QP CODE: 21000712

21000712

Reg No : .....

Name : .....

M Sc DEGREE (CSS) EXAMINATION, JULY 2021

Fourth Semester

Faculty of Science

M Sc PHYSICS

Elective - PH810402 - SCIENCE OF ADVANCED MATERIALS

2019 Admission Onwards

E007DBF4

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

Answer any **eight** questions.

Weight **1** each.

1. Discuss glass ceramics.
2. Explain the purpose of annealing glass.
3. What do you mean by addition polymerization? What are the different stages involved in addition polymerization?
4. Describe the method used for strengthening nickel alloys.
5. How can colour centres be generated using ionizing radiations?
6. Explain impurity centre recombination.
7. Define the external efficiency of LED? Write down the expression for the same.
8. What are the main advantages of Schottky barrier solar cells over p-n junction solar cells?
9. Illustrate the behaviour of a type II superconductor in an external magnetic field.
10. What is melt growth technique in crystal growth? Give any two methods of melt growth.

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any **six** questions.

Weight **2** each.

11. Discuss the different methods of specifying the molecular weight of polymers.

12. Write a short essay on the crystallization of polymers.

13. Schematically explain the phase shift occurring in Gaussian beam as compared to a plane wave.

14. (i) What is meant by mode-locking?
    (ii) What are the important requirements to achieve mode-locking?
    (iii) What are the typical output characteristics of a mode-locked laser pulse?

15. Discuss the electronic conduction in amorphous semiconductors.

16. Differentiate between Pockels effect and Kerr effect.

17. Show that when a superconductor is placed in an external magnetic field, the field must penetrate up to a certain depth inside the superconductor. Hence define penetration depth.

18. The thickness of a gold film is measured by interferomatic technique with Hg green line of wavelength 5640 Å. If the displacement of the fringes at the step is (1/40) of the fringe spacing, calculate the thickness of the film.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight **5** each.

19. Discuss the mechanical behaviour of polymers illustrating the stress-strain behaviour. Also explain the macroscopic and viscoelastic deformations of polymers.

20. Derive the expression for absorption coefficient α, in terms of the populations of the upper and lower laser levels, of a gain medium within a laser cavity. Hence obtain the expression for the small signal gain coefficient of the system.

21. Discuss about (i) photonic crystals and (ii) liquid crystals.

22. Explain Josephson tunnelling and discuss about AC and DC Josephson effects.

(2×5=10 weightage)