



TNPSC CTSE 2025

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WORKSHOP CALCULATION SCIENCE

CODE: 540

**UNIT
WISE
MCQ
QUESTIONS
WITH
ANSWER
EXPLANATION**

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UNIT 01: UNITS, FRACTION, SQUARE ROOT, RATIO, PROPORTION AND PERCENTAGE

QUESTION

Q1. Which of the following is a derived SI unit?

- A) Kilogram
- B) Meter
- C) Newton
- D) Ampere

Q2. Convert 72 km/h to m/s.


- A) 20 m/s
- B) 72/3.6 m/s
- C) 25 m/s
- D) 5 m/s

Q3. Find the HCF of 48, 60 and 96.

- A) 24
- B) 12
- C) 6
- D) 48

Q4. Add: $\frac{4}{7} + \frac{2}{3}$

- A) $\frac{6}{10}$
- B) $\frac{2}{5}$
- C) $\frac{26}{21}$
- D) $\frac{8}{9}$


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Q5. Find the square root of 1156.


- A) 32
- B) 34
- C) 38
- D) 36

Q6. A ladder is 13 m long and reaches 5 m above the ground on a wall. How far is the foot of the ladder from the wall?

- A) 10 m
- B) 12 m






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UNIT 01: UNITS, FRACTION, SQUARE ROOT, RATIO, PROPORTION AND PERCENTAGE

ANSWER AND EXPLANATION

Q1. Which of the following is a derived SI unit?

- A) Kilogram
- B) Meter
- C) Newton
- D) Ampere

Answer: C

Explanation: Newton is a derived unit of force ($\text{kg} \cdot \text{m/s}^2$), whereas others are fundamental.

Q2. Convert 72 km/h to m/s.

- A) 20 m/s
- B) 72/3.6 m/s
- C) 25 m/s
- D) 5 m/s


Answer: B

Explanation: Divide km/h by 3.6 to convert to m/s $\rightarrow 72 \div 3.6 = 20 \text{ m/s}$.

Q3. Find the HCF of 48, 60 and 96.

- A) 24
- B) 12
- C) 6
- D) 48

Answer: B


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Explanation: HCF of 48, 60 and 96 = 12 (common factor of all three numbers).

Q4. Add: $\frac{4}{7} + \frac{2}{3}$


- A) $\frac{6}{10}$
- B) $\frac{2}{5}$
- C) $\frac{26}{21}$
- D) $\frac{8}{9}$

Answer: C

Explanation: LCM = 21, $(\frac{4}{7} + \frac{2}{3}) = \frac{26}{21}$






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UNIT 02: MATERIAL SCIENCE AND HEAT TREATMENT

QUESTION

Q1. Which of the following is a ferrous metal?

- A) Aluminium
- B) Copper
- C) Steel
- D) Titanium

Q2. Cast iron has high carbon content and exhibits:


- A) High ductility
- B) Excellent toughness
- C) Good compressive strength and poor tensile strength
- D) High malleability

Q3. The main mechanical property improved in alloy steel over carbon steel is:

- A) Density
- B) Electrical conductivity
- C) Toughness and strength at high temperature
- D) Magnetic permeability

Q4. Which property primarily distinguishes iron from steel?

- A) Hardness
- B) Magnetic nature
- C) Carbon content and tunable properties
- D) Appearance


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Q5. Bars of structural steel often undergo normalizing to:

- A) Obtain martensite
- B) Increase internal stresses
- C) Refine grain structure uniformly
- D) Produce annealed softness


Q6. Annealing differs from hardening in that annealing:

- A) Uses quenching
- B) Produces more martensite
- C) Softens material, relieves stress, and improves ductility





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UNIT 02: MATERIAL SCIENCE AND HEAT TREATMENT

ANSWER AND EXPLANATION

Q1. Which of the following is a ferrous metal?

A) Aluminium
B) Copper
C) Steel
D) Titanium

Answer: C

Explanation: Steel contains iron; ferrous metals are iron-based alloys.

