SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc. END SEMESTER EXAMINATIONS APRIL-2022
SEMESTER - IV
20UMACT4008 - Statics

Total Duration : 3 Hrs. **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. State Laws of friction.
2. The magnitude of the resultant of two given forces P, Q is R. If Q is doubled, then R is doubled. If Q is reversed, then also R is doubled. Show that
$$\text{P} : \text{Q} : \text{R} = \sqrt{2} : \sqrt{3} : \sqrt{2}$$
3. State and prove triangle law of forces.
4. I is the incentre of a triangle ABC. If forces of magnitudes P, Q, R acting along the bisectors IA, IB, IC are in equilibrium , show that
$$\frac{P}{\cos^{A/2}} = \frac{Q}{\cos^{B/2}} = \frac{R}{\cos^{C/2}}$$
5. State and prove Varignon's theorem.
6. Show that a system of Coplanar forces reduce either to a single force or to a couple.
7. a)Define Centre of mass.
b)What is the mass centre of three particles of same mass?
8. Find the mass centre of a triangular lamina.

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Find the magnitude and direction of the resultant of two forces $\overrightarrow{F_1}$ and $\overrightarrow{F_2}$.
10. State and prove Lami's theorem.
11. A round table of weight W stands on three legs whose upper ends are attached to its rim, so as to form an equilateral triangle. Show that a body whose weight does not exceed W may be placed anywhere on the table without the risk of tilting it.

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12. Three forces P, Q, R act along the sides BC, CA, AB of a triangle ABC. If their resultant passes through the incentre and centroid , then show that

$$\frac{P}{a(b-c)} = \frac{Q}{b(c-a)} = \frac{R}{c(a-b)}$$

13. Find the mass centre of a lamina in the form of a quadrant of an ellipse of axes 2a, 2b

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