2. CENTROID

1. **C. G of a body is the point thorough which, in whatever position the body is placed, passes the line of action of the**
   a. *Resultant of the forces exerted by the attraction of the earth upon its constituent parts*
   b. *Resultant of the forces acting on it.*
   c. *Both of the above.*
   d. *None of the above*
2. **The centroid of a plane lamina will not be at its geometrical centre if it is a**
   a. *Circle*
   b. *Equilateral triangle*
   c. *Square placed with one diagonal horizontal*
   d. *Right angled triangle*
3. **Centroid of composite figure can be determined by**
   a. *Analytical method*
   b. *Graphical method*
   c. *Both*
   d. *None*
4. **Which of the following statement is correct?**
   a. *An irregular body can have more than one C.G.*
   b. *The C.G. of triangle lies at a point where any two medians meet each other.*
   c. *The C.G. of triangle lies at a point where the bisectors of all three angles meet.*
   d. *All of above*
5. **The centroid of an isosceles triangle with base 'a' and sides 'b" is _____ from its base.**
   a. $\left(\frac{1}{6}\sqrt{4b^2-a^2}\right)$
   b. $\left(\frac{1}{6}\sqrt{4a^2-b^2}\right)$
   c. $\left(\frac{a^2-b^2}{4}\right)$
   d. $\left(\frac{a^2+b^2}{4}\right)$
6. **The centroid of an equilateral triangle with each side a is ____ from any of the three sides.**
   a. $\left(\sqrt{\frac{3a}{2}}\right)$
   b. $\left(2\sqrt{3a}\right)$
   c. $\left(\frac{a}{2\sqrt{3}}\right)$
   d. $\left(3\sqrt{2a}\right)$
7. **A triangle of height 'r' and base '2r' is removed from a semicircular lamina of radius 'r'. Distance of centroid of remaining area from base is,**
   a. *0.5 r*
   b. *0.424 r*
   c. *0.584 r*
   d. *0.33 r*
8. **Circular hole of radius 'r' is cut out from a circular disc of radius '2r' in such a way that diameter of hole is radius of disc. The centroid lies at**
   a. *Centre of disc*
   b. *Centre of hole*
   c. *Somewhere in the disc*
   d. *Somewhere in the hole*
9. **The angle made by side of a square lamina with horizontal if suspended freely from a comer is,**
   a. *30°*
   b. *45°*
   c. *90°*
   d. *Zero*
10. **The centroidal distanced of a quarter circular area along its line of symmetry is**
   a. $\left(\frac{4r}{3\pi}\right)$
   b. $\left(\frac{3r}{4\pi}\right)$
   c. $\left(\frac{4\pi}{3r}\right)$
   d. $\left(\sqrt{2}.\frac{4r}{3\pi}\right)$
11. **The centroidal distance for the arc of a circle of radius 'r' and total angle '2α' from 'O' is**
   a. $\left(\frac{2r\ sin\ \alpha}{3\ \alpha}\right)$
   b. $\left(\frac{r\ sin\ \alpha}{\alpha}\right)$
   c. $\left(\frac{4r\ sin\ \alpha}{3\ \alpha}\right)$
   d. $\left(\frac{3r\ sin\ \alpha}{4\ \alpha}\right)$
12. **The centroid of an equilateral triangle of side 'a' with one side parallel to x-axis is**
   a. $\left(\frac{a}{2},\frac{a}{\sqrt{6}}\right)$
   b. $\left(\frac{a}{2},\frac{a}{\sqrt{12}}\right)$
   c. $\left(\frac{a}{2},\frac{a}{\sqrt{24}}\right)$
   d. $\left(\frac{a}{2},\frac{a}{3}\right)$
13. **Assuming a square of side 'a' to be made up of two right angle triangles, then the distance of centroid of each triangle with respect to diagonal is**
   a. $\left(\frac{a}{\sqrt{2}}\right)$
   b. $\left(\frac{a}{\sqrt{3}}\right)$
   c. $\left(\frac{\sqrt{2}\,a}{3}\right)$
   d. $\left(\frac{a}{\sqrt{18}}\right)$
14. **A rectangular plate of 4m x 3m is suspended from one of its comers. In suspended position the angle made by its longer side with vertical is,**
   a. *43.13°*
   b. *36.87°*
   c. *53.13°*
   d. *45°*
15. **C.G. of a thin hollow cone lies on the axis of symmetry at a height of**
   a. *One half of the total height*
   b. *One third of the total height*
   c. *One fourth of the total height*
   d. *None of these.*
16. **If 'r' is radius of a hemisphere then C.G. of solid hemisphere will lie on the line of symmetry at a distance of from plane base**

a. $\left(\frac{3r}{4\pi}\right)$
b. $\left(\frac{4r}{3\pi}\right)$
c. $\left(\frac{3r}{8}\right)$
d. $\left(\frac{5r}{8}\right)$

17. The C.G. of a solid cone from its apex on line of symmetry is
a. $\left(\frac{3h}{4}\right)$
b. $\left(\frac{4h}{3}\right)$
c. $\left(\frac{2h}{3}\right)$
d. $\left(\frac{h}{4}\right)$

18. The C.G. of hemisphere of radius 'r' from its base along its line of symmetry is
a. $\left(\frac{r}{8}\right)$
b. $\left(\frac{r}{2}\right)$
c. $\left(\frac{3r}{8}\right)$
d. $\left(\frac{4r}{3}\right)$

