Chapter- 4

POWERS

QUESTION BANK

Multiple Choice Questions (MCQs)

Question 1:
$[(-3)^2]^3$ is equal to
(a) $(-3)^8$ (b) $(-3)^6$
(c) $(-3)^5$ (d) $(-3)^{23}$

Question 2:
For a non-zero rational number x, $x^8 \div x^2$ is equal to
(a) x^4 (b) x^6 (c) x^{10} (d) x^{16}

Question 3:
x is a non-zero rational number. Product of the square of x with the cube of x is equal to the
(a) second power of x (b) third power of x
(c) fifth power of x (d) sixth power of x

Question 4:
For any two non-zero rational numbers x and y, $x^5 \div y^5$ is equal to
(a) $(x \div y)^1$ (b) $(x \div y)^0$
(c) $(x \div y)^5$ (d) $(x \div y)^{10}$

Question 5:
$a^m \times a^n$ is equal to
(a) $(a^2)^{mn}$ (b) a^{m-n}
(c) a^{m+n} (d) a^{mn}

Question 6:
$(1° + 2° + 3°)$ is equal to
(a) 0 (b) 1 (c) 3 (d) 6

Question 7:
The value of $\frac{10^{22} + 10^{20}}{10^{20}}$ is
(a) 10 (b) 10^{42} (c) 101 (d) 10^{22}

Question 8:
The standard form of the number 12345 is
(a) 1234.5×10^1 (b) 123.45×10^2
(c) 12.345×10^3 (d) 1.2345×10^4

Question 9:

If $2^{1998} - 2^{1997} - 2^{1996} + 2^{1995} = k \cdot 2^{1995}$, then the value of k is

(a) 1 (b) 2
(c) 3 (d) 4

Question 10:

Which of the following is equal to 1?
(a) 2° + 3° + 4° (b) 2° x 3° x 4°
(c) (3° -2°) x 4° (d) (3° – 2°) x (3° + 2°)

Question 11:

In standard form, the number 72105.4 is written as 7.21054×10^n, where n is equal to
(a) 2 (b) 3 (c) 4 (d) 5

Question 12:

Square of [-2/3] is

(a) $\frac{-2}{3}$ (b) $\frac{2}{3}$ (c) $\frac{-4}{9}$ (d) $\frac{4}{9}$

Question 13:

The cube [-1/4] is

(a) $\frac{-1}{12}$ (b) $\frac{1}{16}$ (c) $\frac{-1}{64}$ (d) $\frac{1}{64}$

Question 14:

Which of the following is not equal to $\left(\frac{-5}{4}\right)^4$?

(a) $\frac{(-5)^4}{4^4}$ (b) $\frac{5^4}{(-4)^4}$
(c) $-\frac{5^4}{4^4}$ (d) $\left(-\frac{5}{4}\right) \times \left(-\frac{5}{4}\right) \times \left(-\frac{5}{4}\right) \times \left(-\frac{5}{4}\right)$

Question 15:

Which of the following is not equal to 1?

(a) $\frac{2^3 \times 3^2}{4 \times 18}$ (b) $[(-2)^3 \times (-2)^4] \div (-2)^7$

(c) $\frac{3^0 \times 5^3}{5 \times 25}$ (d) $\frac{2^4}{(7^0 + 3^0)^3}$

Question 16:

$\left(\frac{2}{3}\right)^3 \times \left(\frac{5}{7}\right)^3$ is equal to

(a) $\left(\frac{2}{3} \times \frac{5}{7}\right)^9$ (b) $\left(\frac{2}{3} \times \frac{5}{7}\right)^6$ (c) $\left(\frac{2}{3} \times \frac{5}{7}\right)^3$ (d) $\left(\frac{2}{3} \times \frac{5}{7}\right)^0$

Question 17:

In standard form, the number 829030000 is written as K x 10^8, where K is equal to

(a) 82903 (b) 829.03 (c) 82.903 (d) 8.2903

Question 18:

Which of the following has the largest value?

(a) 0.0001 (b) $\frac{1}{10000}$

(c) $\frac{1}{10^6}$ (d) $\frac{1}{10^6} + 0.1$

Question 19:

In standard form 72 crore is written as

(a) 72 x 10^7 (b) 72 x 10^8 (c)7.2 x 10^8 (d)7.2 x 10^7

Question 20:

For non-zero numbers a and b, $\left(\frac{a}{b}\right)^m + \left(\frac{a}{b}\right)^n$, where $m > n$, is equal to

(a) $\left(\frac{a}{b}\right)^{mn}$ (b) $\left(\frac{a}{b}\right)^{m+n}$ (c) $\left(\frac{a}{b}\right)^{m-n}$ (d) $\left(\left(\frac{a}{b}\right)^m\right)^n$

Question 21:

Which of the following is not true?

