MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN MECHANICAL ENGINEERING

MECHANICS OF MACHINES II

DATE: 5/8/2016   **TIME:**

INSTRUCTIONS:

Question 1 is compulsory

Attempt any TWO other questions from section

1.   a)   State three practical applications of -:

   (i)   Belt drives

   (ii)   Friction clutches   (3 marks)

   b)   A simple train has three gears. Gear A is the input and has 50 teeth. Gear C is the output and has 150 teeth. Calculate the gear ratio and the output speed. The input torque on gear A is 12 Nm and the efficiency is 75%. Calculate the output power and holding torque.   (10 marks)

   c)   From basic principles show that the Torque, T, transmitted by a single disc plate clutch assuming uniform wear theory is given by;

   $$T = \mu W \frac{(R_1 + R_2)}{2}$$

   Where μ = coefficient of friction

   W   = Axial load

   $R_1 + R_2$ = outer and inner radii   (17 marks)

2.	A ship is dragged through a lock by means of capstan which has a diameter of 500 mm, turns at 30 rev/min. The rope makes 3 complete turns around the capstan, μ being 0.25 and at the free end of the rope a pull of 100 N is applied. Find the pull on the ship and the power and the power required to drive the capstan	(20 marks)

3.	A 40 kg mass A mounted on an axle at a distance of 1 m is to be balanced by two masses B and C. The balancing masses are to be mounted in the planes 1 m and 2 m on either sides of 40 kg mass at radii 1 m and 2 m respectively from the axis of rotation. Find the magnitudes of the balancing masses.	(20 marks)

4.	a)	The contact surface in a cone clutch have effective diameter of 75 mm. The semi-angle of the cone is 15^0, and μ = 0.3. Find the torque required to produce slipping if axial force applied is 180 N.	(10 marks)

	b)	This clutch in 4 (a) is employed to connect an electric motor running uniformly at 100 rpm with a flywheel which initially stationery. The flywheel has a mass of 13.5 kg and a radius of gyration of 150 mm. Calculate the time required for the flywheel to attain full speed and also the energy lost in the slipping of the clutch.	(10 marks)

5.	A leather belt 125 mm wide and 6 mm thick transmits power from a pulley 750 mm diameter which runs at 500 rev/min. Find the maximum power which can be transmitted	(20 marks)