

Reg. No..... Name.....

BSC DEGREE END SEMESTER EXAMINATION - OCTOBER 2015
SEMESTER: 3, PHYSICS (COMPLEMENTARY FOR CHEMISTRY MAIN)
COURSE – U3CPPHY6: QUANTUM MECHANICS, SPECTROSCOPY, NUCLEAR PHYSICS
AND ELECTRONICS

Time : 3 Hours

Max. Mars. : 60

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

1. What are matter waves?
2. Explain the term photoelectric work function?
3. Write down the expression for the energy of an electron in the n^{th} orbit. Explain the symbols.
4. What is Raman Effect?
5. What is packing fraction?
6. Briefly explain proton-proton cycle.
7. What are isotopes?
8. Name a commonly used moderator
9. Distinguish between intrinsic and extrinsic semi conductors
10. What is ripple factor? (1 × 10 = 10)

PART B(Answer any **seven** questions. Each question carries 2 marks)

11. Explain the fundamental concepts of Planck's quantum theory.
12. What is meant by a normalized wave function?
13. Distinguish between molecular spectra and atomic spectra.
14. What is a chain reaction?
15. Give a brief account on the principle of atom bomb.
16. What is thermonuclear fusion reaction?
17. State and explain Soddy's displacement law
18. What is a transistor? Describe the construction of a transistor
19. How a depletion layer is formed in a PN junction diode? (2 × 7 = 14)

PART C(Answer any **four** questions. Each question carries 4 marks)

20. The photo electrons emitted by a radiation of frequency 3.65×10^{15} hertz are brought to rest by applying a retarding potential of 10 volts. Find the threshold frequency of that surface.
21. Prove that the de Broglie wavelength of an electron accelerated through a potential difference of V volts is $(150/V)^{1/2} \text{ \AA}$

22. The electron in the hydrogen atom makes a transition from a state of energy -1.51 eV to a state -3.4 eV . Calculate the wavelength of spectral line emitted.
23. Calculate the time required for 10% of a sample of thorium to disintegrate? Assume the half life of thorium to be 1.4×10^{10} years
24. For a transistor β is 100 times α . Find the values of α and β .
25. In a full wave rectifier the diodes used have internal resistance of 25Ω . If the load resistance is 800Ω and the R M S secondary voltage from centre tap to each end of the secondary is 40 V , Calculate the efficiency of the rectifier. (4 × 4 = 16)

PART D

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

26. Derive Schrödinger's time dependent equation.
27. Give an account of the Bohr atom model. Explain the origin of spectral lines of hydrogen on the basis of this theory.
28. Describe the construction and working of a nuclear reactor. When is the reactor said to be critical?
29. (a) What is a zener diode? Explain it's working.
(b) With the help of a circuit diagram show how it can be used as a voltage regulator (10 × 2 = 20)
