WORKSHEET 1

CHAPTER 1 – TURNING FORCES

A. Tick (✓) the correct option.

1. Turning of key in a lock is
   a. linear motion. b. circular motion. c. rotational motion. d. translational motion.
2. Torque is equivalent to
   a. $F \times d$. b. $\frac{F}{d}$. c. $F + d$. d. $\frac{d}{F}$.
3. Torque is a
   a. scalar quantity. b. vector quantity. c. both (a) and (b). d. none of these.
4. 1 Nm is equivalent to
   a. 10^5 dyne cm b. 10^{-7} dyne cm c. 10^7 dyne cm d. 10^{-5} dyne cm
5. The algebraic sum of moments of weights of the particles about the point 'G' is
   a. one. b. zero. c. two. d. four.

B. Fill in the blanks.

1. The centre-seeking force that causes an object to move in a circular path is called _____
2. _____ is the measure of the capacity of a force to turn a body.
3. The earth goes round the sun with constant speed in a circular orbit. Its motion is _____
4. When a body remains in a state of uniform motion, it is said to be in _____ equilibrium.
5. _____ is a push or pull which changes or tends to change the state of rest or of uniform motion, the direction of motion or the shape and the size of the object.

C. State whether the following statements are true or false.

1. Torque is the measure of the capacity of a force to turn a body.
2. SI unit of torque is dyne cm.
3. The centre of gravity of boomerang is outside the body.
4. The centripetal force is radially directed towards the centre of the circle.
5. The SI unit of couple is Nm.

D. Match the following.

1. Torque	opening the cap of the bottle
2. Centre of gravity outside the body	Nm
3. Couple actions	static equilibrium
4. Beam balance	boomerang
5. Earth	dynamic equilibrium

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E. Answer the following questions.

Very short answer questions

1. Define couple. Write its unit and give some examples citing from our daily life.
2. Give two examples of uniform circular motion.

Short answer questions

1. Differentiate between centripetal and centrifugal force.
2. State principle of moments.

Long answer questions

1. A 50 kg girl sits 1.5 m from the fulcrum of a see saw. Where should another girl of 40 kg sit on the other side in order to balance it?
2. A uniform metre scale is balanced at 65 cm mark, when weighs of 6 gf and 40 gf suspended at 10 cm mark and 80 cm mark respectively. Calculate the weight of the metre scale.

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ANSWERS

WORKSHEET 1

A. Tick (✓) the correct option.

1. d 2. a 3. b 4. c 5. b

B. Fill in the blanks.

1. centripetal force 2. Torque 3. accelerated 4. dynamic 5. Force

C. State whether the following statements are true or false.

1. T 2. F 3. T 4. T 5. T

D. Match the following.

1. Torque	Nm
2. Centre of gravity outside the body	boomerang
3. Couple action	opening the cap of the bottle
4. Beam balance	static equilibrium
5. Earth	dynamic equilibrium

E. Answer the following questions.

Very short answer questions

1. Two equal, parallel but opposite forces acting an a body whose lines of action are not same form a couple. Its SI unit is Newton metre (Nm). The couple action can be seen in opening or closing a heater tap and also, when we turn a screw driver.
2. Examples of uniform circular motion are:

   1. The motion of the moon around the earth.

   2. The rotation of the stone tied to a strong string (when whirled).

Short answer questions

1. Refer Table 1.2, Page no. 21 of the textbook.
2. According to principle of moments, if a body under the action of a number of coplanar forces is in rotational equilibrium, then the algebraic sum of the moments of all forces about a given axis is zero, i.e.

$$\underset{\text{(negative)}}{\text{clockwise moments}} + \underset{\text{(positive)}}{\text{anticlockwise moments}} = 0$$

Long answer questions

1. $$\text{Total clockwise moment} = 50 \text{ kgf} \times 1.5 \text{ m}$$
$$= 75 \text{ kgf m}$$

To balance the sea saw, let the other girl of 40 kg sit on the left hand side at distance d from the fulcrum.

$$\therefore \quad \text{Anticlockwise moment} = 40 \text{ kgf} \times x$$
$$= 40\ x \text{ kgf}$$

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According to principle of moments, 75 kgf m = 40 × x kgf

$$x = \frac{75 \text{ kgf m}}{40 \text{ kgf}} = 1.875 \text{ m}$$

2. Taking moments about 65 cm mark,

Moment in clockwise direction = 40 gf × 15 cm

= 600 gf cm

Moment in anticlockwise direction = (W × 10) + (6 × 55) cm

= 10 W + 330 gf cm

According to principle of moments,

$$10\ W + 330 = 600$$

$$10\ W = 600 - 330$$

$$10\ W = 270$$

$$W = \frac{270}{10} = 27 \text{ gf}$$

∴ The weight of the metre scale is 27 gf.

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