Q2. Cast iron has high carbon content and exhibits:

A) High ductility
B) Excellent toughness
C) Good compressive strength and poor tensile strength
D) High malleability





Answer: C

Explanation: Cast iron is brittle in tension, strong in compression.

Q3. The main mechanical property improved in alloy steel over carbon steel is:


A) Density
B) Electrical conductivity
C) Toughness and strength at high temperature
D) Magnetic permeability

Answer: C

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Explanation: Alloying elements (Ni, Cr, Mo) enhance strength & corrosion resistance.



Q4. Which property primarily distinguishes iron from steel?




A) Hardness
B) Magnetic nature
C) Carbon content and tunable properties
D) Appearance

Answer: C

Explanation: Steel has controlled carbon (< 2%) giving higher strength and toughness.




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UNIT 03: MASS, WEIGHT, VOLUME, DENSITY, SPEED, VELOCITY AND WORK POWER ENERGY

QUESTION

Q1. A metal cube has a mass of 250 grams and a volume of 50 cm³. What is its density?

A) 5 g/cm³
 B) 0.2 g/cm³
 C) 12.5 g/cm³
 D) 2.5 g/cm³

Q2. If the weight of an object on Earth is 98 N, what is its mass? (Assume g = 9.8 m/s²)





A) 10 kg
 B) 9.8 kg
 C) 98 kg
 D) 0.98 kg



Q3. A liquid has a density of 1.2 g/cm³. What is its specific gravity?




A) 1.2
 B) 0.12
 C) 12
 D) 0.012

Q4. An object weighs 30 N on Earth. What would be its weight on the Moon where gravity is 1/6th of Earth's?

A) 5 N
 B) 6 N

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C) 180 N
 D) 25 N

Q5. Which of the following quantities is scalar?


A) Weight
 B) Velocity
 C) Acceleration
 D) Mass

Q6.  travels 100 km in 2 hours. What is its average speed?

A) 50 km/h



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UNIT 03: MASS, WEIGHT, VOLUME, DENSITY, SPEED, VELOCITY AND WORK POWER ENERGY

ANSWER AND EXPLANATION

Q1. A metal cube has a mass of 250 grams and a volume of 50 cm³. What is its density?

A) 5 g/cm³
 B) 0.2 g/cm³
 C) 12.5 g/cm³
 D) 2.5 g/cm³

Answer: A

Explanation: Density = Mass / Volume = 250 g / 50 cm³ = 5 g/cm³.

Q2. If the weight of an object on Earth is 98 N, what is its mass? (Assume g = 9.8 m/s²)

A) 10 kg
 B) 9.8 kg
 C) 98 kg
 D) 0.98 kg

Answer: A

Explanation: Weight = Mass × g ⇒ Mass = Weight / g = 98 N / 9.8 m/s² = 10 kg.


Q3. A liquid has a density of 1.2 g/cm³. What is its specific gravity?

A) 1.2
 B) 0.12
 C) 12
 D) 0.012

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Answer: A

Explanation: Specific gravity = Density of substance / Density of water = 1.2 / 1 = 1.2.

Q4. An object weighs 30 N on Earth. What would be its weight on the Moon where gravity is 1/6th of Earth's?

A) 5 N
 B) 6 N
 C) 180 N
 D) 25 N

Answer: B

Explanation: Weight on Moon = Weight on Earth × (1/6) = 30 N × (1/6) = 5 N



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UNIT 04: HEAT AND TEMPERATURE

QUESTION

Q1. Which of the following statements correctly distinguishes between heat and temperature?

A) Heat is a measure of the average kinetic energy of particles; temperature is the total energy.

B) Heat is energy in transit due to temperature difference; temperature is a measure of thermal energy.

C) Heat is measured in Kelvin; temperature is measured in Joules.

D) Heat can be negative; temperature cannot.

Q2. Which instrument is used to measure the temperature of a furnace without direct contact?

A) Thermocouple

B) Mercury thermometer

C) Pyrometer

D) Manometer

Q3. What is the primary mode of heat transfer in solids?

