# T.Y.B.Sc. Physics Theory Exam Online MCQ
# Semester VI, 2019-20
# Paper I - Classical Mechanics [ USPH601 ]

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| 1 | A body of mass 10 kg is falling under gravity. The total force on the body as observed from a frame moving vertically downward with an acceleration of 2 m/s$^2$ is _____. | |
| | (a) | 9.6 N |
| | (b) | 96 N |
| | (c) | 78 N |
| | (d) | 7.8 N |
| 2 | The acceleration that appears only when the starred system is not rotating uniformly with some angular velocity is called _____. | |
| | (a) | Centripetal acceleration |
| | (b) | Coriolis acceleration |
| | (c) | Centrifugal acceleration |
| | (d) | Azimuthal acceleration |
| 3 | In case of 1 dimensional central Force equation $f(r) + \frac{L^2}{mr^3}$ , the term $\frac{L^2}{mr^3}$ represents _____ force | |
| | (a) | Real |
| | (b) | Fictitious |
| | (c) | General |
| | (d) | Resistive |
| 4 | For circular orbit the value of eccentricity _____ | |
| | (a) | $\epsilon$>1 |
| | (b) | $\epsilon \geq 1$ |
| | (c) | $\epsilon$<1 |
| | (d) | $\epsilon$=0 |
| 5 | In a frame of reference, if a body of mass 2 kg is moving with acceleration 5 m/s$^2$ exert the force 10 N then the frame is called as_____. | |
| | (a) | Inertial frame of reference |
| | (b) | Non-inertial frame of reference |
| | (c) | Pseudo frame of reference |
| | (d) | Centrifugal frame of reference |
| 6 | D-Alembert's principle is used for which of the following | |
| | (a) | Change static problem into a dynamic problem |
| | (b) | Change dynamic problem to static problem |
| | (c) | To calculate moment of inertia of rigid bodies |
| | (d) | To calculate angular momentum of a system of masses |
| 7 | In motion of a body on an inclined plane under gravity , the constraint is _____ | |
| | (a) | Hołonomic |
| | (b) | Non-Holonomic |
| | (c) | Scleronomous |
| | (d) | Rheonomous |

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| 8 | A simple pendulum of length $l$. The bob of the pendulum moves in a vertical $x-y$ plane and its distance from the fulcrum is fixed. If $x, y, z$ are coordinates of the bob then equations of the constraints are _____. | |
| | (a) | $x^2 + y^2 = l$ and $z = \text{constant}$ |
| | (b) | $x^2 + z^2 = l$ and $y = \text{constant}$ |
| | (c) | $y^2 + z^2 = l$ and $x = \text{constant}$ |
| | (d) | $x^2 + y^2 + z^2 = l$ |
| 9 | Number of constraints equations for simple pendulum of fixed length are | |
| | (a) | 1 |
| | (b) | 2 |
| | (c) | 3 |
| | (d) | 4 |
| 10 | Lagrangian of free particle in terms of spherical coordinates. Here no force acts on the particle | |
| | (a) | $L = \frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2 + r^2\sin^2\theta\dot{\phi}^2)$ |
| | (b) | $L = \frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2 + r^2\sin^2\theta\dot{\phi}^2) - V(r,\theta,\phi)$ |
| | (c) | $L = \frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2 + r^2\sin^2\theta\dot{\phi}^2) + V(r,\theta,\phi)$ |
| | (d) | $L = \frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2 + r^2\sin^2\theta\dot{\phi}^2) - V(r)$ |
| 11 | If $\nabla \times v = 0$, then the flow in rotating frame is | |
| | (a) | Irrational |
| | (b) | Rational |
| | (c) | Constant |
| | (d) | Zero |
| 12 | The translation motion of a rigid body in a space is is governed by the equation _____ | |
| | (a) | dP/dt = F |

| | | |
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| | (b) | dV/dt = F |
| | (c) | dp/dt = L |
| | (d) | dL/dt = P |
| 13 | For a rigid body rotating about an axis ; each particle of the body describe a ____ with axis of rotation passing through its Centre and perpendicular to its plane of rotation. | |
| | (a) | Square |
| | (b) | Circle |
| | (c) | Ellipse |
| | (d) | Parabola |
| 14 | For an asymmetric top without any external torque, which of the statements is correct? | |
| | (a) | If axis of rotation makes small angle initially with 3-axis it precesses in the opposite direction. |
| | (b) | If axis of rotation makes small angle initially with 2-axis it precesses in the same sense. |
| | (c) | If axis of rotation makes small angle initially with 3-axis, it precesses in the same sense. |
| | (d) | If axis of rotation makes small angle with 1-axis, the motion is unstable. |
| 15 | Due to equatorial bulge, Earth can be considered as_____. | |
| | (a) | an oblate symmetric top |
| | (b) | a prolate symmetric top |
| | (c) | spherical top |
| | (d) | asymmetric top |
| 16 | The word ‘‘anharmonic’’ appears in atomic and molecular physics to describe a ____. | |
| | (a) | Nonlinear oscillator |
| | (b) | Ring oscillator |
| | (c) | Harmonic oscillator |
| | (d) | Phase oscillator |
| 17 | The characteristic of chaotic system is_____ | |
| | (a) | Sensitivity to initial condition |
| | (b) | Linearity |
| | (c) | Fidelity |
| | (d) | Opacity |
| 18 | The Saddle point is a _____. | |
| | (a) | Stable |

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| | (b) | Unstable |
| | (c) | Corresponding to Oscillatory Motion |
| | (d) | Corresponding to Damped Oscillatory Motion |
| 19 | Stable limit cycle in phase cycle is example_____. | |
| | (a) | Attractor |
| | (b) | Strange Attractor |
| | (c) | Repellor |
| | (d) | None of the above |
| 20 | The phase space representation of a simple harmonic oscillator is | |
| | (a) | open but bounded loop |
| | (b) | Ellipse |
| | (c) | closed loop resembling figure of 8 |
| | (d) | a single point |