

Week-H Assignment 11 Solution

① (a) $p_j = \text{constant}$

② (b) $\delta \int_{t_1}^{t_2} \sum_j p_j \dot{q}_j dt = 0$

③ (a) $\delta f = \partial f + \frac{df}{dt} \delta t$, N.B. $\rightarrow \delta t = 0$ (As discussed in the class)
 $\partial f \equiv \partial_j f \equiv \frac{\partial f}{\partial q_j} \delta q_j + \frac{\partial f}{\partial \dot{q}_j} \delta \dot{q}_j$

④ (c) There is no passage of time during such displacement

⑤ (b) $S = \int_{x_1}^{x_2} ds = \int_{x_1}^{x_2} \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx$

⑥ (a) $t = \frac{1}{\sqrt{2g}} \int_{y_0}^{y_1} \frac{\sqrt{1+y^2}}{\sqrt{y}} dx$

⑦ (b) $\frac{dV}{dz} < 0$

⑧ (a) $\theta = 0$ and π respectively

⑨ (c) The modes of vibration in which the string oscillates with same frequency over the whole length.

⑩ (a) $\sum_j T_{ij} \ddot{q}_j + \sum_j V_{ij} q_j$