INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)

ENGINEERING MECHANICS-II
SEMESTER – II, B.TECH(MARINE ENGINEERING): DEC/JAN 2013-14
SUBJECT CODE: T 1206
(AY 2009-10 to 2012-13 batches only)

Date: 10.01.2014 **Time: 3 Hrs**
Maximum Marks:100
(Weightage 70%)

SECTION - A

ANSWER THE COMPULSORY QUESTION **(3 X 10 = 30 MARKS)**

1.

a) A block of 10kg is kept on a horizontal plane. Find the force required to cause motion, if the applied is parallel to the plane. Take the coefficient of friction is 0.25. (3)

b) State the laws of rolling friction. (3)

c) Define D'Alembert's Principle. (3)

d) A small ball is dropped from a height of 19.62m. At what velocity the ball will strike the ground? (3)

e) Define the term amplitude as applied to S.H.M. (3)

f) Define the term 'initial tension' in a belt. How would you find out the initial tensions in a belt? (3)

g) What is centrifugal tension in a belt? How does it affect the power transmitted? (3)

h) Distinguish between brakes and dynamometers? (3)

i) What is difference between centrifugal and inertia type governors? (3)

j) Define the terms Height of the governor and sleeve lift in governor. (3)

SECTION - B

ANSWER ANY FIVE QUESTION **(5 X 14 =70 MARKS)**

2. A body, resting on a rough horizontal plane, required a pull of 180N inclined at 30^0 to the plane just to move it. It was found that a push of 220N inclined at 30^0 to the plane just moved the body. Determine the weight of the body and coefficient of friction. (14)

3. A flywheel weighs 540kg and has a radius of 2.4m. What constant moment must be applied to the wheel about its axis of rotation so that the angular velocity of the flywheel is equal to 30rpm, in six revolutions after the wheel starts from rest? (14)

4. A particle, moving with simple harmonic motion, performs 10 complete oscillation per minute and its speed, is 60% of the maximum speed when it is at a distance of 8 cm from the centre of oscillation. Find amplitude, maximum acceleration of the particle. Also find speed of the particle, when it is 6 cm far from the centre of oscillation. (14 MARKS)

5. A pulley used to transmit power by means of ropes has a diameter of 3.6 meters and has 15 grooves of 45^0 angle. The angle of contact is 170^0 and the coefficient of friction between the ropes and the groove sides is 0.28. The maximum possible tension in the ropes is 960N and the mass of the rope is 1.5 kg per meter length. What is the speed of pulley in r.p.m and the power transmitted if the condition of maximum power prevail.
(14)

6. A simple band brake operates on a drum of 600mm in diameter that is running at 200 r.p.m. The coefficient of friction is 0.25. The brake band has a contact of 270^0, one end is fastened to a fixed pin and the other end to the brake arm 125mm from the fixed pin. The straight brake arm is 750mm long and placed perpendicular to the diameter that bisects the angle of contact.
   (a) What is the pull necessary on the end of the brake arm to stop the wheel if 35kW is being absorbed? What is the direction for this minimum pull?

   (b) What width of steel band of 2.5mm thick is required for this brake if the maximum tensile stress is not to exceed 50 N/mm^2?
(14)

7. A porter governor has all four arms 250mm long. The upper arms are attached on the axis of rotation and the lower arms are attached to the sleeve at a distance of 30mm from the axis. The mass of each ball is 5 kg and the sleeve has a mass of 50kg. The extreme radii of rotation are 150mm and 200mm. determine the range of speed of governor.
(14)

8. a) Write a short note on 'coefficient of insensitiveness' of governors. (8)
   b) Define and explain the isochronisms and Hunting. (6)

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