B.Sc. DEGREE END SEMESTER EXAMINATION OCTOBER 2017

SEMESTER – 3: PHYSICS (COMPLEMENTARY COURSE)

COURSE: 15U3CPPHY6: – QUANTUM MECHANICS, SPECTROSCOPY,

NUCLEAR PHYSICS, ELECTRONICS

For Regular (2016 Admission) & Supplementary / Improvement (2015 & 2014 Admission)

Time: Three Hours   Max Marks: 60

PART A

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

1. Define uncertainty principle. Give its expression.
2. Give the essential conditions of an acceptable wave function.
3. Write the origin of vibrational spectrum.
4. What is de Broglie hypothesis?
5. What are isomers? Give example.
6. What is the difference between an atom bomb and a hydrogen bomb in principle?
7. What is meant by quadrupole moment?
8. Define radioactive series?
9. What are the advantages of negative feedback amplifier?
10. Why do a zener diode is used for constructing a regulated power supply?   (1 x 10 = 10)

PART B

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

11. Discuss the results of Davisson Germer experiment.
12. Compare Bohr atom model with the Sommerfeld model.
13. Explain the fine structure of Hydrogen atom.
14. What are the features of photoelectric emission?
15. The radius of He^4 is 2.238fm. Deduce the radius of Ho^{165}.
16. Compare the units Curie and Rutherford.
17. Explain energy production in stars.
18. Compare the current gain of a transistor in the common base configuration to that in the common emitter configuration.
19. Discuss a diode clamper circuit.

(2 x 7 = 14)

PART C

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

20. Derive time independent Schrodinger equation.
21. Calculate the wavelength associated with an electron having kinetic energy 1eV.

22. The energy required to remove an electron from sodium is 2.3eV. Does sodium show photoelectric effect for orange light with wavelength 680 nm?

23. The disintegration constant λ of a radioactive element is 0.00231 per day. Calculate its half life and mean life.

24. A reactor is developing energy at the rate of 32 x 10^6 of watts. How many atoms of U^{235} undergo fission per second? Assume that on an average, an energy of 200 MeV is released per fission.

25. Over what range of input voltage will the zener circuit maintain 30V across a 2000 ohm load, assuming that series resistance used is 200 ohm and zener current rating is 25mA.

(4 x 4 = 16)

PART D

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

26. What is Raman Effect? Explain using quantum theory. Explain the experimental set up for measuring.

27. Discuss the properties of nuclei. How stability is explained in terms of binding energy?

28. What are power reactors? Describe the construction and working in detail.

29. Explain the working of full wave bridge rectifier. Also derive its efficiency and ripple factor.

(10 x 2 = 20)

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