ELEMENTARY MATHEMATICS

Time: **3 Hours**   Full Marks: **100**

Instructions :   (1) *Answer **all** questions.*

(2) *The figures in the right-hand margin indicate full marks for the questions.*

1. Answer the following questions :   **1×10=10**

    (a) What is the additive inverse of −14?

    (b) Calculate $\left(2^3\right)^5$

    (c) Solve $\dfrac{x^3 \times x^5}{x^2}$

    (d) Find the angle which is $\dfrac{2}{3}$ rd of its complement.

    (e) The mean of three numbers is 10. The mean of other four numbers is 12. Find the mean of the numbers.

    (f) If $\dfrac{2x-1}{3} = \dfrac{x-2}{3} + 1$, find the value of x.

    (g) Cost of an item is ₹50. It was sold with a profit of 12%. Find the selling price.

    (h) Evaluate the following :

$$2 - \frac{1}{2} \text{ of } 4$$

    (i) 8% children of a class of 25 like getting wet in the rain. How many children like getting wet in the rain?

    (j) A rectangular park is 45 m long and 30 m wide. A path 2.5 m wide is constructed outside the park. Find the area of the path.

2. Answer the following questions :   **3×5=15**

    (a) Two poles of height 9 m and 14 m stand upright on the plane ground. If the distance between their tops is 13 m, find the distance between their feet.

    (b) Factorize $a^9 + b^9 + 3a^6 b^3 + 3a^3 b^6$

(c) The height, curved surface area and volume of a cone are h, c and v respectively. Prove that $3\pi v h^3 - c^2 h^2 + 9v^2 = 0$

(d) The sides of a triangle are 12 cm, 16 cm and 20 cm. Find its area.

(e) If $p = 5 + 2\sqrt{6}$ and $x = \dfrac{1}{p}$, then what will be the value of $p^2 + x^2$?

3. Answer any *five* of the following questions :   7×5=35

(a) The capacity of a closed cylindrical vessel of height 1m is 15.4 litres. How much m^2 of metal sheet is needed to make it?

(b) Factorize $(x+2)^2 + p^2 + 2p(x+2)$

(c) The radius and slant height of a cone are in the ratio 4:7. If its curved surface area is 792 cm^2, find the radius.

(d) ₹800 amounts to ₹920 in 3 years at simple interest. If the interest rate is increased by 3%, it would amount to how much?

(e) At what price must Kantilal sell a mixture of 80 kg sugar at ₹6.75 per kg with 120 kg at ₹8 per kg to gain 20%?

(f) The ratio of Vimal's age and Aruna's age is 3:5 and sum of their ages is 80 years. What will be the ratio of their ages after 10 years?

(g) The sum of seven numbers is 235. The average of the first three is 23 and that of the last three is 42. Find the fourth number.

4. Answer any *four* of the following questions :   10×4=40

(a) If 12 persons can do $\dfrac{3}{5}$ of a certain work in 10 days, then how many persons are required to finish the whole work in 20 days?

(b) Find the value of $\dfrac{(625)^{6.25} \times (25)^{2.6}}{(625)^{6.25} \times (5)^{1.2}}$

(c) A third of Vinod's marks in mathematics exceeds a half of his marks in social studies by 30. If he got 240 marks in the two subjects together, how many marks did he get in social studies?

(d) If $x = 5 + \sqrt[3]{25} - \sqrt[3]{5}$, find the value of $x^3 - 15x^2 + 90x$.

(e) $\left(2 - \dfrac{b^2 + c^2 - a^2}{bc}\right) \div \left(2 + \dfrac{a^2 + b^2 - c^2}{ab}\right) = ?$

(f) A train crosses a platform 100 metres long in 60 seconds at a speed of 45 km per hour. Calculate the time taken by the train to cross an electric pole.

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