



# ANURAG GROUP OF INSTITUTIONS

(AUTONOMOUS)

I B. Tech – II Semester Assignment Paper – II 2016 – 17

Subject: **ENGINEERING MECHANICS -II**

**DEPARTMENT OF MECHANICAL ENGINEERING**

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1. Two blocks A (mass 10 kg), B (mass 28 kg) are separated by 12 m on an inclined plane of  $30^\circ$  angle with respect to ground. If the blocks start moving, find the time 't' when the blocks collide. Assume  $\mu = 0.25$  for block A and plane and  $\mu = 0.10$  for block B and plane.
2. A body of mass 25 kg resting on a horizontal table is connected by string passing over a smooth pulley at the edge of the table to another body of mass 3.75 kg and hanging vertically downward. Initially the friction between 25 kg mass and the table is just sufficient to prevent the motion. If an additional 1.25 kg is added to the 3.75 kg mass, find the acceleration of the masses.
3. A block of mass 50 kg, resting on a horizontal plane is required to be given an acceleration of  $2\text{m/s}^2$  towards right by applying a push P at an angle of  $45^\circ$  with the horizontal. Assuming that the coefficient of friction between the block and plane is 0.4, workout the magnitude of push P. Obtain your solution by applying D'Alembert's principle.
4. A sphere and a cylinder of equal masses 'm' and radii 'r' are rolls down on an inclined plane of angle  $\alpha$  without slipping, and are connected by a bar  $G_1G_2$ . Find the acceleration of the system and the tension in the bar.
5. A block of weight 3000 N rests on a rough horizontal surface ( $\mu = 0.2$ ) and is pulled by a force of 1000 N applied at angle of  $45^\circ$  to the horizontal. Determine the velocity attained by the block after it has moved 25 m starting from rest. Proceed to calculate the further distance travelled by the body if the pull is removed. Use work-energy relation.
6. Find the power of a locomotive drawing a train whose weight including that of engine is 500 kN upon incline 1 in 300 at a steady speed of 72 kmph, the frictional resistance being 10 N/kN. While the train is ascending the incline, the steam is shut off. Find how far it will move before coming to rest, assuming that the resistance to motion remains the same.