Code No: 131AH

**R16**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
B.Tech I Year I Semester Examinations, October/November - 2020
**ENGINEERING PHYSICS – I**
(Common to EEE, ECE, CSE, EIE, IT, ETM)

Time: 2 hours                                                                                    Max. Marks: 75

**Answer any five questions**
**All questions carry equal marks**
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1.a) Explain the formation of colors in thin films and show that films which appear light in reflected light appear in transmitted light?
 b) Explain why the center of Newton's rings dark in the reflected system.
 c) A soap film $5 \times 10^5$ cm thick is viewed at an angle of $35$ to the normal. Find the wavelength of light in the visible spectrum which will be absent from the reflected light [$\mu =1.33$]. [6+4+5]

2.a) What is the difference between interference and diffraction?
 b) Briefly explain the N-slits of diffraction pattern.
 c) Examine if two spectral lines of wavelengths $5890 \, A^0$ and $5893 \, A^0$ can be clearly resolved in the (i) first order and (ii) second order by a diffraction grating 2 cm wide and having 425 lines/cm. [4+6+5]

3.a) State and explain Malus's law of polarization?
 b) What is double refraction? Explain the construction of Nicol prism?
 c) What are the quarter and half wave plates and explain the principle. [4+6+5]

4.a) Why the population inversion is necessary to achieve lasing action?
 b) Describe the construction and working of Helium-Neon laser.
 c) Calculate the relative population in the laser transition levels in a ruby laser in thermal equilibrium (without pumping of atoms). The wavelength of the ruby laser light is $6943 \, A^0$ at 300 K. [4+6+5]

5.a) Derive an expression for the numerical aperture of an optical fiber.
 b) Describe the structure of different types of optical fibers with ray paths.
 c) Explain the transmission of a signal through the step index fiber. [4+6+5]

6.a) Explain briefly the basic principle of optical fiber.
 b) Explain the transmission of a signal through the graded index fiber.
 c) Discuss the various factors contributing to attenuation in optical fiber. [4+6+5]

7.a) What is Bravais lattice? What are the different space lattices in the cubic system?
 b) Find the packing fraction for the BCC and FCC?
 c) What are Miller indices? How do you obtain for a given plane in a crystal? [6+4+5]

8.a) Derive Bragg's law.
 b) Explain the significance of Burger's vector.
 c) Define the terms:
  i) Stacking faults   ii) Tilt boundaries   iii) Grain boundaries. [4+6+5]

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