Write a short note on (5M)  
(i) Population Inversion  
(ii) Characteristics of laser
7. a) What is meant by attenuation? Discuss the different mechanisms which are responsible for attenuation in an optical fibre. (8M)  
b) Explain the terms: (7M)  
(i) Numerical Aperture  
(ii) Acceptance angle
8. Discuss Ultrasonic testing in detail through which defects within a material can be determined. (15M)