

Roll No. \_\_\_\_\_

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**SVS 313 B-15**

**B.Sc. V<sup>th</sup> Semester Degree Examination**

**Physics**

**(Quantum mechanics Nuclear Physics, & Energy Physics)**

**Paper : 5.2**

Time : 3 Hours

Maximum Marks : 80

**SECTION -A**

Answer the following:

**(15×1=15)**

1. What is stellar energy.
2. Which gas is produced in Bio-gas plant.
3. What are mesons.
4. What is magic number.
5. Define the unit curie.
6. What are matter waves.
7. Define zero-point energy.
8. Does change in wavelength depend on incident wave length.
9. Define degeneracy.
10. Determine the uncertainty in the momentum if electron in an atom is located within a distance of  $15\text{A}^0$ .
11. State Geiger nuttal law.
12. Define binding energy.

13. Write a principle of H-Atom.
14. Give the principle of scintillation counter.
15. State decay law.

### **SECTION - B**

**Answer any Five:** **(5×5=25)**

16. Write a note on physical significance of wave function.
17. Explain Heisenberg's uncertainty principle with  $\gamma$  -ray ray-microscope.
18. Write a note on nuclear forces.
19. Explain the neutrino Hypothesis in  $\beta$  -decays.
20. Write a note on cyclotron.
21. Explain the production of Bio-mass & bio-gas.
22. Explain nuclear fission chain reaction.

### **SECTION - C**

**Answer any Four of the following questions:** **(4×10=40)**

23. a) Derive time independent schrödinger wave equation.  
b) Explain with neat diagram Davison & germer experiment **(5+5)**
24. a) Explain liquid drop model & write merits & demerits of it.  
b) 1.5 gram of radioactive sample takes 60 sec. to loose 1 centigram. Calculate its half life period and decay constant.

25. a) Derive equation for compton Shift  $\Delta\lambda = \frac{h}{m_0c}(1 - \cos\theta)$
- b) Calculate the momentum of a particle associated with wave length of  $10^{-12}\text{m}$ .
26. a) What are primary; secondary & supplementary sources of energy? Discuss.
- b) Write a note on solar energy. (7+3)
27. a) Describe construction & working of nuclear reactor.
- b) Calculate the energy released in carbon cycle given  ${}_1H^1 = 1.008 \text{ amu}$ .  
 $\text{He} = 4.004 \text{ amu}$ .  
 ${}_1e^0 = 0.00056 \text{ amu}$ .
28. a) Define half life and mean life of a radio active element and derive an equation connecting them.
- b) Write a note on attenuation of  $\gamma$ - rays. (6+4)