



# Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2018-19

EXM/P/09/01

Year and Program: 2018-19

School of Technology

Department of FY B.Tech

Course Code: FYT102

Course Title: Applied Physics

Semester – I

Day and Date

End Semester Examination  
(ESE)

Time: Max Marks: 100

Wednesday 21/11/18

10:00 am to 1:00 pm

## Instructions:

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks.

## Q.1 Solve the following

	Marks	Bloom's Level	CO
a) Explain the magnetostiction method for the production of ultrasonic waves. State any two applications of ultrasonic waves.	07	L <sub>2</sub>	CO1

OR

a) Explain the terms reverberation and reverberation time, and calculate what should be the total absorption in the hall, if a picture hall has volume 8000 m <sup>3</sup> , is required to have reverberation time of 1.5 sec.	07	L <sub>2</sub> , L <sub>3</sub>	CO1
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b) Explain the theory of plane diffraction grating and show that in case of plane diffraction grating $\sin \theta = n.N.\lambda$ . Calculate the specific rotation if the plane of polarization is turned through 26° 15' travelling 20 cm length of 20 % sugar solution.	08		CO2
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OR

b) Distinguish between negative and positive crystals. Also find the grating element if monochromatic light of wavelength 6560 Å falls normally on a grating and the spectral line is diffracted at an angle of 19° 9' from the normal first order.	08	L <sub>4</sub> , L <sub>3</sub>	CO2
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## Q.2 Solve the following

a) Explain the types of optical fibers and list out any two advantages of optical fiber.	07	L <sub>2</sub> , L <sub>4</sub>	CO3
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OR

- |    |   |    |                                 |     |
|----|---|----|---------------------------------|-----|
| a) | Explain the terms Population inversion, pumping and state any three applications of lasers?   | 07 | L <sub>2</sub>                  | CO3 |
| b) | Define matter wave. Obtain its wavelength expression for a particle moving with Kinetic energy 'E'. Calculate de-Broglie's wavelength of 10keV protons in A.U. Given: $m_p = 1.67 \times 10^{-27}$ kg, $h = 6.63 \times 10^{-34}$ J.S | 08 | L <sub>1</sub> , L <sub>6</sub> | CO4 |

OR

- |    |  |    |                |     |
|----|--|----|----------------|-----|
| b) | Explain the properties of matter waves and calculate the wavelength associated with the electrons in a T.V. set which are accelerated by a potential difference of 10kV. | 08 | L <sub>3</sub> | CO4 |
|----|--|----|----------------|-----|

Q.3 **Solve any Two**

- |    |   |    |                |     |
|----|---|----|----------------|-----|
| a) | Explain the following:  | 08 | L <sub>2</sub> | CO1 |
|    | 1) Absorption coefficient and Sabine Formula                        |    |                |     |
|    | 2) Cavitation effect for calculating wavelength of ultrasonic wave. |    |                |     |
| b) | Explain the following terms:  | 08 | L <sub>2</sub> | CO2 |
|    | 1) Optical activity   |    |                |     |
|    | 2) Double refraction  |    |                |     |
| c) | Explain the following:  | 08 | L <sub>2</sub> | CO3 |
|    | 1) Total internal reflection of light.                              |    |                |     |
|    | 2) Structure of optical fiber.                                      |    |                |     |
| d) | Explain the following:  | 08 | L <sub>2</sub> | CO4 |
|    | 1) Dual nature of radiation.  |    |                |     |
|    | 2) Heisenberg uncertainty principle.                                |    |                |     |

**Q.4 Solve any Two**

- |  |    |                                 |     |
|--|----|---------------------------------|-----|
| a) Explain the term magnetic susceptibility and distinguish between diamagnetic and paramagnetic materials.                              | 09 | L <sub>2</sub> , L <sub>4</sub> | CO5 |
| b) Explain in brief ferromagnetic materials. And also explain in brief hysteresis loop in case of ferromagnetic materials.               | 09 | L <sub>2</sub>                  | CO5 |
| c) Explain the terms i) magnetic induction, ii) intensity of magnetization and distinguish between soft and hard ferromagnetic materials | 09 | L <sub>2</sub>                  | CO5 |

**Q.5 Solve any Two**

- |   |    |  |     |
|---|----|--|-----|
| a) Define atomic radius. Obtain its value for SC, BCC and FCC crystals. Calculate lattice constant 'a' of a substance with face centered cubic lattice having density 6250 kg/m <sup>3</sup> and molecular weight 60.2, (Given: Avogadro's No. = 6.02 x 10 <sup>26</sup> kg/mole. | 09 | L <sub>1</sub> , L <sub>6</sub> , L <sub>3</sub> | CO6 |
| b) Define Miller index. Explain the procedure to find the Miller index of a plane. Give its two features and draw the following Miller planes: (111), (110), (100).   | 09 | L <sub>1</sub> , L <sub>3</sub>                  | CO6 |
| c) Define centre of symmetry, axis of symmetry, and plane of symmetry. Show that cube has 13 axes of symmetry.  | 09 | L <sub>1</sub> , L <sub>3</sub>                  | CO6 |

**Q.6 Solve any Three**

- |  |    |                                 |     |
|--|----|---------------------------------|-----|
| a) State any six applications of magnetic materials.   | 06 | L <sub>2</sub>                  | CO5 |
| b) How ferromagnetic materials can be classified on the basis of hysteresis loop?  | 06 | L <sub>3</sub>                  | CO5 |
| c) Obtain number of atoms per unit cell and co-ordination number for, SC, BCC and FCC crystals.  | 06 | L <sub>4</sub>                  | CO6 |
| d) Derive Bragg's law. Calculate the wavelength of X-rays if the spacing between the principal planes of a NaCl crystal is 2.82 Å and the first order Bragg reflection occur at an angle of 10°. | 06 | L <sub>4</sub> , L <sub>3</sub> | CO6 |

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