[147]

*** Questions With Calculation.[3 Marks Each]**

1. Find the value of :$(2^{-1} \times 4^{-1}) \div 2^{-2}$
2. Evaluate :$\left(\frac{5}{8}\right)^{-7} \times \left(\frac{8}{5}\right)^{-4}$
3. Find the value of :$\left\{\left(\frac{-2}{3}\right)^{-2}\right\}^{2}$
4. Find the value of :$\left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2}$
5. In a stack there are 5 books each of thickness 20 mm and 5 paper sheets each of thickness 0.016 mm. What is the total thickness of the stack?
6. $\frac{125 \times x^{-3}}{5^{-3} \times 25 \times x^{-6}}$
7. $5^x + 5^{x-1} = 750$
8. About 230 billion litres of water flows through a river each day. How many litres of water flows through that river in a week? How many litres of water flows through the river in an year? Write your answer in standard notation.
9. Express the following in standard form:
   Express 2 years in seconds.
10. Find the value of x, so that:
    $(-2)^3 \times (-2)^{-6} = (-2)^{2x-1}$
11. Find three repeater machines that will do the same work as a (x64) machine. Draw them, or describe them using exponents.
12. Find the value of x, so that:
    $(2^{-1} + 4^{-1} + 6^{-1} + 8^{-1})^x = 1$
13. Simplify:
    $\frac{(3^{-2})^2 \times (5^2)^{-3} \times (t^{-3})^2}{(3^{-2})^5 \times (5^3)^{-2} \times (t^{-4})^3}$
14. $\frac{16 \times 10^2 \times 64}{2^4 \times 4^2}$
15. Simplify:
    $\left(\frac{4}{13}\right)^4 \times \left(\frac{13}{7}\right)^2 \times \left(\frac{7}{4}\right)^3$
16. Find the value of x, so that:
    $\left(\frac{5}{3}\right)^{-2} \times \left(\frac{5}{3}\right)^{-14} = \left(\frac{5}{3}\right)^{8x}$
17. If $5^{3x-1} \div 25 = 125$, find the value of x.
18. Find the value of x^{-3} if $x = (100)^{1-4} \div (100)^0$.
19. By what number should $\left(\frac{-3}{2}\right)^{-3}$ be divided so that the quotient may be $\left(\frac{4}{27}\right)^{-2}$?
20. Find x.
    $-\frac{2}{5}^{2x+6} \times \frac{2}{5}^{3} = \frac{2}{5}^{x+2}$
21. Find x.
    $\frac{-6^{x-7}}{7} = 1$
22. Find x.
    $-\frac{1}{7}^{-5} + -\frac{1}{7}^{-7} = (-7)^x$
23. If $\frac{5^m \times 5^3 \times 5^{-2}}{5^{-5}} = 5^{12}$, then find m.
24. find the value of n.
    $\frac{2^n \times 2^6}{2^{-3}} = 2^{18}$

25. Simplify:

$\left(\left(\frac{-2}{3}\right)^{-2}\right)^{3} \times \left(\frac{1}{3}\right)^{-4} \times 3^{-1} \times \frac{1}{6}$

26. Find × so that $\left(\frac{2}{9}\right)^{3} \times \left(\frac{2}{9}\right)^{-6} = \left(\frac{2}{9}\right)^{2x-1}$

27. Find x.

$2^x + 2^x + 2^x = 192$

28. By what number should $(-15)^{-1}$ be divided so that quotient may be equal to $(-5)^{-1}$?

29. The number of red blood cells per cubic millimetre of blood is approximately 5.5 million. If the average body contains 5 litres of blood, what is the total number of red cells in the body? Write the standard form. (1 litre = 1,00,000mm^3)

30. By what number should $\left(\frac{1}{2}\right)^{-1}$ be multiplied so that the product may be equal to $\left(\frac{-4}{7}\right)^{-1}$?

