DOON UNIVERSITY, DEHRADUN
End Semester Examination, IV Semester, 2024
Department of Physics, School of Physical Sciences
Integrated M.Sc. Physics
Course PHC-252: Elements of Modern Physics

Time Allowed: 2Hours   *Maximum Marks: 30*

SECTION: A   *(Marks: 1X6 =6)*
Select correct option. Two options can also be correct

1. Select the correct alternative(s):

Light of wavelength λ falls on a photo-sensitive surface having work function hc/λ_0. The photo-electrons will be emitted provided:

(a) $\lambda > \lambda_0$ (b) $\lambda = \lambda_0$

(c) $\lambda < \lambda_0$ (c) $\lambda > 2\lambda_0$

2. The de-Broglie wavelength of an electron is 2Å. Its momentum is:

(a) 6.6×10^{-24} kg m/s   (b) 3.3×10^{-24} kg m/s

(c) 0.30×10^{24} kg m/s   (d) 13.2×10^{-44} kg m/s

3. The relation between Half-life ($T_{1/2}$) and decay constant λ is-

(a) $T_{1/2} = 0.693/\lambda$ (b) $T_{1/2} = 0.693\lambda$

(c) $T_{1/2} = \lambda/0.693$ (d) $T_{1/2} = 0.693/\lambda^2$

4. A rule by means of which from a given function we can find another function is:

(a) Function   (b) Operator

(c) Eigen value   (d) None of these

5. Write down full form of LASER.

6. Write down Schrodinger's equation.

SECTION: B   *(Marks: 12)*

7. Drive the formula for Rutherford and Soddy law for radioactive decay.   4

8. Derive a formula for mean life and half life of a radioactive material.   4

9. What is N-Z graph? How do you explain stability of atom by it?   4

SECTION: C *(Marks: 6X2=12)*

10. What is Einstein A and B coefficients. Deduce relation between them.

11. Explain with diagram what a nuclear reactor is? Which are 3 main parts of nuclear reactor and their role in the working of nuclear reactor?