

CS-2051
NUCLEAR AND PARTICLE PHYSICS-C
SEM(VI)

TIME :3 HOURS

M:M: 30
760/MH

NOTE : The Candidates are required to attempt two question each from Section A and B carrying 5 marks each and the entire Five question from Section C consisting of 7 short answer type questions carrying 2 marks .

Sec-A

Q1. Show that Compton shift is given by $\frac{h}{m_0 c} (1 - \cos\theta)$ where h is Planck's constant, m_0 is rest mass of electron, c is velocity of light and θ is scattering angle.

Q2. Derive Bethe-Bloch formula for loss of energy of a charged particle passing through matter.

Q3. Discuss the principle, working and construction of Linear Accelerator.

Q4. (a) Why cyclotron cannot be used to accelerate electrons? Which machine is used to accelerate electrons? (2)

(b) Briefly explain Electron Synchrotron. (3)

Sec-B

Q5. Discuss the conservation laws in elementary particles.

Q6. Explain in detail the working of G.M counter.

Q7. (a) Draw a block diagram of main components of Scintillation counter. Why it is preferred over G.M counter for detection of Gamma -rays ? (2)

(b) What are main advantages of Semi-conductor detector over other radiation detectors? (3)

Q8. Give main properties of quarks and give quark structure of mesons.

Sec-C

9. Attempt any five.

(i) Range Straggling

(ii) Annihilation

(iii) Give Iso-spin of (i) proton (ii) π^+ -meson

(iv) Anti-particles

(v) Principle of Ionization Chamber

(vi) Betatron condition

(vii) Half value thickness

$2 \times 5 = 10$