

Class:X

Mathematics

Marks:100

Date:

Time:3.00hrs

I choose the correct Answer

14x1=14

- (1) If $f: A \rightarrow B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to
(1) 7 (2) 49 (3) 1 (4) 14
- (2) If $f \circ f(k) = 5$ where, $f(k) = 2k - 1$ Find k .
(1) 0 (2) 1 (3) 2 (4) 4
- (3) The first term of an arithmetic progression is unity and the common difference is 4. Which of the following will be a term of this A.P.
(1) 4551 (2) 10091 (3) 7881 (4) 13531
- (4) The sum of the exponents of the prime factors in the prime factorization of 1729 is
(1) 1 (2) 2 (3) 3 (4) 4
- (5) In the expression: $\frac{x}{x^2+1}$, the excluded value is
(1) $x^2 + 1$ (2) no real (3) zero (4) x
- (6) When proving that a quadrilateral is a trapezium, it is necessary to show
(1) Two sides are parallel. (2) Two parallel and two non-parallel sides.
(3) Opposite sides are parallel. (4) All sides are of equal length.
- (7) If number of columns and rows are not equal in a matrix then it is said to be a
(1) diagonal matrix (2) rectangular matrix (3) square matrix (4) identity matrix
- (8) A tower is 60 m high. Its shadow is x metres shorter when the sun's altitude is 45° than when it has been 30° , then x is equal to
(1) 41.92 m (2) 43.92 m (3) 43 m (4) 45.6 m
- (9) A shuttle cock used for playing badminton has the shape of the combination of
(1) a cylinder and a sphere (2) a hemisphere and a cone
(3) a sphere and a cone (4) frustum of a cone and a hemisphere
- (10) Two poles of heights 6 m and 11 m stand vertically on a plane ground. If the distance between their feet is 12 m, what is the distance between their tops?
(1) 13 m (2) 14 m (3) 15 m (4) 12.8 m
- (11) The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be
(1) 12 cm (2) 10 cm (3) 13 cm (4) 5 cm
- (12) $\frac{\sec A}{\sin A} - \frac{\operatorname{cosec} A}{\cos A} =$
(1) $\cos A$ (2) $\sin A$ (3) $\cot A$ (4) $\tan A$
- (13) If A and B are mutually exclusive events then $P(A \cap B) =$
(1) 0 (2) 1 (3) 0.1 (4) $\frac{1}{2}$
- (14) The sum of all deviations of the data from its mean is
(1) Always positive (2) always negative (3) zero (4) non-zero integer.

II Answer the following (question no.28 is compulsory)**(10x2=20)**

- (15) Let $A = \{1, 2, 3\}$ and $B = \{x \mid x \text{ is a prime number less than } 10\}$.
Find $B \times A$ and $A \times B$.
- (16) Which term of an A.P. 16, 11, 6, 1, ... is -54 ?
- (17) If $\begin{bmatrix} 3x + 7 & 5 \\ y + 1 & 2 - 3x \end{bmatrix} = \begin{bmatrix} 1 & y - 2 \\ 8 & 8 \end{bmatrix}$, then find the value of x and y .
- (18) Simplify: $\frac{2x}{2x-5} + \frac{5}{5-2x}$
- (19) A man goes 18 m due east and then 24 m due north. Find the distance of his current position from the starting point?
- (20) find the value of 'a' for the given points(2, 3), (4, a) and (6, -3) are collinear
- (21) Find the equation of the straight line passing through the point(-2,3) with slope $\frac{1}{3}$.
- (22) The angle of depression of the top and bottom of 20 m tall building from the top of a multistoried building are 30° and 60° respectively. Find the height of the multistoried building (in metres) is
- (23) If the total surface area of a cone of radius 7cm is 704 cm^2 , then find its slant height.
- (24) If the circumference of a conical wooden piece is 484 cm then find its volume when its height is 105 cm.
- (25) Find the volume of a sphere –shaped metallic shot put having diameter of 8.4cm.
- (26) Find the standard deviation of first 21 natural numbers.
- (27) What is the probability that a leap year selected at random will contain 53 saturdays
- (28) Prove $\sqrt{\frac{1-\sin \theta}{1+\sin \theta}} = \sec \theta - \tan \theta$.

III Answer the following (question no.42 is compulsory)**(10x5=50)**

- (29) Find x if $gff(x) = fgg(x)$, given $f(x) = 3x + 1$ and $g(x) = x + 3$.

- (30) A function $f : [-5, 9] \rightarrow \mathbb{R}$ is defined as follows:

$$f(x) = \begin{cases} 6x + 1 & \text{if } -5 \leq x < 2 \\ 5x^2 - 1 & \text{if } 2 \leq x < 6 \\ 3x - 4 & \text{if } 6 \leq x \leq 9 \end{cases}$$

Find (i) $f(7) - f(1)$ (ii) $\frac{2f(-2) - f(6)}{f(4) + f(-2)}$.

- (31) Find the total area of 14 squares whose sides are 11 cm, 12 cm, ..., 24 cm, respectively.
- (32) The product of three consecutive terms of a Geometric Progression is 343 and their sum is $\frac{91}{3}$. Find the three terms
- (33) The sum of the digits of a three-digit number is 11. If the digits are reversed, the new number is 46 more than five times the former number. If the hundreds digit plus twice the tens digit is equal to the units digit, then find the original three digit number
- (34) If $9x^4+12x^3+28x^2+ax+b$ is a perfect square, find the values of a and b .

(35) Given $A = \begin{pmatrix} p & 0 \\ 0 & 2 \end{pmatrix}$, $B = \begin{pmatrix} 0 & -q \\ 1 & 0 \end{pmatrix}$, $C = \begin{pmatrix} 2 & -2 \\ 2 & 2 \end{pmatrix}$ and if $BA = C^2$, find p and q .

- (36) State and prove Basic Proportionality Theorem
- (37) If $\operatorname{cosec}\theta + \cot\theta = P$, then prove that $\cos\theta = \frac{P^2-1}{P^2+1}$
- (38) A toy is in the shape of a cylinder surmounted by a hemisphere. The height of the toy is 25 cm. Find the total surface area of the toy if its common diameter is 12 cm.
- (39) A conical flask is full of water. The flask has base radius r units and height h units, the water poured into a cylindrical flask of base radius xr units. Find the height of water in the cylindrical flask
- (40) The following table shows the marks obtained by 48 students in a Quiz competition in Mathematics. Calculate the standard deviation.

data x	6	7	8	9	10	11	12
frequency f	3	6	9	13	8	5	4

- (41) Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8
- (42) Prove analytically that the line segment joining the mid-points of two sides of a triangle is parallel to the third side and is equal to half of its length.

IV Answer the following

(2x8=16)

(43) (a) Draw the two tangents from a point which is 10 cm away from the centre of a circle of radius 5 cm. Also, measure the lengths of the tangents

(OR)

(b) Show that the angle bisectors of a triangle are concurrent

(44) (a) Draw the graph of $y = 2x^2$ and hence solve $2x^2 - x - 6 = 0$

(OR)

(b) If α, β are the roots of the equation $2x^2 - x - 1 = 0$,

then form the equation whose roots are (i) $\alpha^2, \beta, \beta^2, \alpha$ (ii) $\frac{1}{\alpha}, \frac{1}{\beta}$

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