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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **19MA3003** | **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. | Explain holonomic and non-holonomic constraints. | CO1 | 6 |
| b. | Two particles of mass m1 and m2 are connected by a light string of length l which passes over a smooth pulley. Obtain the equation of motion. | CO2 | 14 |
| **(OR)** | | | | |
| 2. | a. | Derive Lagrange’s equations under the Galilean transformation. | CO2 | 10 |
| b. | Obtain Lagrange’s equations in terms of Ruthian function. | CO2 | 10 |
|  |  |  |  |  |
| 3. | a. | Derive Hamilton’s canonical equations of motion. | CO3 | 14 |
| b. | Discuss the Raleigh Dissipation function. | CO3 | 6 |
| **(OR)** | | | | |
| 4. | a. | Obtain the equation of motion of one dimensional harmonic oscillator using Hamilton’s equation. | CO3 | 10 |
| b. | Derive the orthogonality of eigen vectors. | CO4 | 10 |
|  |  |  |  |  |
| 5. |  | Derive Lagrange’s equation in equilibrium state. | CO4 | 20 |
| **(OR)** | | | | |  |  | CO1 |
| 6. | a. | Discuss the normal coordinates. | CO4 | 10 |
| b. | The potential energy function between two atoms of a diatomic molecule is given by . Find the equilibrium position. | CO4 | 10 |
|  |  |  |  |  |
| 7. | a. | Derive Hamilton’s principle. | CO5 | 10 |
| b. | Show that the curve of minimum length joining a pair of points in the plane is a straight line. | CO5 | 10 |
| **(OR)** | | | | |
| 8. |  | Derive the Eulerian angles. | CO6 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Define virtual displacement and virtual velocity. | CO1 | 4 |
| b. | Derive Lagrangian Equation for a system of N particles. | CO1 | 16 |