



Date: 17-04-2018
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

PART – A

Answer ALL questions:

(10x2=20 marks)

1. What are the drawbacks of Thomson's parabola method?
2. Write down the electronic configuration of Na and Cl.
3. What is Stark effect?
4. Write down the types of excitation giving rise to molecular spectra.
5. Distinguish between isobar and isotope with examples.
6. State Geiger-Nuttall law.
7. What is the value of spin and the value half life of a neutron?
8. Define chain reaction.
9. What are cosmic ray showers?
10. Name the four fundamental interactions.

PART – B

Answer any FOUR questions:

(4X7.5=30 marks)

11. Explain the two different coupling schemes between orbital and spin angular momenta. **(4+3.5)**
12. Describe the Dunnington's method of finding e/m of an electron.
13. Give the elementary theory of the origin of pure rotational spectrum of a rigid linear molecule.
14. Explain (i) mass defect (ii) binding energy and (iii) packing fraction. **(3X2.5)**
15. Write short notes on any three sources of neutrons. **(3X2.5)**
16. a) List out the various conservation laws in elementary particle physics.
b) Explain the conservation of baryon and lepton numbers with examples. **(2.5+5)**

PART - C

Answer any FOUR questions:

(4X12.5=50 marks)

17. a) Explain the principle and theory of Stern-Gerlach experiment.

b) Why it is necessary to use a beam of neutral atoms and not ions in this experiment?

18. a) What is normal and anomalous Zeeman effect?

(4+8.5)

b) Explain sodium doublet lines D_1 and D_2 by deriving Lande's 'g' factor.

19. a) Give the origin of line and continuous spectrum of β rays.

b) Calculate the binding energy of a neutron in the ${}_3\text{Li}^7$ nucleus. (Given masses of ${}_3\text{Li}^7=7.016004$, ${}_3\text{Li}^6=6.015125$ and ${}_0n^1=1.008665$ amu.)

(10+2.5)

20. Obtain an expression for binding energy of nucleus based on the semi-empirical mass formula.

21. Explain the construction and working of a nuclear reactor.

22. Discuss the variation of cosmic ray intensity with

i) altitude,

ii) latitude and

iii) east-west asymmetry.