31. Find x, if

$\left(\frac{8}{3}\right)^{2x+3} \times \left(\frac{8}{3}\right)^{5} = \left(\frac{8}{3}\right)^{x+2}$

32. Find the value of x for which $5^{2x} \div 5^3 = 5^5$.

33. By what number should $(-15)^{-1}$ be ddivded so that the quotient may be equal to $(-15)^{-1}$?

34. If $x = \left(\frac{3}{2}\right)^{2} \times \left(\frac{2}{3}\right)^{-4}$, find the value of x^{-2}

35. If $x = \left(\frac{4}{5}\right)^{-2} \div \left(\frac{1}{4}\right)^{2}$, find the value of x^1

36. Simplify:

$\left\{\left(\frac{2}{3}\right)\right\} \times \left(\frac{1}{3}\right)^{-4} \times 3^{-1} \times 6^{-1}$

37. Find x, if

$\left(\frac{1}{2}\right)^{-19} \div \left(\frac{-1}{2}\right)^{8} = \left(\frac{-1}{2}\right)^{-2x+1}$

38. By what number should $\left(\frac{5}{3}\right)^{-2}$ be multiplied so that the product may be $\left(\frac{7}{3}\right)^{-1}$?

39. Find x, if

$\left(\frac{2}{5}\right)^{-3} \times \left(\frac{3}{2}\right)^{15} = \left(\frac{2}{5}\right)^{2x+1}$

40. Find x, if

$\left(\frac{3}{5}\right)^{-3} \times \left(\frac{3}{2}\right)^{5} = \left(\frac{3}{2}\right)^{2x+1}$

41. Simplify: $(3^{-1} + 6^{-1}) \div \left(\frac{3}{4}\right)^{-1}$

42. Mass of earth is (5.97×10^{24})kg and mass of moon is (7.35×10^{22})kg. What is the total mass of the two?

43. If $5^{2x+1} \div 25 = 125$, find the value of x.

44. Find the value of x for which $\left(\frac{4}{9}\right)^{4} \times \left(\frac{4}{9}\right)^{-7} = \left(\frac{4}{9}\right)^{2x-1}$

45. Find the value of x for which $\left(\frac{5}{3}\right)^{-4} \times \left(\frac{5}{3}\right)^{-5} = \left(\frac{5}{3}\right)^{3x}$

46. In a stack, there are 5 books each of thickness 20 mm and 5 paper sheets each of thickness 0.016 mm . What is the total thickness of the stack?

47. The cells of a bacteria double in every 30 min . A scientist begins with a single cell.
(i) How many cells will be there after
(a) 10 h ? (b) 25 h ?
(ii) What type of value is depicted by the cells of bacteria?

48. Find the value of x^{-3}, if $x = (100)^{1-4} + (100)^0$.

49. Consider a quantity of a radioactive substance. The fraction of this quantity that remains after t half-lives can be found using the expression 3^{-t}.

(i) What fraction of substance remains after 7 half-lives ?

(ii) After how many half-lives, will the fraction be $\frac{1}{243}$ of the original ?

[25]

*** Questions With Calculation.[5 Marks Each]**

50. Simplify : $\frac{3^{-5}\times 10^{-5}\times 125}{5^{-7}\times 6^{-5}}$

51. Simplify : $\frac{25\times t^{-4}}{5^{-3}\times 10\times t^{-8}}(t\neq 0)$

52. Find the value of

(i) $\left(3^{0}+4^{-1}\right)\times 2^{2}$

(ii) $\left(2^{-1}\times 4^{-1}\right)+2^{-2}$

(iii) $\left(\frac{1}{2}\right)^{-2}+\left(\frac{1}{3}\right)^{-2}+\left(\frac{1}{4}\right)^{-2}$

(iv) $\left(3^{-1}+4^{-1}+5^{-1}\right)^{0}$

(v) $\left\{\left(\frac{-2}{3}\right)^{-2}\right\}^{2}$

53. Express the following numbers in usual form.

(i) 3.02×10^{-6}

(ii) 4.5×10^{4}

(iii) 3×10^{-8}

(iv) 1.0001×10^{9}

(v) 5.8×10^{12}

(vi) 3.61492×10^{6}

54. Express the number appearing in the following statements in standard form.

(i) 1 micron is equal to $\frac{1}{1000000}m$.

(ii) Charge of an electron is 0.00000000000000000016 coulomb.

(iii) Size of a bacteria is 0.0000005 m .

(iv) Size of a plant cell is 0.00001275 m .

(v) Thickness of a thick paper is 0.07 mm .

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