Part A

I. Answer any Ten questions. Each question carries 1 marks   **(10x1=10)**

1. Mention the spectral series of Hydrogen atom.

2. List the two modifications made by Sommerfeld to the Bohr model.

3. List the three lines in Raman spectrum of a molecule.

4. Write down the inferences from the black body spectrum.

5. Express Planck's radiation formula and hence deduce Rayleigh-Jean's law from it

6. Express wave particle duality mathematically.

7. Relate phase velocity and group velocity

8. Write the magic numbers for an atomic nucleus.

9. Compare the properties of beta and gamma rays.

10. Define peak inverse voltage of a diode.

11. State the reason for naming NOR and NAND gates as universal gates.

12. Subtract $(1010)_2$ from $(1111)_2$ using 2's complement method.

Part B

II. Answer any Six questions. Each question carries 5 marks   **(6x5=30)**

13. Find the wavelength of the spectral line that corresponds to a transition in the Hydrogen atom from n=10 state to the ground state. Give an account of spectral series of Hydrogen.

14. Write on the quantum theory of Raman effect.

15. Define matter wave. Calculate the de Broglie wavelength associated with a ball of mass 50g moving with a velocity of 600cm/s.

16. The photoelectrons emitted by a radiation of frequency 3.65×10^{15} Hz are brought to rest by applying a retarding potential of 10V. a)Find the threshold frequency of that surface. (b) Examine the response of the cell to a high intensity red light of wavelength $6328A^0$ produced by He-Ne laser.

17. Geiger and Rutherford found by the method of scintillations that thorium emits 4500 α particles per second per gram. Assume 1 gm of thorium contains 2.6×10^{21} atoms, calculate its half life.

18. Calculate the barrier potential for Si junction at (a)100^0C and (b) 0^0C if its value at 25^0C is 0.7V

19. A transistor with α = 0.998 is connected in CE mode. The potential difference across 10 kΩ resistance connected in the collector circuit is 10 V. Find base current, emitter current, collector current and current gain.

20. Convert the hexadecimal number 1AF into its octal equivalent.

21. Explain the adder circuits with the aid of block diagrams and truth tables.

Part C

III. Answer any Two questions. Each question carries 10 marks   **(2x10=20)**

22. Explain the origin of pure rotational spectrum of a rigid molecule.

23. Explain photoelectric phenomena. Discuss how the inadequacy in explaining the photoelectric effect was rectified using quantum concepts.

24. Discuss the law of successive disintegration of nuclei.

25. Describe the working of a full wave centre tap rectifier with the help of a neat diagram. Give the input and output waveforms and obtain the expression for its efficiency and ripple factor.