PH5720 ASSIGNMENT **SUBMISSION DATE (through moodle): 15-7-2020** **MARKS : 10**

A simple pendulum consisting of a mass "m" is hanging from a string of length "L". Write the equation of motion of the pendulum. Modify the equation motion of the pendulum, if it is damped by $-mk\omega$ and forced by $mAcos(\Omega t)$ forces. The detail of the notations is as follows.

ω : Angular velocity of the mass

k : Positive constant

Ω : Driving angular frequency

A : Amplitude of the driving force

Step -1

Formulate the algorithm to solve the equation of motion using (i) Euler predictor-corrector method (ii) Taylor series method, and (iii) second and fourth-order Runge-Kutta methods. Estimate the order of accuracy of each algorithm.

Step-2

Tabulate and also plot θ (in radians) as a function of $time$ using the following parameters.

	$m\ (kg)$	$L\ (m)$	$g(m/s^2)$	$\theta(0)\ (rad)$	$\theta'(0)\ (rad/s)$	k	A	Ω
1	1	1	1	0.2	0	0	0	
2	1	1	1	0.2	0	1,5,10	0	
3	1	1	1	0.2	0	1/2	0.5,1.2	2/3

Δt	n : no of steps	$sin\theta \approx \theta$
0.5, 1, 2	30	

Write the inference from the five plots.