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 – April/May – 2017**

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| **Code :** | **15PH3002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **CLASSICAL MECHANICS** | **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. | Discuss about mechanics of a particle. | CO1 | 5 |
| b. | Derive the equation for a motion of simple pendulum from Lagrange’s equation. | CO2 | 15 |
| (OR) | | | | |
| 2. | a. | Explain different constraints of a dynamical system. | CO2 | 5 |
| b. | State Hamilton’s variational principle and deduce the Lagrange’s equation of motion from that. | CO2 | 15 |
| 3. | a. | Define Kepler’s second law of planetary motion. | CO1 | 5 |
|  | b. | Two body problem can always be reduced to the equivalent one body problem. Justify and prove using Lagrange’s equation of motion. | CO3 | 15 |
| (OR) | | | | |
| 4. | a. | A particle describes the circular orbit given by r = q / 1+ ɳ cos θ. Show that the force under which particle is moving is central . | CO3 | 5 |
|  | b. | Investigate the motion of particle moving under an repulsive inverse square law using the differential equation of the orbit in polar coordinates under a central force. | CO3 | 15 |
| 5. |  | Define Euler’s angle and find three independent parameters which is used to specify the orientation of rigid body with necessary diagrams. | CO2 | 20 |
| (OR) | | | | |
| 6. |  | Two blocks of equal masses are tied with springs as shown in figure. They execute small oscillations on a frictionless surface. Find the normal frequencies and normal coordinates of oscillation of the system. | CO3 | 20 |
| 7. |  | Deduce the normal frequencies of vibration of a linear triatomic molecule and explain the motion of a system. | CO2 | 20 |
| (OR) | | | | |
| 8. | a. | If [φ, ψ] be the poisson bracket of φ and ψ then prove that | CO2 | 5 |
|  | b. | Obtain the equations of motion in poisson bracket form. | CO2 | 15 |
|  | | **Compulsory**: |  |  |
| 9. |  | Solve the Kepler’s problem by Hamilton Jacobi method. | CO3 | 20 |

ALL THE BEST