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BME-016

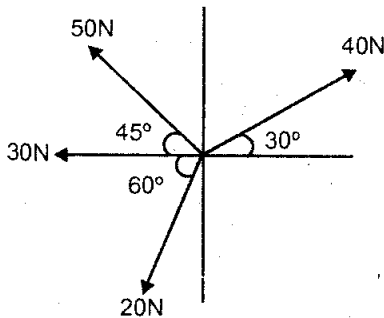
**B.Tech. MECHANICAL ENGINEERING
(COMPUTER INTEGRATED MANUFACTURING)****B.Tech. AEROSPACE ENGINEERING (BTAE)****Term-End Examination, 2019****BME-016 : ENGINEERING MECHANICS**

Time : 3 Hours]

[Maximum Marks : 70

Note : Answer any five questions. All questions carry equal marks. Use of scientific calculator is permitted. Assume missing data, if any.

1. (a) Four forces act on a body as shown in Fig. 1. Determine the resultant of the system of forces : [10]



- (b) Define rolling friction and sliding friction. [4]
2. (a) A smooth sphere weighing 200N is resting as shown in Fig. 2. Determine the reactions at the supports. [10]

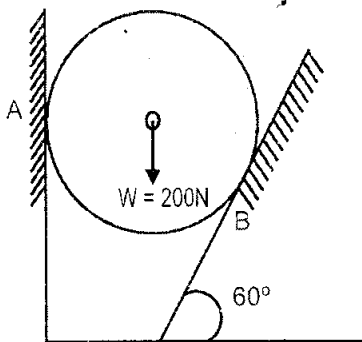


Figure 2

- (b) Draw neat sketches of any two types of support and show possible reactions on those supports. [4]
3. (a) Determine the moment of inertia of a rectangular area of base 'b' and height 'd' about centroidal axis GX as shown in Figure-3 [7]

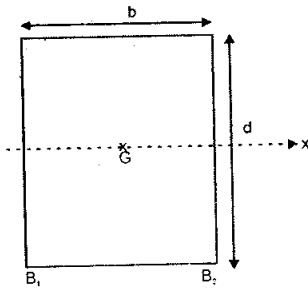


Figure 3

- (b) Determine the C.G. of a body formed by a solid sphere placed over a solid cylinder of the same radius ' a ' and height ' $2a$ ' as shown in Fig. 4. Take $a = 20\text{cm}$. [7]

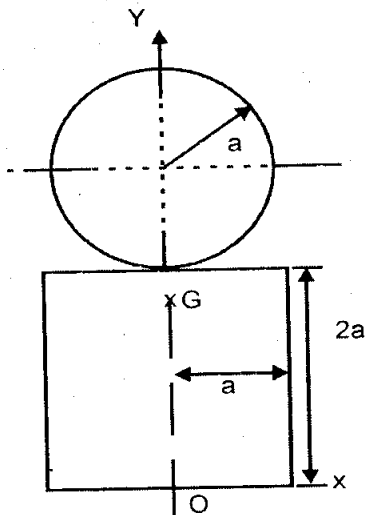


Figure 4
(3)

4. (a) Describe D' Alemberti principle. [7]
- (b) A particle of mass M is resting on a smooth horizontal plane as shown in Fig. 5. It is attached to a spring which has a stiffness constant ' K '. The mass is displaced by a force P to a distance x_0 from its equilibrium position as shown. Show the equilibrium of the object in this position. [7]

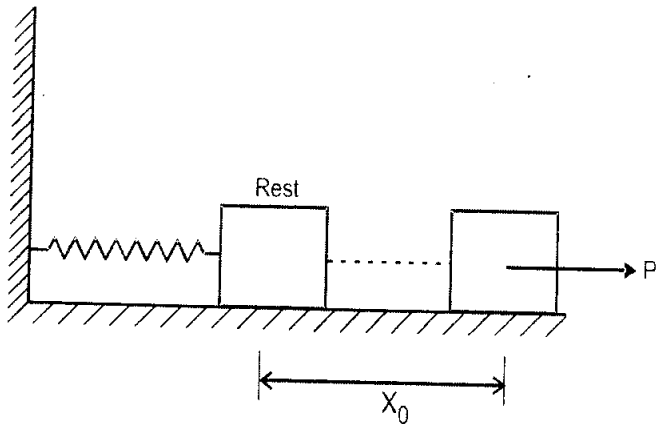


Figure 5

5. A cord passes over a massless and frictionless pulley as shown in Fig. 6. Carrying a mass M_1 at one end and wrapped around cylinder of mass M_2 which rolls on a horizontal plane. What is the acceleration of Mass M_1 ?

[14]

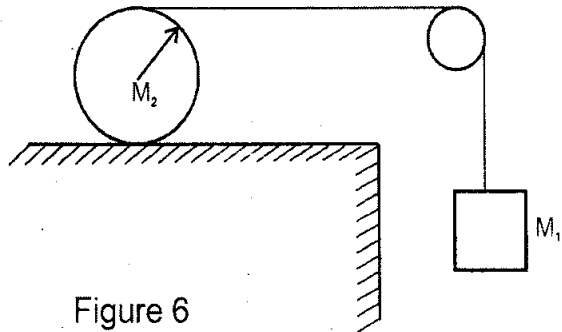


Figure 6

6. (a) Enumerate various assumptions in the analysis of pin jointed trusses. [7]
- (b) Figure 7 shows a truss with supports on planes that are perpendicular to each other. Determine the forces in each member of the truss due to the given loading. [7]

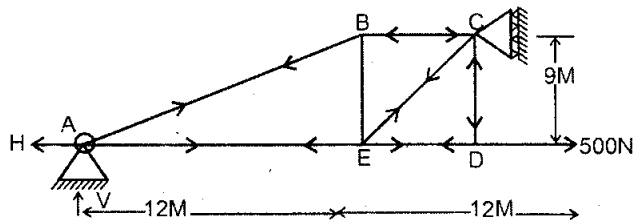


Figure 7

7. (a) Define the following (i) Mechanical advantage
(ii) Ideal Machine [4]
- (b) The efficiency of a machine is 75% when an effort of 20N is required to lift a load of 160 N. Calculate the velocity ratio and frictional force of the machine in terms of effort and load. [4]

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