(a) $3^2 > 2^3$ (b) $4^3 = 2^6$ (c)$3^3 = 9$ (d) $2^5 > 5^2$

Question 22:

Which power of 8 is equal to 2^6?

(a) 3 (b) 2 (c) 1 (d) 4

ill in the Blank

In questions 23 to 39, fill in the blanks to make the statements True .

Question 23:

$(-2)^{31} \times (-2)^{13} = (-2)^{\_\_}$

Question 24:

$(-3)^8 \div (-3)^5 = (-3)^{\_\_}$

Question 25:

$\left(\frac{11}{15}\right)^4 \times (\_\_\_\_)^5 = \left(\frac{11}{15}\right)^9$

Question 26:

$\left(\frac{-1}{4}\right)^3 \times \left(\frac{-1}{4}\right)^{\_\_} = \left(\frac{-1}{4}\right)^{11}$

Question 27:

$\left[\left(\frac{7}{11}\right)^3\right]^4 = \left(\frac{7}{11}\right)^{\_\_}$

Question 28:

$\left(\frac{6}{13}\right)^{10} \div \left[\left(\frac{6}{13}\right)^5\right]^2 = \left(\frac{6}{13}\right)^{\_\_}$

Solution:

Question 29:

$$\left[\left(\frac{-1}{4}\right)^{16}\right]^{2} = \left(\frac{-1}{4}\right)^{\_\_}$$

Question 30:

$$\left(\frac{13}{14}\right)^{5} + (\_\_)^{2} = \left(\frac{13}{14}\right)^{3}$$

Question 31:

$a^6 \times a^5 \times a^\circ = a^{\_\_}$

Question 32:

1 lakh = $10^{\_\_}$

Question 33:

1 million = $10^{\_\_}$

Question 34:

729 = $3^{\_\_}$

Question 35:

432 = $2^4 \times 3^{\_\_}$

Question 36:

53700000 = ___ x 10^7

Question 37:

88880000000 = ___ x 10^{10} .

Question 38:

27500000 = 2.75 x $10^{\_\_}$

Question 39:

340900000 = 3.409 x $10^{\_\_}$

Question 40:

(a) 3^2 _____ 15

(b) 2^3 _____ 3^2

(c) 7^4 _____ 5^4

(d) 10000 _____ 10^5

(e) 6^3 _____ 4^4

True/ False

In questions 41 to 65, state whether the given statements are True or False.

Question 41:

One million = 10^7

Question 42:

One hour = 60^2 seconds

Question 43:

$1° \times 0^1 = 1$

Question 44:

$(-3)^4 = -12$

Question 45:

$3^4 > 4^3$

Question 46:

$$\left(\frac{-3}{5}\right)^{100} = \frac{-3^{100}}{-5^{100}}$$

Question 47:

$(10 + 10)^{10} = 10^{10} + 10^{10}$

Question 48:

$x° \times x° = x° + x°$ is true for all non-zero values of x.

Question 49:

In the standard form, a large number can be expressed as a decimal number between 0 and 1, multiplied by a power of 10.

Question 50:
4^2 is greater than 2^4.

Question 51:
$x^m + x^m = x^{2m}$, where x is a non-zero rational number and m is a positive integer.

Question 52:
$x^m \times y^m = (x \times y)^{2m}$, where x and y are non-zero rational numbers and m is a positive integer.

Question 53:
$x^m \div y^m = (x \div y)^m$, where x and y are non-zero rational numbers and m is a positive integer.

Question 54:
$a^m \times a^n = a^{m+n}$, where x is a non-zero rational number and m, n are positive integers.

Question 55:
4^9 is greater than 16^3.

Question 56:
$$\left(\frac{2}{5}\right)^3 \div \left(\frac{5}{2}\right)^3 = 1$$

Question 57:
$$\left(\frac{4}{3}\right)^5 \times \left(\frac{5}{7}\right)^5 = \left(\frac{4}{3} \div \frac{5}{7}\right)^5$$

Question 58:
$$\left(\frac{5}{8}\right)^9 \div \left(\frac{5}{8}\right)^4 = \left(\frac{5}{8}\right)^4$$

Question 59:
$$\left(\frac{7}{3}\right)^2 \times \left(\frac{7}{3}\right)^5 = \left(\frac{7}{3}\right)^{10}$$

Question 60:
$5° \times 25° \times 125° = (50)6$

Question 61:
$876543 = 8 \times 10^5 + 7 \times 10^4 + 6 \times 10^3 + 5 \times 10^2 + 4 \times 10^1 + 3 \times 10°$

