ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)
I B. Tech II Semester 2018 – 19
Assignment Paper – I
DEPARTMENT OF MECHANICAL ENGINEERING

SUBJECT: EM   **BRANCHES: MECHANICAL**

1. A system of four forces acting on a body is shown in **Fig. 1**. Determine the resultant force and its direction.
2. Forces P1, P2, P3 and P4 of magnitudes 10 kN, 20 kN, 25 kN and 40 kN are concurrent in space and are directed through the points A(3,2,5), B(1,7,4), C(4, -2, 4) and D(-2,4,-3) respectively. Determine the resultant of the system of forces. Given the system forces are concurrent at the origin.
3. Two loads of 30 N and W_F are hung by a set of wire ropes as shown in **Fig. 2**. Calculate the tensions in the wire ropes AB, BC, CD and also the unknown weights W_F hung at the point B.
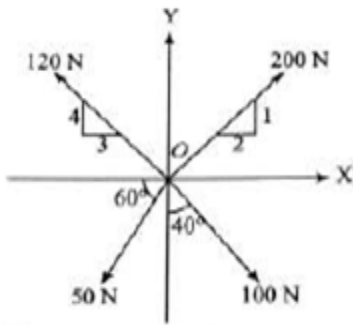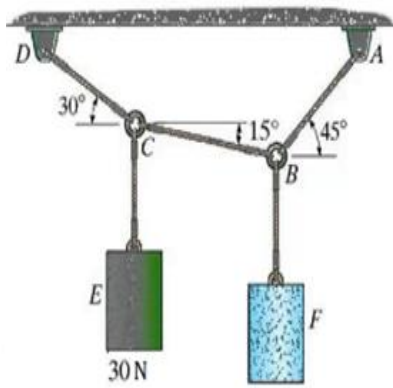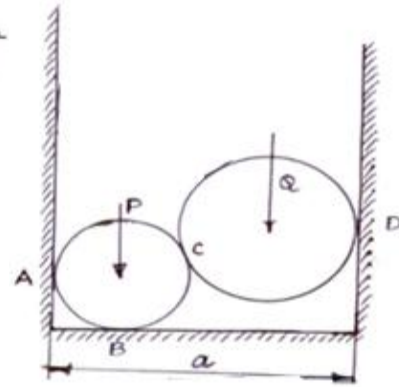

Fig. 1   Fig. 2   Fig. 3

4. The smooth cylinders rest in a horizontal channel having vertical walls, the distance between which is 'a' (shown in **Fig. 3**). Find the pressures exerted on the walls and floor at the points of contact A, B, C and D. The following numerical data are given: P = 200N, Q=400N, r_1=120mm, r_2 = 180 mm and a = 540 mm.
5. A block of mass M = 10 kg is sitting on a surface inclined at angle θ = 45°shown in **Fig. 4.** Given that the coefficient of friction is μ = 0.5 between block and surface, what is the minimum force F necessary to prevent slipping? What is the maximum force F that can be exerted without causing the block to slip?

6. a) Define Friction and write Laws of Friction   (1.5M)
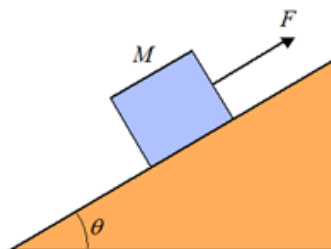   b) Angle of Friction c) Angle of Repose   (1M)

Fig. 4