PHY401A: Weekly Quizzes (Odd semester: 2022-23)

Total points: 5x10= 50 Date: Tuesday Time: 13h15-13h25

Quiz no. 2 (more than one answer may be correct)

6. A holonomic constraint

   (a) needs to be an algebraic equation or inequality
   (b) cannot have explicit time dependence
   (c) can involve more than one coordinates
   (d) can potentially reduce the number of degrees of freedom of a system

7. The action integral, as it is defined in the lecture,

   (a) is a pure number for the evolution of a physical system
   (b) may explicitly depend on the intrinsic independent variable of a physical system
   (c) is always positive definite for natural processes
   (d) may change its value as a result of virtual variation

8. For a simple pendulum with a point bob of mass m hanging by a massless string with langth $\ell = \ell_0(1+\sin\omega t)$, where ℓ_0 and ω are constants, the number of generalized velocity will be

   (a) 1
   (b) 2
   (c) 3
   (d) infinity

9. If the velocity vector of a particle does not explicitly depend on time then

   (a) the acceleration will also have no explicit dependence of time
   (b) the kinetic energy cannot have an explicit time dependence
   (c) the kinetic energy will be a function of generalized velocities only
   (d) the acceleration would not have any term which is linear in generalized velocities

10. If the Lagrangian L of a particle of mass m (constant) moving in one dimension is given by $L = \frac{1}{2}\frac{m}{t^2}(q-\dot{q}t)^2$, then the particle

    (a) moves with constant acceleration
    (b) moves with constant velocity
    (c) is performing a simple harmonic motion
    (d) moves under an inverse-square law