Name:……

Roll No:……..……

NATIONAL INSTITUTE OF TECHNOLOGY CALICUT

14

ZZ1001D ENGINEERING MECHANICS

End Semester Examination Winter Semester 2019-20

Time: 2 hrs **Max Marks: 20**

1. Determine the force in each member of the loaded truss shown in Fig. 1 using the method of joints. State whether each member is in tension or compression. Tabulate the results [5]

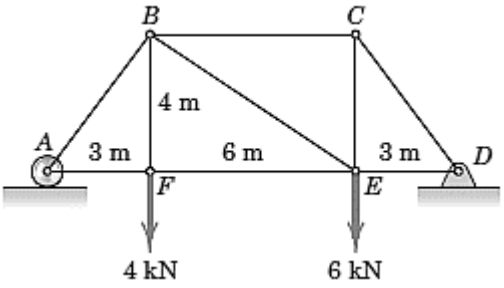

Fig. 1

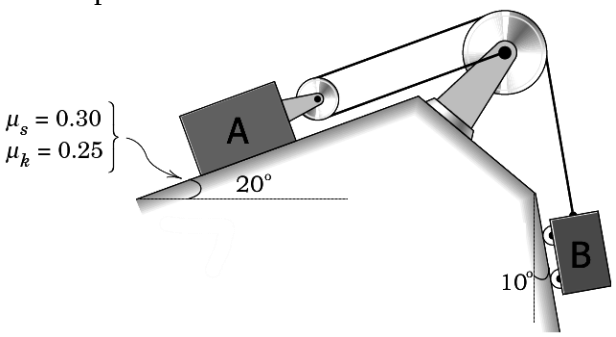

Fig. 2

2. Two blocks *A* and *B* are connected by cables and pulley as shown in Fig. 2. Block *A* weighs 100 N. Find the range of weights of block *B* for which the block *A* remains in equilibrium. All wheels and pulleys are frictionless. (Note: There is no friction between the block B and the surface.) [5]

3. A ship moves with a constant velocity of magnitude $v = 36$ km/hr as shown in Fig. 3. The angle between the velocity vector $\boldsymbol{v}$ and the position vector $\boldsymbol{r}$ with respect to the lighthouse L remains constant at $\alpha = 45°$. Determine the magnitude of the acceleration of the ship when $r = 1$ km. [5]

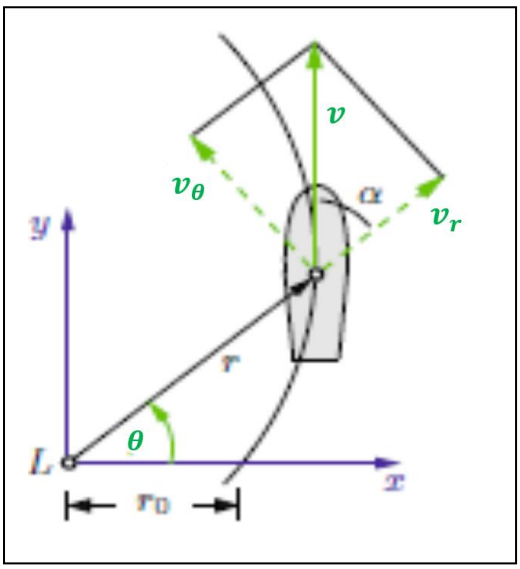

Fig. 3

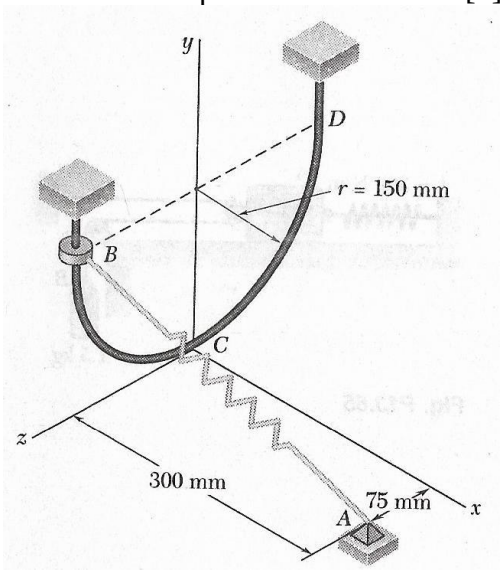

Fig. 4

4. A 750-g collar can slide without friction along the **semi-circular rod** *BCD* in Fig. 4. The rod BCD is in the *yz* plane. The spring is of stiffness 350 N/m and its undeformed length is 220 mm. The collar is released with an initial velocity at *B*. Determine the initial velocity, if the collar should just reach *D*. (Hint: Use work-energy method). Take g = 9.81 m/s^2 in the negative *y* direction [5]