A) Convection

B) Radiation

C) Conduction

D) Evaporation

Q4. Which of the following materials has the highest thermal conductivity?

A) Copper

B) Aluminum

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C) Silver

D) Diamond

Q5. What is the coefficient of linear expansion?

A) Change in volume per unit temperature change.

B) Change in area per unit temperature change.

C) Change in length per unit length per degree temperature change.


D) Change in mass per unit temperature change.

Q6. Which metal has the highest melting point?

A) Iron



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ANSWER AND EXPLANATION

Q1. Which of the following statements correctly distinguishes between heat and temperature?

A) Heat is a measure of the average kinetic energy of particles; temperature is the total energy.

B) Heat is energy in transit due to temperature difference; temperature is a measure of thermal energy.

C) Heat is measured in Kelvin; temperature is measured in Joules.

D) Heat can be negative; temperature cannot.

Answer: B

Explanation: Heat refers to the energy transferred between systems due to a temperature difference, whereas temperature measures the thermal energy within a system.

Q2. Which instrument is used to measure the temperature of a furnace without direct contact?

A) Thermocouple

B) Mercury thermometer

C) Pyrometer

D) Manometer

Answer: C

Explanation: A pyrometer measures high temperatures from a distance by detecting thermal radiation, making it suitable for furnaces.

Q3. What is the primary mode of heat transfer in solids?

A) Convection

B) Radiation

C) Conduction

D) Evaporation

Answer: C

Explanation: In solids, heat is primarily transferred through conduction, where energy is passed between adjacent particles.





Q4. Which of the following materials has the highest thermal conductivity?

A) Copper

B) Aluminum


C) Silver

D) Diamond

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C) Conduction

D) Evaporation

Answer: C

Explanation: In solids, heat is primarily transferred through conduction, where energy is passed between adjacent particles.





Q4. Which of the following materials has the highest thermal conductivity?

A) Copper

B) Aluminum



C) Silver




D) Diamond

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UNIT V: BASIC ELECTRICITY

QUESTION

Q1. Which of the following is a unit of electric current?

- A) Ohm
- B) Watt
- C) Ampere
- D) Volt

Q2. The primary difference between AC and DC is:





- A) AC flows only in one direction
- B) DC flows in both directions
- C) AC reverses direction periodically
- D) DC has more voltage than AC

Q3. Which material is a good electrical conductor?



- A) Glass
- B) Rubber
- C) Copper
- D) Plastic




Q4. What is the SI unit of resistance?

- A) Ampere
- B) Ohm
- C) Watt
- D) Henry

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Q5. In Ohm's Law, $V = IR$. What does "R" stand for?

- A) Reactance
- B) Resistance
- C) Rotation
- D) Rectifier

Q6. Which device is used to convert AC to DC?

- A) Transformer
- B) Inverter
- C) Rectifier
- D) Resistor





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UNIT V: BASIC ELECTRICITY

ANSWER AND EXPLANATION

Q1. Which of the following is a unit of electric current?

A) Ohm
B) Watt
C) Ampere
D) Volt

Answer: C

Explanation: Ampere (A) is the SI unit of electric current.

Q2. The primary difference between AC and DC is:

A) AC flows only in one direction
B) DC flows in both directions
C) AC reverses direction periodically
D) DC has more voltage than AC

Answer: C

Explanation: AC (alternating current) changes direction periodically; DC flows in one direction.

Q3. Which material is a good electrical conductor?

A) Glass
B) Rubber
C) Copper
D) Plastic

Answer: C

Explanation: Copper has low resistance, making it ideal for conduction.

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Q4. What is the SI unit of resistance?

A) Ampere
B) Ohm
C) Watt
D) Henry

Answer: B

Explanation: Resistance is measured in ohms (Ω).



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UNIT 06: MENSURATION – AREA OF CUT-OUT REGULAR AND IRREGULAR SURFACES

QUESTION

Q1. A square has a perimeter of 48 cm. What is its area?

