

19P309

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Name.....

Reg. No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CBCSS-PG)

CC19P PHY3 E05 - EXPERIMENTAL TECHNIQUES

(Physics)

(2019 Admission Regular)

Time : Three Hours

Maximum : 30 Weightage

Section A

Answer *all* questions. Each question carries 1 weightage.

1. What is a sorbent material? Give examples. How is it useful in vacuum technology?
2. Explain the action of isolation cum air inlet valve.
3. Why the use of ceramic crucibles is needed in thermal evaporation technique?
4. What are dark mirrors and cold mirrors. Explain with some examples.
5. How does synchrotron overcome the difficulties experienced by cyclotron?
6. How will you calculate grain size of the material from XRD pattern?
7. Which are the detectors used in PIXE and NAA? Discuss their efficiency and resolution.
8. What are the advantages of r. f acceleration over electrostatic acceleration?

(8 x 1 = 8 Weightage)

Section B

Answer any *two* questions. Each question carries 5 weightage.

9. Describe the various parts and working of an oil diffusion pump with the help of a neat diagram. Compare it with rotary pump.
10. Describe in detail any two electrical techniques for thickness measurement of thin films.
11. Explain the principle of RBS technique. With a neat diagram describe the experimental setup for elemental analysis using RBS. What are the applications of this technique?
12. Explain how high voltage required for heavy ion acceleration is achieved in van de graph generator. Describe the working with neat diagram

(2 x 5 = 10 Weightage)

Section C

Answer any *four* questions. Each question carries 3 weightage.

13. Describe Knudsen cosine rule and comment on thin film thickness distribution on the substrate at a distance from the source.
14. What is meant by sputtering? Explain one sputtering technique in detail giving a neat diagram.

15. Derive the expression for the film thickness in terms of refractive index of the material of the film and wavelength λ_1 of k^{th} order maximum ($k+1$)th order one at λ_2 at normal incidence.
16. For an electron and a proton moving along circles in a uniform magnetic fields $B=10$ kG (Kilo Gauss). Determine the orbital periods and radii if the kinetic energy of the particles is 10 MeV. Also find the kinetic energies if the orbital radius is 10cm.
17. By how many percent should the frequency of an alternating field of a synchro-cyclotron be changed accelerate protons and alpha particles to an energy of 500 MeV
18. Alpha particle with K E 1.7MeV are scattered by Coulomb field of a stationary Pb Nucleus ($A=208$). Calculate the differential cross section for scattering through an angle 60 degree
19. What is the principle behind XRD technique, describe in detail Debye Scherrer camera and Debye Scherrer equation in XRD techniques?

(4 x 3 = 12 Weightage)
