GENERAL ENGINEERING SCIENCE I

Attempt ALL questions

Marks far each part question are shown in brackets

1. Arrange the following fractions in ascending order of magnitude:

    3/17, 5/13, 0.625, 23/53, 119/264, 0.031   (8)

2. A rectangle has sides of 18 cm and 15 cm.

    Determine the length of the diagonal of a square having an area that is 67% greater than the rectangle.   (8)

3. A tank can be emptied by valve A in 4 hours, and by valve B in 6 hours.

    Determine the time it would take to empty the tank using valve A and valve B together.   (8)

4. A flywheel has a diameter of 4.66 m and turns at 7.85 rad/s.

    Determine the velocity of a point on the rim in Km/hr.   (8)

5. A body is travelling at 1.5 m/s when it is uniformly accelerated to 6.5 m/s in 2.5 seconds.

    Calculate:

    (a) the acceleration;   (5)

    (b) the distance travelled in the 2.5 seconds.   (5)

6. A metal bar A is 320 mm long and has the same mass as a metal bar B which is 140 mm long with a diameter of 37.5 mm.

    Determine the diameter of bar A given that its density is half that of bar B.   (8)

7. Fig. Q.7 shows a vertical support column having a wall thickness of 18 mm. A vertical load of 5.4 tonne is applied at the top.

Determine:

(a) the stress in the column in MN/m^2; (5)

(b) the strain in the column, given that the Modulus of Elasticity of the material is $203GN/m^2$. (5)
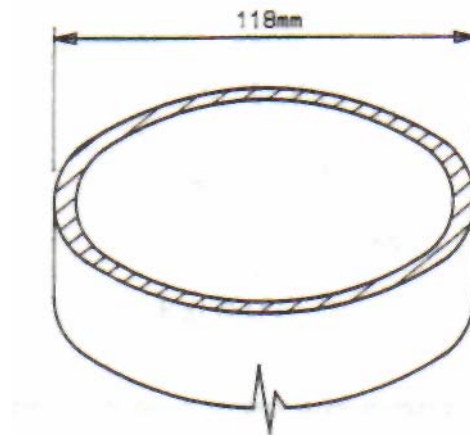

Fig. Q.7

8. A rectangular dock gate measures 28.5 metre wide and 15.5 metre deep.

Calculate the maximum depth of water on the outside only if the load on the gate is not to exceed 27.1 MN. (8)

Note: Take the density of water as 1018 kg/m^3

9. The perimeter of a triangle is 120 metres.
The three sides are in the ratio of 4:5:6.

Determine the length of EACH side. (6)

10. A mass of 168 kg is raised through 12.8 metres in 34 seconds by a power winch.

Determine the power input to the system in kW if the system efficiency is 0.48. (8)

11. Fig. Q.11 shows a mass of 150 kg suspended from points A and B by chains.
    Determine the tensile force in chains AC and BC by any suitable means.   (10)
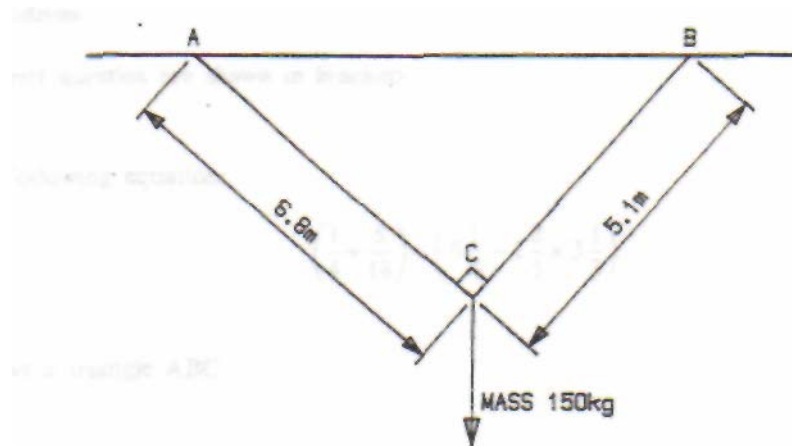

Fig. Q.11

12. Determine the diameter of a sphere which has a surface area numerically equal to its volume.   (8)