

Roll No.

No. of Questions : 9]

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1)

**UG (CBCS) IIIrd Year (Annual)
Examination**

2529

B.Sc. PHYSICS

(Nuclear and Particle Physics)

(DSE-1B)

Paper : PHYS 304 TH

Time : 3 Hours]

[Maximum Marks : 70

Note :- Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is compulsory.

Section-A

(Compulsory Question)

- (a) What is size of Nucleus ?
- (b) Explain Parity.
- (c) What is meaning of ISOTONES ?
- (d) What will be the value of electric quadrupole moment for spherical nucleus ?

- (e) Convert 1 barn into m^2 .
- (f) What are limitations of Shell Model ?
- (g) Find mean (or) average life of a radioactive sample having disintegration constant as 10 sec^{-1} .
- (h) Explain Internal Conversion.
- (i) What are Stripping Reactions ?
- (j) Explain Straggling.
- (k) What is the main composition of primary cosmic rays ?

$11 \times 2 = 22$

Section-B

- (a) Explain Average Binding Energy and its variation with mass number.
- (b) Calculate energy equivalent to 1 amu.
- (c) From magnetic moment variations, explain why electron cannot exist inside nucleus ? $6+3+3=12$
- (a) What are assumptions of the liquid drop model ?
Calculate the semi-empirical mass formula.

(b) Evaluate the Binding Energy of ${}_{10}\text{Ne}^{22}$ in MeV.

Given that $a_v = 15.6$ MeV, $a_s = 16.8$ MeV,

$a_c = 0.72$ MeV, $a_{\text{sym}} = 23.3$ MeV and $a_p = 34$

MeV. 8+4=12

Section-C

4. (a) Explain using Gamow's theory of alpha decay, how the alpha particle is emitted from nucleus. Find the expression for transmission coefficient.

(b) What happens to the nucleus when a gamma ray is emitted from it ? 10+2=12

5. (a) Discuss the Kinematics of nuclear reaction and hence find the 'Q value of equation'.

(b) What do you mean by Nuclear Cross Section ? 10+2=12

Section-D

6. (a) Find the Bethe-Block formula for stopping power.

(b) What is the effect of intensity of light on Photoelectric Current ? 10+2=12

Turn Over

7. (a) Discuss the basic principle of Scintillation Detectors. Explain the construction of Photo-multiplier Tube.

(b) What are advantages and limitations of Cyclotron ? $8+4=12$

Section-E

8. (a) Discuss the various conservation laws that are followed in particle interactions.

(b) What is CPT Theorem ? $9+3=12$

9. (a) What is the origin of Cosmic Rays ?

(b) Explain Cosmic Ray Showers.

(c) What is the need of color quantum number ? $4+4+4=12$