Question 62:
$600060 = 6 \times 10^5 + 6 \times 10^2$

Question 63:
$4 \times 10^5 + 3 \times 10^4 + 2 \times 10^3 + 1 \times 10° = 432010$

Question 64:
$8 \times 10^6 + 2 \times 10^4 + 5 \times 10^2 + 9 \times 10° = 8020509$

Question 65:
$4° + 5° + 6° = (4 + 5 + 6)°$

Question 66:
Arrange in ascending order.
2^5, 3^3, $2^3 \times 2$, $(3^3)^2$, 3^5, $4°$, $2^3 \times 3^1$

Question 67:
Arrange the following exponents in descending order. 2^{2+3} , $(2^2)^3$, (2×2^2) , $3^5/3^2$, $(3^2 \times 3^0)$, $(2^2 \times 5^2)$.

Question 68:
By what number should $(-4)^5$ be divided so that the quotient may be equal to $(-4)^3$?

Question 69:
Find m, so that $\left(\frac{2}{9}\right)^3 \times \left(\frac{2}{9}\right)^6 = \left(\frac{2}{9}\right)^{2m-1}$.

Question 70:
If $\frac{p}{q} = \left(\frac{3}{2}\right)^2 \div \left(\frac{9}{4}\right)^0$, find the value of $\left(\frac{p}{q}\right)^3$.

Question 71:

Find the reciprocal of the rational number $\left(\frac{1}{2}\right)^2 \div \left(\frac{2}{3}\right)^3$.

Question 72:

Find the value of

(a) 7^0 (b) $7^7 \div 7^7$

(c) $(-7)^{2\times7-6-8}$ (d) $(2^0+3^0+4^0)(4^0-3^0-2^0)$

(e) $2\times3\times4\div2^0\times3^0\times4^0$ (f) $(8^0-2^0)\times(8^0+2^0)$

Question 73:

Find the value of n, where n is an integer and $2^{n-5}\times6^{2n-4}=\frac{1}{12^4\times2}$.

Question 74:

Express the following in usual form.

(a) 8.01×10^7 (b) 1.75×10^{-3}

Question 75:

Find the value of

(a) 2^5 (b)(-3^5) (c) $-(-4^4)$

Question 76:

Express the following in exponential form.

(a)3 x 3 x 3 x a x a x a x a (b) a x a x b x b x b x c x c x c x c x c (c) s x s x t x t x s x s x t

Question 77:

How many times of 30 must be added together to get a sum equal to 30^7.

Question 78:

Express each of the following numbers using exponential notations,

(a) 1024 (b) 1029 (c) $\frac{144}{875}$

Using prime factorization of 1024, we have

Question 79:
Identify the greater number, in each of the following.
(a) 2^6 or 6^2 (b) 2^9 or 9^2 (c) 7.9×10^4 or 5.28×10^5

Question 80:
Express each of following as a product of powers of their prime factors,
(a) 9000 (b) 2025 (c) 800

Question 81:
Express each of the following in single exponential form,
(a) $2^3 \times 3^3$
(b) $2^4 \times 4^2$
(c) $5^2 \times 7^2$
(d) $(-5)^5 \times (-5)$
(e) $(-3)^3 \times (-10)^3$
(f) $(-11)^2 \times (-2)^2$

Question 82:
Express the following numbers in standard form.
(a) 76,47,000 (b) 8,19,00,000
(c) 5,83,00,00,00,000 (d) 24 billion

Question 83:
The speed of light in vacuum is 3×10^8 m/s. Sunlight takes about 8 minutes to reach the Earth. Express distance of Sun from Earth in standard form.

Question 84:
Simplify and express each of the following in exponential form.

(a) $\left[\left(\frac{3}{7}\right)^4 \times \left(\frac{3}{7}\right)^5\right] \div \left(\frac{3}{7}\right)^7$ (b) $\left[\left(\frac{7}{11}\right)^5 \div \left(\frac{7}{11}\right)^2\right] \times \left(\frac{7}{11}\right)^2$

(c) $(3^7 \div 3^5)^4$ (d) $\left(\frac{a^6}{a^4}\right) \times a^5 \times a^0$

(e) $\left[\left(\frac{3}{5}\right)^3 \times \left(\frac{3}{5}\right)^8\right] \div \left[\left(\frac{3}{5}\right)^2 \times \left(\frac{3}{5}\right)^4\right]$

(f) $(5^{15} \div 5^{10}) \times 5^5$

Question 85:

