

TECHNICAL UNIVERSITY OF MOMBASA

AMA 4214 CLASSICAL MECHANICS

2015/2016

END OF SEMESTER TWO YEAR TWO EXAMINATION FOR THE DEGREE OF MATHEMATICS AND COMPUTER SCIENCE

QUESTION ONE (30MARKS) COMPULSORY

- a) A particle moves on a circle of radius R with a constant angular acceleration α . If the particle starts from rest, find the
- Angular velocity
 - Tangential velocity
 - Tangential acceleration
 - Magnitude of acceleration (5mks)
- b) Two cars A and B are travelling in the same direction with constant velocities V_A and V_B respectively. When car A is a distance d behind B the brakes on A are applied causing a deceleration at a rate a . demonstrate that in order for the cars to collide, it is necessary that $V_A - V_B \geq \sqrt{2ad}$ (5mks)
- c) A car of mass 1000kg moves uphill along a street inclined at 30° to the horizontal. Determine the force which the car must produce to move with
- Uniform acceleration (3mks)
 - An acceleration of $0.2m/s^2$ (2mks)
- Neglect the effect of friction
- d) Show that for a conservative force field, the work done in moving a particle from points p_1 to p_2 is equal to the change in potential energy. (5mks)
- e) Prove that the torque on a particle is equal to the true rate of change in its angular momentum (5mks)
- f) Find the potential associated with a uniform force field. (5mks)