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

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)