

M.Sc.(Physics) (CBCS Pattern) Semester-III
PSCPHYT10 - Core Paper-X : Solid State Physics and Spectroscopy

P. Pages : 2

Time : Three Hours



GUG/W/24/11296

Max. Marks : 80

Either:

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|----|----|---|---|
| 1. | a) | Explain 2D & 3D lattices in details. | 8 |
| | b) | What are liquid crystals? Explain their types in details. | 8 |

OR

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| e) | Explain Miller indices with example draw following planes.
(121), (101), (001) in cubic system. | 8 |
| f) | Explain bonding of common crystal structure. | 8 |

Either:

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|----|----|---|---|
| 2. | a) | Derive Clausius-Mossotti relation. | 8 |
| | b) | Write short note on piezo, pyro and ferroelectricity. | 8 |

OR

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| e) | What is dislocation. Discuss Burgers vector and Burgers circuit. | 8 |
| f) | What is defects? Explain its types in details. | 8 |

Either:

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| 3. | a) | Discuss quantum states of an electron in an atom. | 8 |
| | b) | Define Franck-Condon principle. How does it monitor intensities in electronic band. | 8 |

OR

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| e) | Derive interaction in case of LS & JJ couplings. | 8 |
| f) | Write a note on Auger transitions. | 8 |

Either:

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| 4. | a) | Write a note on 'Raman Spectroscopy' in brief. | 8 |
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- b) What is Morse potential energy curve? Explain vibration spectrum of diatomic molecules. 8

OR

- e) Discuss P, Q, & R branches in rotational structure transitions. 8

- f) Discuss ESR & NMR spectroscopy. 8

5. Answer **all** the followings:

- a) Explain short and long range orders in liquids. 4

- b) Write short note on point defects and line defects. 4

- c) Explain the spectrum of Helium atom. 4

- d) Explain electronic spectra of diatomic molecules. 4
