St. Joseph's College of Arts & Science (Autonomous)
Cuddalore – 607001

SUBJECT: NUCLEAR AND PARTICLE PHYSICS
SUBJECT CODE: PH806T
STAFF INCHARGE: Dr.S.Sebastian, Mr.M.Sathish

SECTION – A

1. Differentiate prolate and oblate.
2. Define nuclear magneton.
3. What is quadrupole moment?
4. List the properties of nuclear force.
5. Define Q value of a nuclear reaction.
6. What is scattering cross section? Give its unit.
7. Explain half life.
8. What is positron emission?
9. Form an electron from quarks.
10. Define strangeness.
11. What are the magic numbers?
12. Define angular moment of nucleus.
13. What are tensor forces?
14. State meson theory of nucleus.
15. What is spalliation nuclear reaction?
16. What is meant by Q- value of a nuclear reaction?
17. What is meant by neutrino?
18. Explain forbidden transistions.
19. What are baryons?
20. What are quarks?
21. Give the importance of liquid drop model.
22. Write a note on Schmidt lines.

23. What are tensor forces?

24. Explain the spin dependence of nuclear forces.

25. Define elastic scattering in nuclear reactions.

26. Define nuclear fusion.

27. Define angular momentum.

28. Give the properties of neutrino.

29. What are hadrons?

30. What are strange particles? What kind of strangeness they possess?

31. What are the magic numbers?

32. Why stable nuclei have more neutron than protons?

33. Give any two properties of ground state of deuteron.

34. What are the types of exchange forces?

35. What is nuclear fusion?

36. Mention any three conservation laws involved in nuclear reactions.

37. Mention any two properties of neutrino particles.

38. Define angular momentum.

39. What are quarks?

40. Give the classification of Hadrons.

41. What are the magic numbers?

42. Define angular moment of nucleus.

43. What are tensor forces?

44. State meson theory of nucleus.

45. What is spalliation nuclear reaction?

46. What is meant by Q- value of a nuclear reaction?

47. What is meant by neutrino?

48. Explain forbidden transistions.

49. What are baryons?

50. What are quarks?

SECTION – B

1. Explain the liquid drop model.
2. Explain angular momentum and parity of a nucleus.
3. Explain the magnetic dipole moment and electric quadrupole moment of nuclei.
4. Discuss the spin dependence of nuclear force.
5. List the conservation laws of nuclear reactions.
6. Write a note on the controlled fission reaction.
7. Explain the detection and properties of neutrino.
8. Write a note on gamma decay.
9. Discus the different types of interaction.
10. What are quarks? Discuss their flavours, charge and spin.
11. Explain the liquid drop model of nucleus
12. Give experimental evidence for magic numbers.
13. Explain the concept of nuclear magnetic dipole moment.
14. Explain neutron- proton scattering at low energies.
15. Write a note on compound nucleus and assumption.
16. Explain thermo nuclear reaction.
17. Describe neutrino hypothesis of ß- decay.
18. Discuss briefly parity violations of ß- decay.
19. Give an account of weak and strong interaction on elementary particles.
20. Explain Gellman- Mishijima schemes.
21. Explain shell model of nucleus
22. Explain the collective model of Bohr & Mottelson.
23. Explain p-p scattering at low energies
24. Explain the various conservation laws in nuclear reactions
25. Obtain the four factor formula for nuclear fission.
26. Write a note on allowed and forbidden transition.
27. Give an account of the detection of neutrino?
28. Give an account on strong and weak interactions in elementary particles.
29. Write a note on baryons and quarks.
30. Give the main assumptions of liquid drop model.
31. Briefly explain the collective model of Bohr and Mottelson.
32. Explain the charge independence and spin dependence of nuclear forces.
33. Give a brief note on exchange forces.
34. What is the importance of thermonuclear energy in the universe?
35. Distinguish between nuclear fission and fusion.
36. Write a note on Fermi theory of beta decay.
37. Explain the theory of violation of parity conservation of beta decay.
38. Write a short note on Gellman-Nishijima relation.
39. What are leptons? Discuss the properties of leptons.
40. Explain the main features of nuclear core shell model.
41. b) Explain collective model of Bohr and Mottelson.
42. Explain the nuclear electric quadrapole moment.
43. Explain the mesons theory of nuclear forces.
44. Write a note on nuclear reaction with expression.
45. Write note on the critical size of the reactors.

46. Explain the Fermi theory of beta decay.
47. Explain allowed and forbidden transistion?
48. Give an account on strong and weak interaction in elementary
49. particles.
50. Explain the property of elementary particles.
51. Explain the liquid drop model of nucleus
52. Give experimental evidence for magic numbers.
53. Explain the concept of nuclear magnetic dipole moment.
54. Explain neutron- proton scattering at low energies.
55. Write a note on compound nucleus and assumption.
56. Explain thermo nuclear reaction.
57. Describe neutrino hypothesis of ß- decay.
58. Discuss briefly parity violations of ß- decay.
59. Give an account of weak and strong interaction on elementary particles.
60. Explain Gellman- Mishijima schemes.

SECTION – C

1. Discuss in detail the salient features of the collective model of the
2. nucleus.
3. Explain the existence of tensor forces.
4. Discuss the Yukawa's theory of Meson exchange.
5. Write a note on the thermonuclear reactions.
6. Explain the working of a fission reactor.
7. Discuss the Fermi's theory of beta decay and explain the shape of the beta spectrum.
8. Brief the application of Gellman- Nishijima formula in the classification of hadrons.
9. Discuss the shell model of nucleus. Give its merits and demerits.
10. Write notes on (i) nuclear quadrapole moment.
    i. (ii) proton- proton scattering at low energies.
11. Explain the conservation law in nuclear reaction.
12. Describe the salient features of ß- decay process.
13. Explain in detail the elementary ideas of SU(3) symmetry and quarks.
14. Discuss the Bohr-wheeler theory of nuclear fission.
15. Explain in detail the Meson theory of nuclear forces?
16. Discuss the formation and decay of compound nucleus in detail.
17. Discuss the Fermi theory of beta decay
18. Give a detail account on SU(3) symmetry.
19. Explain the main function of shell model.
20. Explain the n-p scattering and p-p scattering at low energies of nuclear forces.
21. Define Q-value of a nuclear reaction.
22. Derive an expression for the Q-value of the reaction X(a,b) Y in
23. terms of kinetic energies of the incident and product particles and masses of the various particles and nuclei.
24. Explain the two component theory of neutrino decay.
25. Discuss the various types of interaction between elementary particles.
26. Discuss the Bohr- wheeler theory of nuclear fission.
27. Discuss the simple theory to estimate the ground state of deutron.
28. Explain i) Conservation laws of nuclear reaction

29. ii) Reactor materials
30. Discuss two component theory of neutrino decay.
31. Explain in detail the elementary ideas of SU(3) symmetry and quarks.
32. Discuss the shell model of nucleus. Give its merits and demerits.
33. Explain the conservation law in nuclear reaction.
34. Describe the salient features of ß- decay process.
35. Explain in detail the elementary ideas of SU(3) symmetry and quarks.