LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

THIRD SEMESTER – **NOVEMBER 2024**

PH 3202 – PHYSICS FOR CHEMISTRY - II

Date: 15-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

SECTION A

Answer ANY FOUR of the following **4 x 10 = 40 Marks**

1. Explain the working of a JK Flip Flop and discuss its applications in digital circuits.
2. Discuss Bohr's atomic model and its significance in explaining the hydrogen spectrum.
3. Explain the production of X-rays and differentiate between continuous and characteristic X-ray spectra.
4. Derive the semi-empirical mass formula and explain its significance in determining nuclear stability.
5. Describe the liquid drop model of the nucleus and its application in explaining nuclear fission.
6. Derive an expression for the velocity of a transverse wave on a stretched string and discuss factors that affect its speed.
7. Explain Sabine's law for reverberation time and discuss the conditions required for good acoustical design in a room.
8. Discuss the failure of classical mechanics with reference to black body radiation and explain how Planck's theory resolved the issue.

SECTION B

Answer ANY THREE of the following **3 x 20 = 60 Marks**

9. Explain the working principles of binary counters and differentiate between Mod-n and decade counters. Provide examples of their applications in digital systems.
10. Discuss the fine structure splitting of spectral lines, focusing on the sodium doublet. Explain the quantum mechanical reasons for this splitting.
11. Classify elementary particles into quarks and leptons. Explain their properties and their role in the Standard Model of particle physics.
12. Discuss the generation, detection, and industrial applications of ultrasonic waves. How are ultrasonic waves used in medical imaging and industrial non-destructive testing?
13. Explain the Davisson and Germer experiment and how it confirmed the wave nature of matter. Discuss its significance in the development of quantum mechanics.
14. Explain Einstein’s photoelectric equation and its experimental verification through Millikan’s experiment. Discuss the applications of photoelectric cells in modern technology.

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