STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2008-09 & thereafter)

SUBJECT CODE : PH/MC/NP64

B.Sc. DEGREE EXAMINATION APRIL 2013
BRANCH III - PHYSICS
SIXTH SEMESTER

REG. No._____

COURSE : MAJOR – CORE
PAPER : NUCLEAR PHYSICS
TIME : 30 MINS. **MAX. MARKS : 30**

SECTION – A

TO BE ANSWERED IN THE QUESTION PAPER ITSELF:

ANSWER ALL QUESTIONS:

I. CHOOSE THE CORRECT ANSWER:

1. Nuclear Radius is expressed in

   (a) FERMI (b) Angstorm (c) Radon

2. The atoms of different element having same mass numbers are called

   (a)isobar (b) isotone (c)isomer

3. Mass defect is

   (a) $\Delta m= Zm_p + Nm_n - Z^{M^A}$

   (b) Δm= A-Z

   (c) Δm=Z-A

4. Positive rays carry_____ charge

   (a) Positive (b) negative (c) Zero

5. Positron is antiparticle for

   (a) electron (b) Proton (c) neutron

6. In Nuclear reaction $_5B^{10}+_2Ne^4 \rightarrow {}_7H^{13}$+X. X is

   (a) neutron (b) electron (c) Proton

7. Law of Radioactive decay is

   (a) $N= N_{oe^{-\lambda t}}$ (b) N=No (c) $\Rightarrow N=e^{\lambda t}$

8. In Nuclear reaction $_{92}U^{238} \rightarrow {}_{90}Th^{234}$ +Y, Y is

   (a) αparticle (b) β particle (c) γ-particle

..2..

9. The energy equivalent of mass unit is

(a) 931.49 Mev (b) 900 Mev (c) 800 Mev

10. Half life T ½ =

(a) .693/λ (b) .693/λ1/2 (c) .693λ

11. Energy released in fission is

(a) 330 Mev (b) 200 Mev (c) 50 Mev

12. The energy released in fusion is

(a) 25.7 Mev (b) 100 Mev (c) 50 Mev

13. In the process in which reaction charge is conserved?

(a) $n \rightarrow p + \Pi^-$ meson (b) $p \rightarrow n + \Pi^-$ (c) $n \rightarrow p$

14. Nuclear force is

(a) Short range (b) gravitational (c) Long range

15. In cyclotron frequency of revolution of a particle is

(a) Bq/2 Πm (b) 2Bq / 3Πm (c) Bq/4Πm

II. FILL IN THE BLANKS:

16. ${}_5B^{10} + {}_0n^1 \rightarrow 3^{Li^7} +$_____

17. Moderator is used to _____

18. Unit of Radioactivity is _____

19. NMR is _____

20. Neutron is a _____

III. STATE TRUE OR FALSE:

21. In ${}_zX^A$, A is mass number.

22. Synchrotron is frequency modulated cyclotron.

23. The fission produces 3 neutrons.

24. K=1 is called critical state

25. B.E. is defined as Binding Energy.

IV ANSWER BRIEFLY:

26. What are magic numbers?

27. Distinguish between β and γ ray.

28. What is fission?

29. Explain chemical shift.

30. What is Geiger Muller counter?

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TIME : 2 ½ HOURS MAX. MARKS : 70

SECTION – B

ANSWER ANY FIVE QUESTIONS: (5X 5 = 25)

1. Calculate binding energy per nucleon in $_6C^{12}$, masses of proton, and neutron are 1.007276, 1.008665 amu. The mass of $_6C^{12}$ atom is 12.0000 amu.

2. The disintegration constant of radioactive element is .00231 per day, calculate its half life and average life.

3. Calculate time required for 10% of sample of Thorium to disintegrate Assume half life of Thorium to be 1.4×10^{10} years.

4. Compare alpha, Beta and γ – rays.

5. Write note on Radioactivity.

6. Discuss Q-value of Nuclear reactions.

7. Distinguish fission and fusion with examples.

SECTION C

ANSWER ANY THREE QUESTIONS: (3X15= 45)

8. a) Explain liquid drop model and shell model of nucleus.
   b) Give evidences for shell model.

9. Explain (a) Radioactive series.
   (b) Geiger Nuttals law.
   (c) Units of Radioactivity.

10. Give the construction and working of GM counter.

11. Explain a Nuclear Reactor with a neat diagram explain the parts and working of a Nuclear reactor.

12. Write note on NMR and NQR spectroscopy.

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