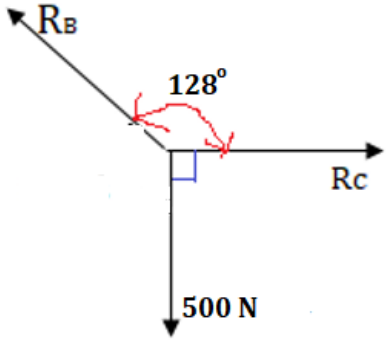
ENGINEERING MECHANICS

MCQ's

Unit III – Equilibrium

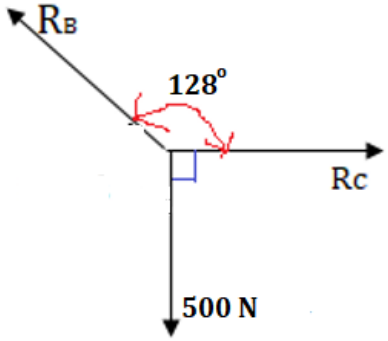
1. If a particle is acted upon by two forces and if that particle is in equilibrium, then these two forces must be
   a) equal, opposite and collinear.
   b) equal, opposite and non-collinear
   c) equal, acting in same direction and collinear
   d) none of the above
2. If a body is acted upon by three coplanar forces, and if that body is in equilibrium, then these three forces
   a) Must be parallel
   b) Must be concurrent
   c) May be parallel or concurrent
   d) None of the above
3. For coplanar concurrent force system, the number of equilibrium equations available are:
   a) 1
   b) 3
   c) 4
   d) 2
4. For general coplanar force system, the number of equilibrium equations available are:
   a) 1
   b) **3**
   c) 4
   d) 2
5. Free body diagram is defined as an isolated diagram showing
   a) Only external forces
   b) Only internal forces
   c) Both (a) and (b)
   d) None of the above
6. For equilibrium of the three forces shown in figure below, the magnitude of R_B = ….N.