A) 144 cm²
B) 196 cm²
C) 256 cm²
D) 576 cm²

Q2. A rectangle has a length of 15 cm and a width of 10 cm. What is its area?

A) 150 cm²
B) 125 cm²
C) 100 cm²
D) 200 cm²

Q3. The area of a parallelogram is 120 cm², and its base is 10 cm. What is its height?

A) 10 cm
B) 12 cm
C) 15 cm
D) 20 cm

Q4. A triangle has a base of 8 cm and a height of 5 cm. What is its area?

A) 20 cm²
B) 30 cm²
C) 40 cm²

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D) 50 cm²

Q5. The radius of a circle is 7 cm. What is its area? (Use $\pi = 22/7$)

A) 154 cm²
B) 144 cm²
C) 164 cm²
D) 134 cm²

Q6. The diameter of a semicircle is 14 cm. What is its area? (Use $\pi = 22/7$)

A) 154 cm²
B) 154 cm²



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UNIT 06: MENSURATION – AREA OF CUT-OUT REGULAR AND IRREGULAR SURFACES

ANSWER AND EXPLANATION

Q1. A square has a perimeter of 48 cm. What is its area?

A) 144 cm²
B) 196 cm²
C) 256 cm²
D) 576 cm²

Answer: A

Explanation: Perimeter of a square = $4 \times \text{side}$

So, side = $48 \text{ cm} / 4 = 12 \text{ cm}$

Area = $\text{side}^2 = 12^2 = 144 \text{ cm}^2$

Q2. A rectangle has a length of 15 cm and a width of 10 cm. What is its area?

A) 150 cm²
B) 125 cm²
C) 100 cm²
D) 200 cm²

Answer: A

Explanation: Area = length \times width = $15 \text{ cm} \times 10 \text{ cm} = 150 \text{ cm}^2$

Q3. The area of a parallelogram is 120 cm², and its base is 10 cm. What is its height?

A) 10 cm
B) 12 cm
C) 15 cm
D) 20 cm

Answer: B

Explanation: Area = base \times height

So, height = Area / base = $120 \text{ cm}^2 / 10 \text{ cm} = 12 \text{ cm}$

Q4. A triangle has a base of 8 cm and a height of 5 cm. What is its area?

A) 20 cm²
B) 30 cm²
C) 40 cm²
D) 50 cm²

Answer: C

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Q4. A triangle has a base of 8 cm and a height of 5 cm. What is its area?

A) 20 cm²
B) 30 cm²
C) 40 cm²
D) 50 cm²

Answer: C

Explanation: Area = $\frac{1}{2} \times \text{base} \times \text{height}$

So, area = $\frac{1}{2} \times 8 \text{ cm} \times 5 \text{ cm} = 20 \text{ cm}^2$

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UNIT: 07 FRICTION

QUESTION

Q1. What is friction?

- A) Resistance to motion between two surfaces
- B) Force that increases speed
- C) Energy conversion in motion
- D) None of the above

Q2. Which one is not an advantage of friction?

- A) Enables walking
- B) Helps in braking
- C) Produces heat in machines
- D) Aids in holding tools

Q3. Which law of friction states that the force of friction is proportional to the normal force?

- A) First law
- B) Second law
- C) Third law
- D) Coulomb's law

Q4. The coefficient of friction (μ) is defined as:

- A) Ratio of normal force to frictional force
- B) Product of normal force and frictional force
- C) Ratio of frictional force to normal force
- D) Difference between normal force and frictional force

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Q5. What is the unit of coefficient of friction?

- A) Newton
- B) No unit
- C) Joule
- D) Pascal

Q6. Which of the following factors does not affect the force of friction between two surfaces?

- A) Nature of the surfaces
- B) Area of contact





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UNIT: 07 FRICTION

ANSWER AND EXPLANATION

Q1. What is friction?

A) Resistance to motion between two surfaces
B) Force that increases speed
C) Energy conversion in motion
D) None of the above

Answer: A

Explanation: Friction is a resistive force that occurs when two surfaces move or try to move across each other.

