

M.Sc.(Physics) (NEP Pattern) - Semester-III
03MSCPH1 - Paper-I : Nuclear and Particle Physics

P. Pages : 2

Time : Three Hours



GUG/W/24/16023

Max. Marks : 80

Either:

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| 1. | a) | Obtain the expression for semi-empirical mass formula. Show graphically, the combination of various factors to binding energy per nucleon of nucleus. | 8 |
| | b) | Explain size, shape, charge distribution, spin and parity of nucleus. | 8 |

OR

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| | e) | Explain liquid drop model in detail with nuclear stability. | 8 |
| | f) | Explain single particle shell model with its validity and limitations. | 8 |

Either:

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| 2. | a) | Explain the properties of alpha, beta and gamma decay of nuclei. | 8 |
| | b) | Explain the law of conservations of nuclear reactions. | 8 |

OR

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| | e) | Explain direct and compound nuclear reaction mechanism. | 8 |
| | f) | Explain nuclear fission process in terms of the liquid drop model. | 8 |

Either:

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| 3. | a) | Explain the interaction of electro-magnetic radiation with matter in detail. | 8 |
| | b) | Explain: | 8 |
| | | i) G-M counter | |
| | | ii) Proportional counter. | |

OR

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| | e) | Explain the elementary principles of particle accelerators and explain linear accelerator. | 8 |
| | f) | Discuss: | 8 |
| | | i) Scintillation detector. | |
| | | ii) Semiconductor detector. | |

Either:

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| 4. | a) | Derive an expression for Gell Mann-Nishijima formula. | 8 |
| | b) | Explain the properties of nuclear particles in the form of their quantum number, charge, mass, spin and parity. | 8 |

OR

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|-----------|----|---|----------|
| | e) | Explain the quark model in detail. | 8 |
| | f) | Explain the strong, weak and electromagnetic interaction of nuclear particles with example. | 8 |
| 5. | | Answer all the followings. | |
| | a) | Define nuclear force and explain the charge independence and charge symmetry of nuclear forces. | 4 |
| | b) | Explain nuclear energy and nuclear power. | 4 |
| | c) | Write iso-spin and strangeness of all nuclear particles. | 4 |
| | d) | Explain the cyclotron. | 4 |
