# C.U.SHAH UNIVERSITY
## Winter Examination-2015

**Subject Name: Electromagnetism and Nuclear Physics**

**Subject Code:  4SC05ENC1**                                **Branch: B.Sc.(Physics)**

**Semester: 5     Date: 09/12/2015      Time: 2:30 To 5:30          Marks: 70**

Instructions:
  (1)  Use of Programmable calculator & any other electronic instrument is prohibited.
  (2)  Instructions written on main answer book are strictly to be obeyed.
  (3)  Draw neat diagrams and figures (if necessary) at right places.
  (4)  Assume suitable data if needed.

| Q-1 | | **Attempt the following questions:** | **(14)** |
|---|---|---|---|
| | **a)** | Give the relation between ranges of an alpha particle and decay constant. | 01 |
| | **b)** | Give names of three electromagnetic interaction of energy emission. | 02 |
| | **c)** | Give the equation of disintegration energy for alpha decay. | 01 |
| | **d)** | Give selection rules for γ-Rays. | 02 |
| | **e)** | Define Hysteresis. | 01 |
| | **f)** | Give Maxwell's equation of electricity and magnetism. | 02 |
| | **g)** | Define retarded potential. | 02 |
| | **h)** | Give formula of electromagnetic density. | 01 |
| | **i)** | Define beta decay. | 02 |

**Attempt any four questions from Q-2 to Q-8**

| Q-2 | | **Attempt all questions** | **(14)** |
|---|---|---|---|
| | **a)** | Explain  disintegration energy of spontaneous alpha decay. | **05** |
| | **b)** | Explain Maxwell's equations . | **06** |
| | **c)** | Discuss decay of free charge . | **03** |
| Q-3 | | **Attempt all questions** | **(14)** |
| | **a)** | Explain Gamma ray emission . | **05** |
| | **b)** | Discuss  energy flux in a plane wave. | **05** |
| | **c)** | Discuss  long range alpha particle. | **04** |
| Q-4 | | **Attempt all questions** | **(14)** |
| | **a)** | Write in detail Pauli's Neutrino hypothesis. | **07** |
| | **b)** | Explain selection rules of β-Decay. | **05** |
| | **c)** | Draw a diagram of paradoxical situation of alpha decay. | **02** |

| | | | |
|---|---|---|---|
| **Q-5** | | **Attempt all questions** | **(14)** |
| | **a)** | Explain the alpha spectrum and fine structure. | **05** |
| | **b)** | Explain Multipolarity in Gamma transitions. | **05** |
| | **c)** | Explain hysteresis . | **04** |
| **Q-6** | | **Attempt all questions** | **(14)** |
| | **a)** | Explain detection of neutrino. | **05** |
| | **b)** | Explain retarded potential. | **06** |
| | **c)** | Explain in detail nuclear Isomerism. | **03** |
| **Q-7** | | **Attempt all questions** | **(14)** |
| | **a)** | Explain Weizsacher's semi empirical mass formula and discuss volume energy term and surface energy term . | **06** |
| | **b)** | Explain Lienard-Wiechert potentials. | **06** |
| | **c)** | Define skin depth. | **02** |
| **Q-8** | | **Attempt all questions** | **(14)** |
| | **a)** | Explain plane waves in non conducting media. | **06** |
| | **b)** | Explain potentials of electromagnetic field. | **05** |
| | **c)** | Write short note on Lorentz gauge condition. | **03** |