B. Sc. DE**GREE END SEMESTER EXAMINATION - OCTOBER 2019**

SEMESTER – **3, PHYSICS (COMPLEMENTARY FOR B.Sc. CHEMISTRY)**

COURSE : **15U3CPPHY6 - QUANTUM MECHANICS, SPECTROSCOPY,**

NUCLEAR PHYSICS, ELECTRONICS

(For Regular - 2018 Admission and Supplementary 2017, 2016, 2015 & 2014 Admissions)

Time : Three Hours   Max. Marks : 60

PART A

(Answer **all** questions. Each question carries 1 mark)

1. Explain the size and shape of the nucleus.
2. State uncertainty principle.
3. What is the physical significance of the wave function ψ?
4. Differentiate intrinsic semiconductor and extrinsic semiconductor.
5. What is Raman Effect?
6. What are magic numbers?
7. Write any four properties of α ray.
8. Explain the term binding energy.
9. What is ripple factor?
10. Write a note on Thomson's atom model.   (1 x 10 = 10)

PART B

(Answer any **Seven** Questions. Each question carries 2 marks)

11. What is a chain reaction?
12. What are the features of vector atom model?
13. Explain nuclear fission with example.
14. What are the limitations of Bohr atom model?
15. How is a Zener diode different from an ordinary diode?
16. Explain the fundamental concepts of Planck's quantum theory.
17. Define the quantities half-life and mean life.
18. Briefly outline the salient features of Rutherford's atom model.
19. Explain the input characteristics of common emitter configuration.   (2 x 7 = 14)

PART C

(Answer any **four** questions. Each question carries 4 Marks)

20. The series limit of Balmer series is 3646 Å. Calculate the wavelength of the first member of the series.
21. Prove that the de Broglie wavelength of an electron accelerated through a potential difference of V volt is $\sqrt{150/V}$ Å.

22. The half-life of radon is 3.8 days. After how many days will only one twentieth of radon sample be left over?

23. How many fissions take place per second in a 300 MW reactor? Assume that 200MeV is the energy released per fission.

24. Wave function for a particle in a box is given by $\psi = A \sin\left(\frac{3\pi x}{L}\right)$,0≤X≤L. Evaluate 'A' so that the wave function is normalized.

25. a) Find the value of β if(i) α=0.99 (ii)α=0.98   (4 x 4 = 16)

    b) What are the advantages of voltage divider biasing?

PART D

(Answer any *two* questions. Each carries 10 marks)

26. Explain radioactive series and also explain radioactive dating.
27. Derive Schrodinger's time dependent equation.
28. What is a Zener diode? Explain how Zener diode maintains constant voltage across a load.
29. On the basis of liquid drop model, account for the fission of a nucleus.

(10 x 2 = 20)

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