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

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**End Semester Examination – Nov/Dec – 2018**

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| **Code : 17MA3021** |  | **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. | What is degrees of freedom? and give an example. | CO1 | 4 |
| b. | Derive Lagrangian Equation for a system of N particles. | CO1 | 16 |
| (OR) | | | | |
| 2. | a. | What is scleronomic and rheonomic systems? | CO1 | 4 |
| b. | Obtain the equation of motion for a harmonic oscillator. | CO1 | 16 |
|  |  |  |  |  |
| 3. | a. | Derive standard form of Lagrange’s equation for a holonomic system. | CO2 | 10 |
| b. | Show that natural system is separable through an example. | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Find the differential equations of motion for a spherical pendulum. | CO2 | 10 |
| b. | Define Routhian function and use it to derive Lagrange’s equation. | CO2 | 10 |
|  |  |  |  |  |
| 5. | a. | Obtain Hamilton’s principle. | CO3 | 10 |
| b. | The kinetic energy of a system is  and then potential energy is . Find the eigen frequencies. | CO3 | 10 |
| (OR) | | | | |
| 6. |  | Derive Lagrange’s equation in equilibrium state. | CO4 | 20 |
|  |  |  |  |  |
| 7. | a. | Establish Stackel’s theorem. | CO4 | 16 |
| b. | Explain Pfaffian differential forms. | CO4 | 4 |
| (OR) | | | | |
| 8. | a. | Discuss the normal coordinates. | CO5 | 10 |
| b. | A slender bar of length l and mass m slides on the smooth floor and wall and has counterclockwise angular velocity . What is the acceleration of bar? | CO5 | 10 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss Eulerian angles. | CO6 | 16 |
| b. | Consider the transformation . Use the Poisson bracket to show that it is canonical. | CO6 | 4 |