EH-248

B.E. IInd Semester (CGPA) Inform. Tech.

Examination, 2019

Engg. Mechanics

Paper - IT - 204

Time : 3 Hours]   [Maximum Marks : 60

Note :- Attempt all questions. Marks allotted and internal choices are given with the questions. Assume missing / misprint data suitably. Answer all parts of a question at one place only.

1. This question contains eight sub-questions. Four possible an swers are given for each sub-questions. out of four possible answers, only one is correct choose the correct answer :

(i) If the sum of all the forces acting on a body is zero, then the body may be in equilbrium provided the forces are

(a) Concurrent

(b) Parallel

(c) Like parallel

(d) Unlike parallel

(ii) The moment of inertia of a circular section of diameter D is given by

(a) $\dfrac{\pi}{16}D^4$

(b) $\dfrac{\pi}{32}D^4$

(c) $\dfrac{\pi}{64}D^4$

(d) $\dfrac{\pi}{128}D^4$

(iii) Angle of friction is the angle.

(a) Included between normal reaction and resultant reaction

(b) Included between the limiting friction and result

ant reaction.

(c) Included between the limiting friction and the line of action of weight.

(d) None of the these

(iv) The belt drive in which the driver rotates in a direction opposite to the direction of rotation of the follower is called.

(a) Open felt drive

(b) Compound felt drive

(c) Cross felt drive

(d) None of these

(v) If a body travels equal distances in equal time intervals in the same direction, then it is said to be moving with.

(a) Uniform velocity

(b) Unifor acceleration

(c) Variable velocity

(d) Variable acceleration

(vi) The moment diagram for a cantilever carrying uniformly distributed load will be

(a) Parabola

(b) Rectangle

(c) Triangle

(d) Cubic

(vi) The torque acting on a body of moment of inertia

(I) and angular acceleration (x) is

(a) $I\alpha$

(b) $I\alpha^2$

(c) $I^2\alpha$

(d) $\frac{1}{2}I\alpha$

(vi) The coefficient of restitution for inelastic bodies is

(a) 1

(b) 0

(c) Between 0 and 1

(d) None of these

2. (a) What is parallelogram law of forces ?

(b) Two forces of magnitude 50 KN and 10 KN respectively act at a point 0. The included angle between them

is 60°. Find the magnitude and the direction of the result-

ant.

OR

(a) What is the principle of virtual work ?

(b) A beam AB 3m in length is hinged at A and supported at C at a distance 2m from the hinge. Determine the reaction at C when the beam carries a load of 15 KN at a distance 1 m from the hinge use virtual work method.

3. (a) What is theorem of perpendicular axis ?

(b) Determine the centre of gravity of a T-section having the following dimensions :

Flange - 15cm × 1cm and web- 29cm × 1cm

OR

(a) Define the followings :

(i) Centre of gravity

(ii) Moment of inertia

(b) Derive the relation for moment of inertia of a circular lamina of radius r with its x - x and y - y axes located passing through the centre of gravity.

4. (a) What are laws of static friction ?

(b) A body of 20 KN rests on a horizontal plane. Just to move the body along horizontal direction, the minimum force required is 7.28 KN. Determine the least inclined force required to just draw the body along the same horizontal plane.

OR

(a) Define the following terms :

(i) Coefficient of friction

(ii) Angle of friction

(iii) Angle of repose

(b) A bucket of 60 N weight containing 420 N of water is to be raised from the well by means of wheel and axle. Axle diameter is 10 cm and the wheel diameter is 50cm. Determine the followings if the effort applied on the wheel is 120 N.

(i) Mechanical advantage

(ii) Velocity ratio

(iii) Efficiency of machine

5. (a) State the advantages and disadvantages of felt drive.

(b) Two gears in mesh have 100 and 25 teeth respectively. The module of the gears is 4mm. Find out the distance between the centres of the two gears.

OR

(a) Define the following terms with reference to gear :

(i) Pitch

(ii) Addendum circle

(iii) Module

(b) A belt is to be designed to transmit 100 KW power when its speed is 800 m/min. The tight side tension is 2.6 times tension in the slack side. Determine the width of the felt required if the maximum tension in the belt is limited to 500 N/cm width of the belt neglect centrifugal tension.

6. (a) What is D'Alemberts principle ?

(b) A pulley of 1.5m radius is fixed on a shaft of 7.5 cm radius and rotated uniformly at 300 RPM. Find the normal acceleration and the tangential acceleration of a point on the pulley.

OR

A cantilever 6m long carries a point load of 2 KN at the end and uniformly distributed load of 0.5 KN/M for the fixed end. Draw shear force and bending moment diagrams finding the values of shear force and bending moment at important points.

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