19. A semicircular plate is suspended from one of the ends of its diameter. The angle made by diameter with vertical in suspended position is,
a. *45°*
b. *23°*
c. *67°*
d. *32.5°*

20. A semicircular uniform rod is suspended from one of the ends. The angle made by diameter with horizontal in suspended position is :
a. *45°*
b. *23°*
c. *57.5°*
d. *32.5°*

21. Out of the following which are the examples of distributed forces?
I) A load which is continuously along the length of a cable suspended between two supports
II) Water pressure acting against the face of the dam
III) self weight of a prismatic bar supported at its ends
IV) The sand piled along the beam with variable depth
a. *only I is correct*
b. *I and II are correct*
c. *I,II and III are correct*
d. *All are correct*

22. For a plane figure having two axes of symmetry, the centroid lies on
a. *lies on horizontal axis*
b. *lies on vertical axis*
c. *lies on intersection point of two axes*
d. *not on any axis*

23. The centroid 'c' is a point which defines the _____ of an object
a. *Area*
b. *Volume*
c. *Geometric centre*
d. *all of the above*

24. A trapezoid having two parallel sides 'a' and 'b' and height 'h'. The Y centroidal distance from bottom side 'b' is,
a. $\left(0.5h\frac{b+2a}{b+a}\right)$
b. $\left(0.5h\frac{b-2a}{b+a}\right)$
c. $\left(\frac{h(b+2a)}{3(b+a)}\right)$
d. $\left(\frac{h(b-2a)}{3(b-a)}\right)$

25. A parabolic lamina of base 10 cm and height 5 cm is given by the equation $\left(y=\frac{hx^2}{a^2}\right)$. The y centroidal distance is
a. *1.5 cm*
b. *1.67 cm*
c. *3.75 cm*
d. *6.67 cm*

26. If a parabolic area of height 'h' is symmetric about y-axis, the centroidal x co-ordinate is
a. $\left(\frac{3h}{10}\right)$
b. *zero*
c. $\left(\frac{3h}{5}\right)$
d. $\left(\frac{3a}{8}\right)$

27. The centroidal distance of of an equilateral triangle with side 'a' from any of the three side is,
a. *0.866 a*
b. *0.471 a*
c. *0.288 a*
d. *0.235 a*

28. For a line of length 2.5 m passing through origin and inclination 60° with x-axis, centroid along x is
a. *0.625*
b. *0.5*
c. *2.5*
d. *1*

29. The y centroidal distance of an unequal I-section from its bottom having upper flange 15 cm x 5 cm, lower flange 10 cm x 5 cm and web 5 cm x 15 cm deep is
a. *12.5 cm*
b. *13.75 cm*
c. *20 cm*
d. *15 cm*

30. A triangular hole is cut from circular lamina of radius 10 cm such that the vertex of triangle is on y-axis and base coincides with horizontal diameter. If base of triangle is 20 cm and height is 10 cm. The C.G. of remaining lamina is,
a. *2.22 cm*
b. *-2.22 cm*
c. *1.55 cm*
d. *-1.55 cm*

31. The C.G. of an isosceles triangle with base 10 cm and sides 20 cm is _____ from its base.
a. *6.455 cm*
b. *5 cm*
c. *7 cm*
d. *9 cm*

Ans Key – Unit No:-1
1. Forces & Force System

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	a	51	d	101	d
2	b	52	c	102	a
3	c	53	c	103	d
4	d	54	c	104	b
5	d	55	a	105	c
6	b	56	a	106	c
7	c	57	b	107	a
8	c	58	a	108	c
9	b	59	b	109	a
10	d	60	d	110	b
11	a	61	b	111	b
12	b	62	a	112	c
13	c	63	c	113	a
14	b	64	c	114	c
15	d	65	b	115	a
16	a	66	d	116	b
17	d	67	a	117	c
18	b	68	b	118	b
19	b	69	a	119	d
20	b	70	b	120	c
21	a	71	c	121	a
22	a	72	c	122	c
23	b	73	b	123	a
24	b	74	c	124	c
25	a	75	d	125	c
26	a	76	b	126	a
27	a	77	a	127	c
28	b	78	b	128	b
29	c	79	a	129	a
30	b	80	c	130	b
31	b	81	a	131	b
32	c	82	a	132	a
33	b	83	c	133	b
34	b	84	a	134	c
35	b	85	c	135	a
36	c	86	b	136	b
37	b	87	c	137	c
38	a	88	c	138	d
39	b	89	a	139	b
40	b	90	b	140	d
41	c	91	b	141	a
42	d	92	d	142	c
43	d	93	d	143	a
44	b	94	a	144	b
45	c	95	a	145	a
46	d	96	c		
47	c	97	c		
48	b	98	d		
49	d	99	c		
50	c	100	d		

Ans Key – Unit No:-1
2. Centroid

Q. No.	Answer
1	a
2	d
3	c
4	b
5	a
6	c
7	c
8	c
9	b
10	d
11	b
12	b
13	d
14	c
15	b
16	b
17	a
18	c
19	b
20	c
21	d
22	c
23	c
24	c
25	a
26	b
27	c
28	a
29	b
30	d
31	a