   a) 390.64
   b) 634.51

c) 465.23
d) 245.89

7. For equilibrium of the three forces shown in figure below, the magnitude of R_C = ….N.



a) 90.64

b) 634.51

c) 465.23

d) 390.64

8. For fixed support in general, which of the following statement is correct:

a) unknowns are horizontal and vertical reaction

b) unknowns are horizontal reaction, vertical reaction and moment

c) unknown is only moment

d) unknown is only vertical reaction

9. For roller support in general, which of the following statement is correct:

a) unknown reaction is perpendicular to the plane of support

b) unknown reaction is always vertical

c) unknown reaction is always horizontal

d) unknowns are horizontal and vertical reaction

10. Pin or hinge support

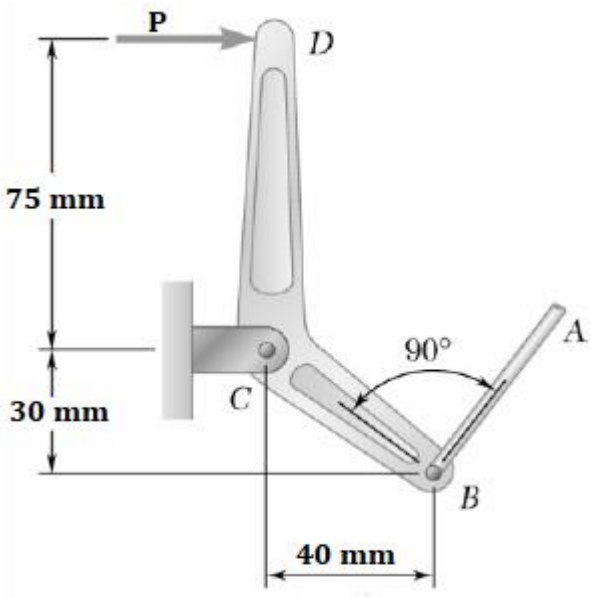
a) permits translation

b) permits only rotation

c) permits both translation and rotation

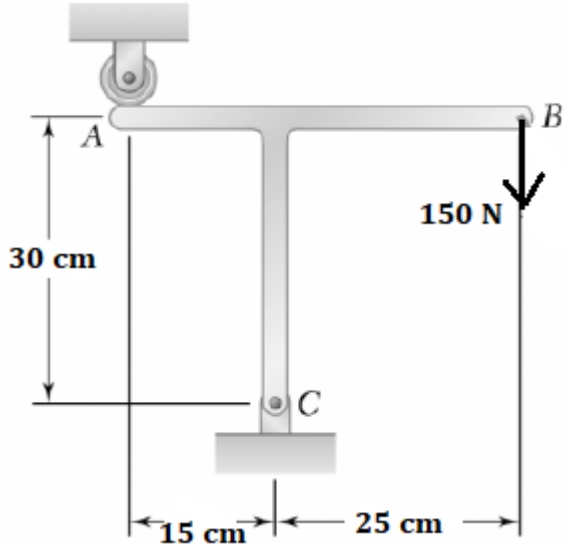
d) permits neither translation nor rotation

11. The lever *BCD* is hinged at *C* and is attached to a control rod at *B*. If *P* = 200 N, determine the tension in rod *AB*.



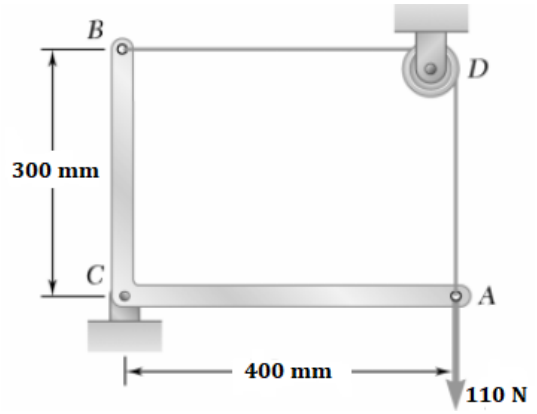
a) 400 N
b) 500 N
c) 300 N
d) 100 N

12. A T-shaped bracket supports a 150 N load as shown. Determine the reactions at *A*.



a) 250 N
b) 90 N
c) 180 N
d) 325 N

13. The L-shaped member *ACB* is supported by a pin and bracket at *C* and by an inextensible cord attached at *A* and *B* and passing over a frictionless pulley at *D*. Determine the tension in the cord:



a) 400 N
b) 350 N
c) 440 N
d) 550 N

14. For fixed support the number of unknowns are …
a) 1
b) 2
c) 3
d) 4

15. Which of the following statement is correct for fixed support:
a) permits neither rotation nor translation
b) permits both rotation and translation
c) permits only rotation
d) permits only translation

16. For cantilever beam
a) one support is hinged and other is roller
b) one support is fixed and other end is free
c) one support is fixed and other is roller
d) both supports are fixed

17. For simply supported beam, generally
a) one support is hinged and other is roller
b) one support is fixed and other end is free
c) one support is fixed and other is roller
d) both supports are fixed

18. For simply supported beam of span 6 m subjected to UDL of intensity 2 kN/m throughout the span, the support reaction at both the ends is …….kN.
a) 12
b) 6
c) 24

d) 3

19. A simply supported beam *AB* of span 2 m is subjected to triangular loading with zero intensity at support *A* and 1 kN/m intensity at support B, the support reaction at R_A = ……. kN.
a) 0.67
b) 0.78
c) 0.22
d) 0.33

20. A simply supported beam *AB* of span 2 m is subjected to triangular loading with zero intensity at support *A* and 1 kN/m intensity at support B, the support reaction at R_B = ……. kN.
a) 0.67
b) 0.78
c) 0.22
d) 0.33

21. A space force acts at the origin of a coordinate system in a direction defined by the angles θ_x = 55° and θ_z = 86° Knowing that the *y* component of the force is −40 N, determine the angle θ_y:
a) 35.29°
b) 40.29°
c) 144.71°
d) 139.71°

22. A space force of magnitude 100 N is acting from point A (0.5, 0.6, 0.9)m to point B (-0.6, 1.1, 0.4)m. The x-component of force = …….N.

a) 38.2
b) -38.2
c) -84.1
d) 84.1

23. A space force of magnitude 100 N is acting from point A (0.5, 0.6, 0.9)m to point B (-0.6, 1.1, 0.4)m. The y-component of force = …….N.

