B.Sc.DEGREE EXAMINATION,APRIL 2020
II Year IV Semester
Statics

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. If the resultant of forces are $3P, 5P$is equal to$7P$,find the angle between the forces.
2. Define cone of friction.
3. State triangle law of forces.
4. Show that the greatest inclination of a rough inclined plane to the horizontal so that a particle will remain on it at rest, is equal to the angle of friction.
5. Define rigid body.
6. Define like and unlike parallel forces.
7. Define moment of a Couple.
8. If P, Q, R are forces act along the sides *BC,CA,AB* of a triangle *ABC* taken in order.
9. Define centre of mass.
10. Where will be the centre of gravity of solid hemisphere of radius a?
11. State Newton's laws of motion.
12. Define moment of a force.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. The resultant of two forces of magnitudes *P* and Q acting at a point , has magnitudes $(2n+1)\sqrt{P^2+Q^2}$ and $(2n-1)\sqrt{P^2+Q^2}$ when the forces are inclined at α and $90^\circ - \alpha$ respectively. Show that $\tan\alpha = \dfrac{n-1}{n+1}$.
14. State the laws of friction.
15. Prove that the sum of the moments of two intersecting forces or parallel about any point is equal to the moment of the resultant of the forces about the same point.

16. Prove that three coplanar forces represented by and acting along the sides of a triangle, taken in order, reduce to a couple, the magnitude of whose moment being equal to twice the area of triangle.
17. Find the centre of gravity of a triangular lamina
18. *S*and *H* are the circumcentre and orthocentre of a triangle ABC.Show that the resultant of the forces $\overline{SA}, \overline{SB}, \overline{SC}$ acting at S is $\overline{SH}$. (ii) the resultant of the forces $\overline{HA}, \overline{HB}, \overline{HC}$acting at $H$is $2\overline{HS}$.
19. A particle rests on a plane inclined at 45° to the horizontal,being supported by a string along the line of the greatest slope. If the ratio of the maximum and minimum tensions consistent with equilibrium is $2 : 1$,find the coefficient of friction.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. The resultant of two forces P, Q is R.If P is doubled,then R is doubled.If Q is doubled and reversed , then also R is doubled.Show that $P : Q : R = \sqrt{6} : \sqrt{2} : \sqrt{5}$.
21. State and prove Lami's theorem.
22. Find the resultant of two parallel forces acting on a rigid body.
23. $ABCD$ is a square of side a.Forces$5P, 4P, 3P, 6P, 2\sqrt{2}P$ act along AB, BC, CD, DA, BD respectively.Show that the system reduces to a couple of moment $9aP$.
24. Find the centre of gravity of solid right circular cone of height h.