

19002098



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Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, NOVEMBER 2019

Third Semester

Faculty of Science

Branch II—Physics—A—Pure Physics

Elective—Bunch C—Material Science

PH3 EC1—SOLID STATE PHYSICS

(2012—2018 Admissions)

Time : Three Hours

Maximum Weight : 30

Part A

*Answer any **six** questions.*

Weight 1 each.

1. What are Bravais' lattices ? Explain.
2. Explain Laue spots.
3. What makes colour for crystals ?
4. Explain the behavior of traps.
- 5 . State the principle of semiconductor lasers.
- 6 . Explain the band structure of silicon.
7. Differentiate between polarons and polaritons.
8. Explain thermodynamic theory of atomic imperfections.
9. What are the forces acting on a dislocation?
10. Explain twinning.

(6 × 1 = 6)

Part B

*Answer any **four** questions.*

Weight 2 each.

11. Bring out the physical basis for classifying crystals into 14 Bravais's lattices.
12. Discuss on Q-switching and mode locking processes.

Turn over





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13. Give the dielectric function of the electron gas.
14. Describe the theory and energy level diagram of a four level laser.
15. Bring out the classification of imperfections in crystals.
16. Discuss Frank-Read mechanism of dislocations.

(4 × 2 = 8)

Part C

Answer **all** questions.

Weight 4 each.

17. (a) What is meant by Bravais lattice ? What are the different space lattices in the cubic systems ? How many lattice points per unit cell are there in each of these lattices ?

Or

- (b) What are point groups and space groups ? Give their number for two and three dimensional lattices. List all point groups of a two dimensional lattice.

18. (a) Describe thallium activated alkali halides for electroluminescence and give salient features.

Or

- (b) Discuss the theory and experimental setup for Nd :YAG and Nd : glass lasers state applications.

19. (a) Obtain an expression for Fermi level in case of an intrinsic semiconductor considering electrons and holes.

Or

- (b) Describe the band theory for semiconductors.

20. (a) Discuss on different diffusion mechanisms with theory and experimental support.

Or

- (b) Describe the dislocations associated with crystals along with experimental evidences.

(4 × 4 = 16)

