Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **15PH3012** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Nuclear and Particle Physics** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | If the wave function is extended beyond the nuclear box, how it would affect the problem of a nucleon trapped inside an infinite potential well? Solve using appropriate methods. | CO1 | 15 |
| b. | Write short notes on nuclear size and radius. | CO1 | 5 |
| (OR) | | | | |
| 2. | a. | Find the eigen values and eigen function of a particle in a box by applying Schrodinger’s wave equation. | CO1 | 15 |
| b. | Write short notes on the internal structure of proton. | CO1 | 5 |
|  |  |  |  |
| 3. | a. | Derive Weisacker Semi empirical mass formula from first principles. | CO1 | 15 |
|  | b. | Explain briefly about negatron and positron decay. | CO1 | 5 |
| (OR) | | | | |
| 4. | a. | On the surface of planet earth, a nucleus with two neutrons are not found in nature. Explain the existence of a nucleus with billions of neutrons in space in the form of a neutron star. | CO1 | 15 |
|  | b. | What are the various radioactive decay modes? | CO1 | 5 |
|  |  |  |  |  |
| 5. | a. | What are the significant successes of the shell model of a nucleus? | CO1 | 15 |
|  | b. | The liquid drop model failed to explain the existence of magic numbers. Explain. | CO1 | 5 |
| (OR) | | | | |
| 6. | a. | The nucleus was successfully explained in analogy with a drop of spherically shaped drop of water. Explain in detail how it was developed into a successful model. | CO1 | 15 |
|  | b. | Give any three evidenes for the existence of magic numbers. | CO1 | 5 |
|  |  |  |  |  |
| 7. | a. | Explain in detail about the four fundamental forces of nature. | CO1 | 15 |
|  | b. | Write short notes on residual electromagnetic force. | CO1 | 5 |
| (OR) | | | | |
| 8. | a. | What is nuclear fission? Explain with a model how controlled nuclear fission reaction can be achieved. | CO1 | 15 |
|  | b. | Write short notes on controlled thermonuclear fusion reaction. | CO1 | 5 |
|  |  |  |  |  |
|  | | **Compulsory:** |  |  |
| 9. | a. | Elaborate the classification scheme of fundamental particles with suitable examples. | CO1 | 15 |
|  | b. | Which particle gives particles their mass? Describe briefly. | CO1 | 5 |

ALL THE BEST