Exam.Code:0475
Sub. Code: 3727

2071

M.Sc. (Physics) Fourth Semester

PHY-7056: Particle Accelerator Physics

Time allowed: 3 Hours Max. Marks: 60

NOTE: *Attempt five questions in all, including Question No. IX (Unit-V) which is compulsory and selecting one question each from Unit I -IV.*

x-x-x

UNIT-I

1. (a) What are positive and negative ion sources? Describe in detail a working principle of duoplasmatron ion source? 8
   (b) Define briefly the various beam parameters? 4

2. (a) Explain how the beam gets transported from the accelerator to an experimental area? What is the use of EINZEL lens in beam transport systems? 8
   (b) Describe in detail with examples the production of secondary beams? 4

UNIT-II

3. (a) What is a cyclotron? Derive its working principle. 6
   (b) What is alternating gradient accelerator? Describe it in detail. 6

4. (a) What is the basic principle of linear accelerator? Describe in detail the acceleration process and phase stability in a typical linear accelerator. 12

UNIT-III

5. (a)Describe in detail the working principle and different parts of a Tandem electrostatic accelerator? 8
   (b) What is the difference between a Pelletron and Tandetron accelerator? 4

6. (a)What is heavy ion linear accelerator? Describe its working principle. 8
   (b) What is the purpose of insulating column in Van-de-Graff accelerator? 4

UNIT-IV

7. (a) Describe the use of bending magnets, wavelength shifter, wiggler magnets and undulator for synchrotron radiations? 8
   (b) Describe how radiation from relativistic electron beams produces electromagnetic radiations? 4

8. (a) Describe the various methods for the production of the radioactive ion beams? 8
   (b) Write a short note on colliding accelerators? 4

UNIT-V

9. (a)Write the characteristics of synchrotron radiation?
   (b) Write a short note on polarized beams?
   (c) What is beam emittance?
   (d) What do you understand by cluster beam?
   (e)Why cooling is required in in-flight fragment separation technique for radioactive ion beam production?
   (f) What are micro beams? (6 X2)

x-x-x