

Mid-West University  
**Examinations Management Office**  
End Semester Examinations-2080

Master level/ M.Sc.(Physics)/1<sup>st</sup> Semester  
Time: 3 hours  
Subject: Classical Mechanics (PHY512)

Full Marks: 37.50  
Pass Marks: 18.75

*Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.*

**Attempt all the questions**

1. What do you mean by constraints? Derive an expression for Lagrange's equations of motion using D'Alembert's principle. [10]
2. What is point transformation? Derive an expression for canonical transformation. [10]  
OR  
State and explain the principle of least action.
3. Discuss the role of Hamilton –Jacobi equation for Hamilton's principal function. [5]  
OR  
Describe the transition from a discrete to a continuous system.
4. If  $P = q \cot p$   
 $Q = \log \left( \frac{1}{q} \sin p \right)$ , Show that it is a canonical transformation equation. [5]
5. With help of action - angle variable, Calculate the frequency of periodic motion. [5]  
OR  
Write the short notes on Lagrange equation of motion for non-holonomic system.
6. Using Lagrange equations of motion calculate the time period of linear harmonic oscillator. [2.5]

**THE END**