# Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2020-21

EXM/P/09/00

**M.Sc. I** | **School of Science** | **Department: Physics**

**PHS 505** | **Classical Mechanics** | **Semester : I**

**End Semester Examination** | **Time:2 Hrs.** **Max Marks:50**

**Instructions**: 1) All Questions are compulsory.

| | | Marks | Bloom's Level | CO |
|---|---|---|---|---|
| **Q.1** | **Answer / Solve the following** | | | |
| a) | Discuss how the total energy of the system is conserved for a system of particles. | 8 | L1 | CO1 |
| b) | Explain the elastic scattering in laboratory and center of mass system. | 8 | L5 | CO2 |
| | OR | | | |
| b) | Obtain the Rutherford's scattering formula for scattering cross-section. | 8 | L3 | CO2 |
| **Q.2** | **Answer / Solve the following** | | | |
| a) | Obtain the Lagrange's equation of motion for a conservative system using D'Alembert's principle. | 8 | L3 | CO3 |
| b) | Prove the law of conservation of linear momentum using Lagrange's equation of motion. | 8 | L2 | CO3 |
| | OR | | | |
| b) | Explain the Poisson's Bracket.<br>Prove that<br>i) [u, vw] = [u, v] w + v [u, w]<br>ii) [u, [v,w]] + [v, [w,u]] + [w, [u, v]] = 0 | 8 | L2 | CO3 |
| **Q.3** | **Answer / Solve the following** | | | |
| a) | Describe the consequences of Lorentz Transformation. | 9 | L4 | CO4 |

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| b) | Derive the Lorentz transformation equation from Galilean Transformations. | 9 | L2 | CO4 |
| | OR | | | |
| b) | Explain the variation of mass with velocity in relativistic mechanics. | 9 | L2 | CO4 |

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