BS/2111

22022/NH

Statics-III

Sem-III (Syll-Dec/2020)

Time: 3hrs

M.M.- 40

Note: The candidates are required to attempt two questions each from A & B Section C will be compulsory

Section A **(6 marks each)**

1. The resultant R of forces P and Q makes an angle 2α with the line of action of P is now replaced by P +R, Q remaining unchanged. Show that the new resultant makes an angle α with P.
2. Forces equal to 4, 8 and 12 kg. wt. acts along the sides of an equilateral triangle taken in order. Find their resultant completely
3. P and Q are magnitudes of two like parallel forces. If first force be moved parallel to itself through a distance x, prove that their resultant moves through a distance $\frac{Px}{P+Q}$.
4. A) State and prove Varigonon's theorem.
   b) The parallel forces of magnitude P, Q and R acts at a point A,B and C respectively of a triangle ABC. Prove that their centre is orthocenter of the triangle if $\frac{P}{\tan A} = \frac{Q}{\tan B} = \frac{R}{\tan C}$.

Section B**(6 marks each)**

5. A) Find Centre of Gravity of a uniform Trapezium
   b) A square is described externally on a side on an equilateral triangle. Find C.G. of the Lamina of compound body.
6. A piece of wire of given length is bent to form a circular quadrant and its two bounding radii. Find the distance of the C.G. of the whole from the centre.
7. ABCD is of side $2a$. E is a mid-point of the side BC. Find the distance from A of the center of gravity of the portion AECD.
8. A weight can be just supported on a rough inclined plane by a force P acting along the plane or by a force Q acting horizontally. Show that the weight is $\frac{PQ}{\sqrt{Q^2 sec^2\lambda - P^2}}$.

Section C**(8 X 2= 16)**

9.

a) Define centre of gravity and moment of inertia.
b) State and prove parallelogram law of vectors.
c) Resolve a force of 100kg into two components making angles of 60° and 90° with it on the opposite sides.
d) Find resultant of two like parallel forces acting on a rigid body.
e) Define couple and zero couple.
f) Define Laws of limiting friction
g) Define Laws of Statical friction.
h) Differentiate between Coplaner and Non-coplaner forces.