Q2. Which one is not an advantage of friction?

A) Enables walking
B) Helps in braking
C) Produces heat in machines
D) Aids in holding tools

Answer: C

Explanation: Heat generation is a disadvantage of friction as it leads to energy loss and wear.

Q3. Which law of friction states that the force of friction is proportional to the normal force?

A) First law
B) Second law
C) Third law
D) Coulomb's law

Answer: B

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Explanation: The second law of friction states that frictional force is directly proportional to the normal reaction force.


Q4. The coefficient of friction (μ) is defined as:

A) Ratio of normal force to frictional force
B) Product of normal force and frictional force
C) Ratio of frictional force to normal force
D) Difference between normal force and frictional force

Answer: C

Explanation: $\mu = \text{Frictional force} / \text{Normal force}$

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**UNIT 08: CENTRE OF GRAVITY, LEVERS AND SIMPLE MACHINES
AND ELASTICITY**

QUESTION

Q1. The center of gravity of a uniform semicircular lamina lies at a distance of:

- A) $r/2$ from the center along the axis
- B) $4r/3\pi$ from the center along the axis
- C) $2r/\pi$ from the center along the axis
- D) $3r/4$ from the center along the axis

Q2. Which of the following statements is true regarding the center of gravity?





- A) It always lies within the material body
- B) It coincides with the centroid for homogeneous bodies
- C) It is affected by the orientation of the body
- D) It depends on the shape but not the mass distribution

Q3. The center of gravity of a composite body can be found by:


- A) Averaging the centers of gravity of individual parts
- B) Using the principle of moments
- C) Considering only the largest part
- D) Ignoring the mass distribution

Q4. For a uniform solid cone, the center of gravity lies at a distance of:

- A) $h/4$ from the base
- B) $h/3$ from the base
- C) $3h/4$ from the base

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D) $2h/3$ from the base

Q5. The center of gravity of a uniform thin rod of length L is located at:



- A) One-fourth from one end
- B) Midpoint of the rod
- C) Three-fourths from one end
- D) At one end

Q6. In a first-class lever, the fulcrum is located:

- A) Between the effort and the load
- B) At the end of the lever

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UNIT 08: CENTRE OF GRAVITY, LEVERS AND SIMPLE MACHINES AND ELASTICITY

ANSWER AND EXPLANATION

Q1. The center of gravity of a uniform semicircular lamina lies at a distance of:

- A) $r/2$ from the center along the axis
- B) $4r/3\pi$ from the center along the axis
- C) $2r/\pi$ from the center along the axis
- D) $3r/4$ from the center along the axis

Answer: B

Explanation: For a semicircular lamina, the center of gravity lies at a distance of $4r/3\pi$ from the center along the axis perpendicular to the diameter.

Q2. Which of the following statements is true regarding the center of gravity?

- A) It always lies within the material body
- B) It coincides with the centroid for homogeneous bodies
- C) It is affected by the orientation of the body
- D) It depends on the shape but not the mass distribution

Answer: B

Explanation: For homogeneous bodies, the center of gravity coincides with the centroid, which is the geometric center of the body.

Q3. The center of gravity of a composite body can be found by:

- A) Averaging the centers of gravity of individual parts
- B) Using the principle of moments
- C) Considering only the largest part
- D) Ignoring the mass distribution





Answer: B

Explanation: The center of gravity of a composite body is determined by taking moments of individual parts about a reference axis and dividing the sum of moments by the total mass.



Q4. For a uniform solid cone, the center of gravity lies at a distance of:

- A) $h/4$ from the base
- B) $h/3$ from the base
- C) $3h/4$ from the base
- D) $2h/3$ from the base

Answer: D

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ANSWER AND EXPLANATION

Q4. For a uniform solid cone, the center of gravity lies at a distance of:

- A) $h/4$ from the base
- B) $h/3$ from the base
- C) $3h/4$ from the base
- D) $2h/3$ from the base

Answer: D

Explanation: The center of gravity of a uniform solid cone lies at a distance of $2h/3$ from the base.