Evaluate

(a) $\frac{7^8 \times a^{10} b^7 c^{12}}{7^6 \times a^8 b^4 c^{12}}$

(b) $\frac{5^4 \times 7^4 \times 2^7}{8 \times 49 \times 5^3}$

(c) $\frac{125 \times 5^2 \times a^7}{10^3 \times a^4}$

(d) $\frac{3^4 \times 12^3 \times 36}{2^5 \times 6^3}$

(e) $\left(\frac{6 \times 10}{2^2 \times 5^3}\right)^2 \times \frac{25}{27}$

(f) $\frac{15^4 \times 18^3}{3^3 \times 5^2 \times 12^2}$

(g) $\frac{6^4 \times 9^2 \times 25^3}{3^2 \times 4^2 \times 15^6}$

Question 86:

Express the given information in Scientific notation (standard form) and then arrange them in ascending order of their size.

S. N.	Deserts of the World	Area (in sq km)
1.	Kalahari, South Africa	932,400
2.	Thar, India	199,430
3.	Gibson, Australia	155,400
4.	Great Victoria, Australia	647,500
5	Sahara, North Africa	8,598,800

Question 87:

Express the given information in scientific notation and then arrange them in descending order of their size.

S. N.	Name of the planet	Mass (in kg)
1.	Mercury	330000000000000000000000
2.	Venus	4870000000000000000000000
3.	Earth	5980000000000000000000000
4.	Mars	642000000000000000000000
5.	Jupiter	1900000000000000000000000000
6.	Saturn	569000000000000000000000000
7.	Uranus	86900000000000000000000000
8.	Neptune	102000000000000000000000000
9.	Pluto	13100000000000000000000

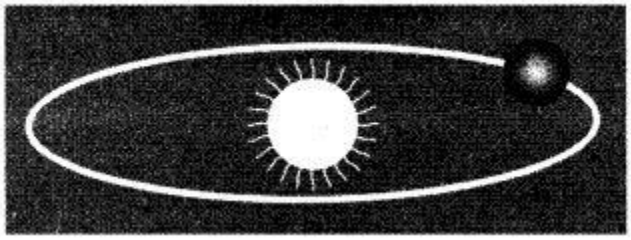
Question 88:
Write the number of seconds in scientific notation.

S. N.	Unit	Value in seconds
1.	1 minute	60
2.	1 hour	3,600
3.	1 day	86,400
4.	1 month	2,600,000
5.	1 year	32,000,000
6.	10 years	3,20,000,000

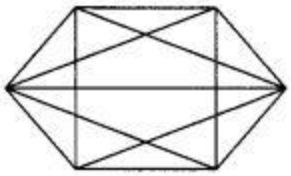
Question 89:
In our own planet Earth, 361,419,000 square kilometre of area is covered with water and 148,647,000 square kilometre of area is covered by land. Find the approximate ratio of area covered with water to area covered by land converting these numbers into scientific notation.

Question 90:
If $2^{n+2} + 2^{n+1} + 2n = c \times 2^n$, then find c.

Question 91:
A light year is the distance that light can travel in one year.
1 light year = 9,460,000,000,000 km.
(a) Express one light year in scientific notation.
(b) The average distance between Earth and Sun is 1.496×10^8 km. Is the distance between Earth and the Sun greater than, less than or equal to one light year?



Question 92:
Geometry Application
The number of diagonals of an n-sided figure is $\frac{1}{2}(n^2 - 3n)$. Use the formula to find the number of diagonals for a 6-sided figure (hexagon).



Question 93:

Life Science

Bacteria can divide in every 20 minutes. So, 1 bacterium can multiply to 2 in 20 minutes, 4 in 40 minutes, and so on. How many bacteria will there be in 6 hours? Write your answer using exponents, then evaluate.

Most Bacteria reproduce by a type of simple cell division known as binary fission. Each species reproduce best at a specific temperature and moisture level.

Question 94:

Blubber makes up 27 per cent of a blue whale's body weight. Deepak found the average weight of blue whales and used it to calculate the average weight of their blubber. He wrote the amount as 22 x 32 x 5 x 17 kg. Evaluate this amount.

Question 95:

Life Science Application

The major components of human blood are red blood cells, white blood cells, platelets and plasma. A typical red blood cell has a diameter of approx 7×10^{-6} metre. A typical platelet has a diameter of approximately 2.33×10^{-6} metre.

Which has a greater diameter, a red blood cell or a platelet?

Question 96:
A googol is the number 1 followed by 100 zeroes.
(a) How is a googol written as a power?
(b) How is a googol times a googol written as a power?

Question 97:
What's the Error?
A student said that $3^5/5^5$ is the same as 1/3. What mistake has the student made?