Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University) Coimbatore-641043.

Master's Degree Examination - November-2018
Semester - I

Class : I PG **Time: 3 hours**

Major : Physics **Max. Marks: 60**

17MPHC02 Classical Mechanics

Part A **(10 x 1/2 = 5)**

Choose the correct answer

1.The number of coordinates required to completely specify the configuration of the system is called
a.generalised coordinates b. normal coordinates
c. Cartesian coordinates d.spherical coordinates

2.Hamiltonian is conserved along

a.every path b.linear path c.circular path d.zig zag path

3.According to Kepler's law

a.$t^2 \alpha r^3$ b. $t \alpha r$ c. $t \alpha x$ d. $t \alpha x^2$

4.Two body problem may be reduced to a single body problem only when----is conserved
a.linear momentum b.angular momentum c.energy d. total energy

5.Cyclic coordinates are functions of
a. time b. p c. q d. p and q

6.Poisson bracket obeys
a. commutative law b.distributive law
c.associative law d.linear law

7.A rigid body with N particles, will have ____ degrees of freedom.

a. 3N b.4N c .2N d.1N

8.To completely specify the orientation of a rigid body we use

a.Euler's angles b.action angle c.acute angle d.fixed angle

9.Force F=

a. m b. dV/dx c. -dV/dx d. v/m

10.Slope of a potential energy curve of small oscillations is

a. zero b. one c.five d.ten

Part B **(5 x 4 = 20)**

Answer ALL questions

Each answer should not exceed 200 words or one page

11a.State and prove D'Alembert's principle .

(or)

11b.Obtain an expression for the principle of least action.

12a.State and prove virial theorem .

(or)

12b.Discuss about stability and closure of orbit.

13a.Brief about generalized momentum and coordinates.

(or)

13b.List any four properties of Poisson brackets.

14a.Obtain an expression for the angular momentum of a rigid body.

(or)

14b.Explain about principal axes transformation.

15a.Compare and contrast stable and unstable equilibrium.

(or)

15b. Discuss about normal coordinates and normal frequencies of vibration.

Part C **(5 x 7 = 35)**

Answer ALL questions

Each answer should not exceed 600 words or three pages

16a.Derive Lagrange's equation from D'Alembert's principle.

(or)

16b.Deduce Hamilton's equation from D'Alembert's principle.

17a.Elaborate about reduction of equivalent one body problem.

(or)

17b.Discuss about scattering in a central force field.

18a.Give an account of Hamilton Jacobi method and obtain solution for Hamilton's equations

(or)

18b.Discuss about Kepler's problem in action angle variables .

19a.Find matrix transformation Euler angles by first and second rotation.

(or)

19b.Brief about force free motion of a symmetric top molecule.

20a.Obtain expression for normal coordinates for two coupled oscillators.

(or)

20b.Give an account of vibrations of linear triatomic molecule.

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