

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, OCTOBER 2017
(Regular/Supplementary/Improvement)
(CUCSS - PG)
CC15P PHY3 E07 – EXPERIMENTAL TECHNIQUES
(Physics)
(2015 Admission Onwards)

Time : Three Hours

Maximum : 36 Weightage

SECTION A

(Answer all questions, Each question carries a weight of 1)

1. What is meant by Pump compression ratio?
2. With a neat diagram explain the working of Pirani gauge.
3. What is meant by Sorption trap?
4. What are the advantages of laser evaporation technique?
5. Write a short note on Quartz crystal thickness monitor.
6. What are multilayered films? Give their importance.
7. Discuss the technique adopted to attain temperature below 1 K.
8. Write a short note on Henning cryostat
9. Differentiate primary and secondary thermometers with examples
10. Write a short note on Van de Graff Generator
11. What are the important applications of Ion implantation
12. Give the principle and working of Debye Scherrer camera.

(12 x 1 = 12 Weightage)

SECTION B

(Answer any two questions, Each question carries a weight of 6)

13. Explain the principle, instrumentation and applications Cryogenic Pump.
14. Explain sputter deposition technique.
What are the factors on which the sputtering yield depends?
15. What are the principle characteristics of an iron source ?
Explain with necessary theory the working of a cascade generator.
16. What is differential scattering cross section ? List important applications of RBS technique.
What are the limitations of RBS technique?

(2 x 6 = 12 Weightage)

SECTION C

(Answer any four questions, Each question carries a weight of 3)

17. A quartz crystal monitor indicates a change in frequency of 1600 Hz when an aluminum film of density 2700 kg/m³ is deposited on its face. Determine the film thickness. If the quartz crystal is 0.2 mm thick and the density of quartz is 2.3 g/cm³, estimate the starting frequency of the crystal.
18. A 6 MeV alpha particle is scattered by a Hg nucleus (atomic weight = 80) at 120⁰ C. Find the minimum approach of the particle to the nucleus and the corresponding kinetic energy of the particle.
19. The pressure in a gas thermometer is 0.70 atm at 100⁰C and 0.512 atm at 0⁰C . (a) What is the temperature when the pressure is 0.04 atm ? (b) What is the pressure of 450⁰C ?
20. What should be the speed of a rotary pump to be used to achieve a vacuum of 10⁻³ Torr, in a chamber of volume 100 litres in 30 minute.
21. The calibration constants K for particular trace element using the PIXE setup was 2548 counts/μgm/μC. For the internal standard element used with a concentration of 100 ppm, the corresponding value is 515. Evaluate the concentration of trace element considered.
22. Proton in a cyclotron describes an orbit of radius 0.32m just before emerging from the dees. Calculate the velocity of proton, their energy in MeV and frequency of alternation of the voltage applied to the dees when a magnetic field is 0.65 T.

(4 x 3 = 12 Weightage)
