T.Y.B.SC. SEM – V (2014 COURSE) : SUMMER - 2018

SUBJECT: PHYSICS: CLASSICAL MECHANICS

Day : **Friday** Time: **03.00 PM TO 05.00 PM**

Date : **20/04/2018** **S-2018-0752** Max. Marks: 40.

N.B.:

1) All questions are **COMPULSORY.**
2) Figures to the **RIGHT** indicate full marks.
3) Draw neat labeled diagrams **WHEREVER** necessary.

Q.1 Attempt any **TWO** of the following: **(10)**

a) Discuss the motion of charged particle under constant magnetic field.
b) Set up the Hamiltonian function for compound pendulum and solve it.
c) State and prove Kepler's second law of planetary motion.

Q.2 Attempt any **TWO** of the following: **(10)**

a) Show that path of a charged particle moving in uniform transverse electric field is a parabola.
b) The distance between Sun and Earth is suddenly reduced to half of its present distance. What will be duration of year?
c) Comment on the equation $\mathbf{g}_{eff} = \mathbf{g} - \boldsymbol{\omega} \times (\boldsymbol{\omega} \times \mathbf{r})$, draw the necessary diagram.

Q.3 Attempt any **TWO** of the following: **(10)**

a) Show that $[d\mathbf{r}/dt]_f = [d\mathbf{r}/dt]_r + \boldsymbol{\omega} \times \mathbf{r}$, where symbols have their usual meanings.
b) Write the Lagrangian for Atwood's machine and deduce its equation of motion.
c) What is the central force? Explain how a two body problem is reduced into equivalent one body problem.

Q.4 Attempt any **FIVE** of the following: **(10)**

a) Explain holonomic constraints with suitable example.
b) What is the central force field? State its characteristics.
c) Write the equation of motion of charged particle in electromagnetic field.
d) Write in short about Coriolis force in moving coordinate system.
e) Show that q_j is cyclic in Lagrangian formulation.
f) Define conservative force with suitable example.
g) State the principle of Galilean invariance.

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