

7.4) A particle moves in a plane under the influence of a force $f = -Ar^{\alpha-1}$ directed toward the origin; A and $\alpha (> 0)$ are constants. Choose appropriate generalized coordinates, and let the potential energy be zero at the origin. Find the Lagrangian equations of motion. Is the angular momentum about the origin conserved? Is the total energy conserved?

** ANSWERS : $m\ddot{r} - mr\dot{\theta}^2 + Ar^{\alpha-1} = 0$;

$$\frac{d}{dt}(mr^2\dot{\theta}) = 0$$

- Ang momentum origin \rightarrow YES
- Total energy conserved \rightarrow YES