Code: R7100105

R07

B.Tech I Year (R07) Supplementary Examinations, June 2013
APPLIED MECHANICS
(Civil Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

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1. Define the following terms:
    (i) Coplanar parallel forces.
    (ii) Like parallel forces.
    (iii) Unlike parallel forces.

2. (a) Explain the working principle of screw jack with neat sketch.
    (b) Explain laws of friction.

3. Derive an expression for the velocity ratio of a belt-drive considering thickness of the belt. The power is transmitted from a pulley 1m diameter running at 200 r.p.m to a pulley 2.25 m diameter by means of a belt. Find the speed lost by the driven pulley as a result of the creep, if the stress on the tight and slack side of the belt is 1.4 N/mm^2 and 0.05 N/mm^2 respectively. The Young's modulus for the material of the belt is 100 N/mm^2.

4. (a) Determine centriod for the rectangle lamina, having a width of "b" and depth of "d".
    (b) Determine the centriod for triangular lamina, having a base "b" and height "h".

5. Derive the expression for mass moment of inertia of a homogeneous sphere of radius 'r' and mass density 'w', with reference to its diameter.

6. An enemy ship was located at a distance of 25 km in north – west direction by a warship. If the enemy ship is moving with a velocity of 18 km/h N 30^0 E, in which direction the warship must move with a velocity of 36 km/h to strike at its earliest. Assume the fire range of warship is 5 km. When is the shell to be fired?

7. (a) State "work – energy principle".
    (b) A solid cylinder of weight 'w' and radius 'r' rolls, down an inclined plane which makes an angle "θ" with the horizontal axis. Determine the minimum coefficient of friction and the acceleration of the mass center for rolling, without slipping.

8. The piston of an engine moves with simple harmonic motion. The crank rotates at 110 r.p.m. and the stroke is 200 cm. Find the velocity and acceleration of the piston, when it is at a distance of 60 cm from the center.

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