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UNIT 09: ALGEBRA & TRIGONOMETRY**ANSWER AND EXPLANATION**Q1. What is the value of $(a + b)^2 - (a - b)^2$?

- A) $2ab$
 B) $4ab$
 C) $a^2 + b^2$
 D) $a^2 - b^2$

Answer: B**Explanation:** $(a + b)^2 - (a - b)^2 = a^2 + 2ab + b^2 - (a^2 - 2ab + b^2) = 4ab$ Q2. Simplify: $3x(2x - 5) - 4x(3x + 1)$

- A) $-6x^2 - 19x$
 B) $-6x^2 - 13x$
 C) $6x^2 - 19x$
 D) $-6x^2 + 13x$

Answer: B**Explanation:** $3x(2x - 5) = 6x^2 - 15x$ $4x(3x + 1) = 12x^2 + 4x$ **Now,** $6x^2 - 15x - 12x^2 - 4x = -6x^2 - 19x$ Q3. If $x^2 - 5x + 6 = 0$, then the value of x is:

- A) 2, 3
 B) -2, -3
 C) 1, 6
 D) 3, -2

Answer: A

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Explanation: Factoring: $x^2 - 5x + 6 = (x - 2)(x - 3) \Rightarrow x = 2, 3$ Q4. The value of $81^{1/4}$ is:

- A) 2
 B) 3
 C) 9
 D) 4

Answer: B**Explanation:** $81 = 3^4 \Rightarrow 81^{1/4} = (3^4)^{1/4} = 3$

Q5. Which is a correct identity?





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UNIT 10: ESTIMATION AND COSTING, PROFIT AND LOSS

QUESTION

Q1. What is the term used for the method of calculating various quantities and expenditure on a particular job or process?

A) Estimation
B) Drawing
C) Specification
D) Plan

Q2. Which authority publishes the schedule of rates used in estimation?

A) Individual
B) Corporate
C) Partnership firm
D) Government department

Q3. What is the main factor to be considered while preparing a detailed estimate?





A) Shape of material
B) Brand of the materials
C) Quantity, availability, and transportation of materials
D) Location of material

Q4. What is the term for an estimate that falls short of the actual expenditure?


A) Overestimate
B) Underestimate
C) Accurate estimate

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D) Revised estimate

Q5. What is the most reliable type of estimate?


A) Preliminary estimate
B) Plinth area estimate
C) Cube rate estimate
D) Detailed estimate

Q6. Alfred buys an old scooter for Rs. 4,700 and spends Rs. 800 on its repairs. If he sells the scooter for Rs. 5,800, his gain percent is:

A) 4.4%



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UNIT 10: ESTIMATION AND COSTING, PROFIT AND LOSS

ANSWER AND EXPLANATION

Q1. What is the term used for the method of calculating various quantities and expenditure on a particular job or process?

A) Estimation
B) Drawing
C) Specification
D) Plan

Answer: A

Explanation: Estimation involves calculating the quantities and costs required for a specific job or process.

Q2. Which authority publishes the schedule of rates used in estimation?

A) Individual
B) Corporate
C) Partnership firm
D) Government department

Answer: D

Explanation: Government departments publish the schedule of rates, which are standardized rates for various items of work.

Q3. What is the main factor to be considered while preparing a detailed estimate?

A) Shape of material
B) Brand of the materials
C) Quantity, availability, and transportation of materials
D) Location of material

Answer: C





Explanation: Accurate estimation requires considering the quantity, availability, and transportation costs of materials.

Q4. What is the term for an estimate that falls short of the actual expenditure?

A) Overestimate
B) Underestimate
C) Accurate estimate
D) Revised estimate


Answer: B

Explanation: An underestimate occurs when the estimated cost is less than

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Answer: C

Explanation: Accurate estimation requires considering the quantity, availability, and transportation costs of materials.

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