

**MILAGRES COLLEGE, KALLIANPUR**

**Credit based sixth Semester BSc Degree Examination**

**first Internals June - July 2021**

**nuclear Physics (PHYSICS VII): BSC PHC-354**

**Duration :1 hr 30 min.**

**Time :9.30 am - 11.00 am**

**Total: 40 marks**

**Date: 05/07/2021**

**Part A**

**Short answer type questions(8x2=16)**

- 1) State Geiger – Nuttall law. Justify with graphical representation
- 2) Explain secular equilibrium.
- 3) Estimate the age of the earth using radio uranium dating technique
- 4) What is orbital electron capture (K capture).
- 5) Mention any four characteristics of neutrino produced in beta decay process.
- 6) Write the  $\beta^+$  decay equation of Carbon ( $Z= 6, A=12$ )
- 7) What is angle of scattering? Write its relation with impact parameter.
- 8) Write the equation of interaction of gamma rays with matter and explain each term.

**Part B**

**UNIT 1**

- 1) Explain tunnelling effect in alpha decay. (4 marks)
- 2) With elements A, B and C (stable nuclide) forming a radioactive series, derive and expression for the number of atoms of B (daughter nuclide) if at start b was not present in the sample. (6 marks)

**Problems**

- 1) Calculate the alpha particle potential barrier in the case of Polonium ( $Z = 84, A = 212$ ) (4 marks)

**UNIT 2**

- 1) With the diagram give the account of Rutherford alpha ray scattering and mention its observations. (4 marks)
- 2) Assuming the expression for impact parameter derive the expression for Rutherford scattering formula. (6 marks)