a) 38.2
b) -38.2
c) -84.1
d) 84.1

24. A space force of magnitude 100 N is acting from point A (0.5, 0.6, 0.9)m to point B (-0.6, 1.1, 0.4)m. The z-component of force = …….N.

a) 38.2

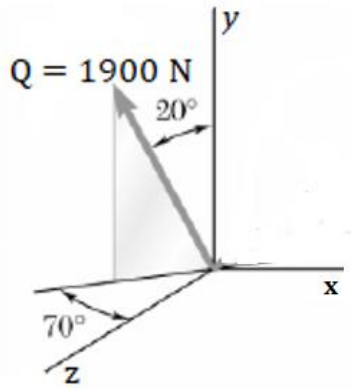
b) -38.2
c) -84.1
d) 84.1

25. A space force of magnitude 100 N is acting from point A (0.5, 0.6, 0.9)m to point B (-0.6, 1.1, 0.4)m. The angle θ_x = …..
a) 67.54
b) 147.25
c) 172.38
d) 87.28

26. A space force of magnitude 100 N is acting from point A (0.5, 0.6, 0.9)m to point B (-0.6, 1.1, 0.4)m. The angle θ_y = …..
a) 67.54
b) 147.25
c) 172.38
d) 87.28

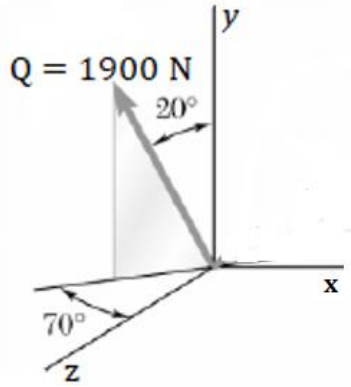
27. A space force of magnitude 100 N is acting from point A (0.5, 0.6, 0.9)m to point B (-0.6, 1.1, 0.4)m. The angle θ_z = …..
a) 67.54
b) 147.25
c) 112.46
d) 87.28

28. The y-component of force Q = ……N.



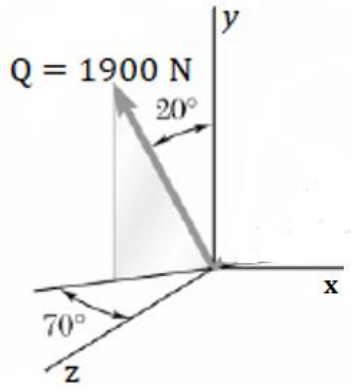
a) 649.84
b) 1785.42
c) -649.84
d) 1285.23

29. The z-component of force Q = ……N.



a) 222.26
b) -222.26
c) 1785.42
d) -1785.42

30. The x-component of force Q = ……N.



a) 222.26
b) -222.26
c) 610.65
d) -610.65

31. A horizontal square plate *ABCD* of side 1 m is suspended by means of three vertical wires at A, B, and C. If the weight of plate is 1000 N, tension in cable C = …N.

a) 500
b) 600
c) 400
d) 300

31. A horizontal square plate *ABCD* of side 1 m is suspended by means of three vertical wires at A, B, and C. If the weight of plate is 1000 N, tension in cable A = …N.

a) 500

b) 600
c) 400
d) 300

32. A square foundation *ABCD* of side 1 m is acted upon by two vertically downward forces of magnitude 100 N and 300 N at corners *A* and *B*, respectively. Considering corner *A* as origin, and *AB* as x-axis and *AD* as z-axis, the x-coordinate of resultant = …….m.
a) 0.25
b) 0.75
c) 0
d) 0.15

33. A square foundation *ABCD* of side 1 m is acted upon by two vertically downward forces of magnitude 100 N and 300 N at corners *A* and *B*, respectively. Considering corner *A* as origin, and *AB* as x-axis and *AD* as z-axis, the z-coordinate of resultant = …….m.
a) 0.25
b) 0.75
c) 0
d) 0.15

34. Which of the following statement is true for hinge support:
a) there is one reaction with unknown line of action
b) there are three unknowns
c) there are two unknowns
d) both (a) and (c)