

Sourm Deb / 19/9/18

Indian Institute of Science Education and Research Kolkata
Department of Physical Sciences

PH1101 :: Physics I
Mid-semester Examination (Autumn 2018)
Marks: 20, Duration: 1 hour

1. Compute following limits: [2+2]

$$(i) \lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}, \quad (ii) \lim_{x \rightarrow 0} \frac{\sin x}{x}.$$

2. Using definition compute the derivative of \sqrt{x} with respect to x . [3]
3. Sketch the area between two curves $y_1(x) = \sin 2x$ and $y_2(x) = \cos 2x$ in the domain $[0, \frac{1}{4}\pi]$ and then determine the area. [4]
4. Show that the functions $\sin x$ and $\sin 3x$ are linearly independent. [3]
5. The orbital eccentricity of Triton, the largest moon of the planet Neptune, is less than 10^{-4} i.e. the orbit is almost circular. At a given time t , if the position vector of Triton is $\vec{r}(t)$ and its orbital speed is v then find its acceleration vector. [6]