B.Sc. DEGREE EXAMINATION, APRIL 2018.

II YEAR IV SEMESTER

Core Major - Paper VIII - STATICS

Time : 3 Hours Max. Marks : 75

SECTION A – (10 × 2 = 20 marks)

Answer any *TEN* questions

1. If two equal forces acting at a point and is the angle between them, what is the magnitude and direction of their resultant ?
2. The resultant of two forces of magnitudes and  acting at a point has magnitudes and  when the forces are inclined at  and  respectively. Show that.
3. State triangle law of forces.
4. Define angle of friction and cone of friction.
5. Define moment of a force about a point. Show that it is independent of the position of a point on the force.
6. Two like parallel forces  and  act on a rigid body at and. If  and  be interchanged in position show that the points of application of the resultant has been displaced through adistance .
7. Define moment of a couple.
8. A solid cone of height and semi vertical angle  is placed with its base against a smooth wall and is supported by a string attached to its vertex and to a point in the wall. Show that thegreatest possible length of the string is .
9. Define centre of mass of a system of particles.
10. Find the centre of mass of three uniform rods forming a triangle.
11. If the resultant of two forces acting at a point with magnitudes and  is a force withmagnitude , find the angle between the two given forces.
12. Find the centre of mass of the hollow hemisphere of radius .

SECTION B – (5 × 5 = 25 marks)

Answer any *FIVE* questions

1. The resultant of two forces and  is equal toand makes an angle of  with direction of . Show that or .

[P.T.O.]

1. State and prove Lami’s theorem.
2. Forces , , act respectively at , ,  of an equilateral triangle . If their resultant is a force parallel to  and through the centroid  of the triangle, show that.
3. A system of forces in the plane of a triangle  is equivalent to a single force at  acting along the internal bisector of the angle  and a couple of moment . If the moments of the system about  and  are and , show that .
4. Find the centre of mass of a thin wire in the form a circular arc of radius  and which subtends an angle  at the centre .
5. Two forces of magnitudes ,  act along ,  of a triangle . Prove that their resultant is .
6. Three like parallel forces , , act at the vertices of a triangle . If their resultant

passes through the orthocenter, show that .

SECTION C – (3 × 10 = 30 marks)

Answer any *THREE* questions

1. Two forces of magnitudes  and  act at a point. They are inclined at an angle . If theforces are interchanged, show that their resultant is turned through the angle.
2. is the orthocenter of a triangle . If forces of magnitudes  acting along are in equilibrium, show that .
3. Three like parallel forces of magnitudes  act at the vertices of a triangle . Show that, if their resultant passes through

(a) Circumcentre then 

(b) .

1. is a regular hexagon. Forces , , , ,  act along , , , , , . Show that the six forces are equivalent to a couple and find the moment of the couple.
2. Find the mass centre of a solid right circular cone of height