

SECTION-B

11. Explain the method used by Wu and Shalnov to prove that fermions and anti-fermions have the opposite parity.
12. Show that negative energies are simply associated with the destruction operators acting on positive energy particles to reduce the energy within the system.
13. Describe the properties of the various types of pion and discuss in detail the experiments which have been carried out to determine their spin, parity, and isospin.
14. If a K_S^0 meson at rest decays in 0.900×10^{-10} sec, how far will a K_S^0 meson travel if it is moving at $0.960c$ through a bubble chamber?
15. Mention the list of leptons with their quantum numbers like mass, parity, spin, life time and Lepton number.
16. What is the evidence for another quantum number “Color”, under which the strong interactions are exactly symmetric? How many colors are there believed to be?
17. Explain five fundamental conservation laws used in particle physics in context to the electromagnetic interaction.

SECTION-C

18. What is a charge conjugation operator? How it is defined for the particles like pions, photon and neutrinos? Discuss the conservation of C and CP and CPT(together) in weak interaction.
19. Using general relativistic mass energy conservation term between energy(E), momentum(P), and mass(m), derive the Dirac wave equation for free particle in the covariant form.
20. Describe with a table the particle content of the standard model of particle physics. Show how the particles can be divided into bosons and fermions, and indicate why some particles appear in generations?

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