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MODEL QUESTION PAPER 1

Date : 09-Feb-20

10th Standard

MATHEMATICS

Reg.No. :

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Exam Time : 03:00:00 Hrs

Total Marks : 100

14 x 1 = 14

PART 1

CHOOSE THE CORRECT ANSWER.

- 1) $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
 (a) 8 (b) 20 (c) 12 (d) 16
- 2) If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then $f \circ g$ is
 (a) $\frac{3}{2x^2}$ (b) $\frac{2}{3x^2}$ (c) $\frac{2}{9x^2}$ (d) $\frac{1}{6x^2}$
- 3) Euclid's division lemma states that for positive integers a and b , there exist unique integers q and r such that $a = bq + r$, where r must satisfy
 (a) $1 < r < b$ (b) $0 < r < b$ (c) $0 \leq r < b$ (d) $0 < r \leq b$
- 4) Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
 (a) 3 (b) 5 (c) 8 (d) 11
- 5) The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are
 (a) 100, 120 (b) 10, 12 (c) -120, 100 (d) 12, 10
- 6) Which of the following can be calculated from the given matrices $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$.
 (i) A^2
 (ii) B^2
 (iii) AB
 (iv) BA
 (a) (i) and (ii) only (b) (ii) and (iii) only (c) (iii) and (iv) only (d) all of these
- 7) If in triangles ABC and EDF , $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar, when
 (a) $\angle B = \angle E$ (b) $\angle A = \angle D$ (c) $\angle B = \angle D$ (d) $\angle A = \angle F$
- 8) A man walks near a wall, such that the distance between him and the wall is 10 units. Consider the wall to be the Y axis. The path travelled by the man is
 (a) $x = 10$ (b) $y = 10$ (c) $x = 0$ (d) $y = 0$
- 9) When proving that a quadrilateral is a parallelogram by using slopes you must find
 (a) The slopes of two sides (b) The slopes of two pair of opposite sides (c) The lengths of all sides (d) Both the lengths and slopes of two sides
- 10) if $5x = \sec\theta$ and $\frac{5}{x} = \tan\theta$, then $x^2 - \frac{1}{x^2}$ is equal to
 (a) 25 (b) $\frac{1}{25}$ (c) 5 (d) 1
- 11) If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}:1$ then the angle of elevation of the sun has measure
 (a) 45° (b) 30° (c) 90° (d) 60°
- 12) The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be
 (a) 12 cm (b) 10 cm (c) 13 cm (d) 5 cm
- 13) A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units. Then $r_1 : r_2$ is
 (a) 2:1 (b) 1:2 (c) 4:1 (d) 1:4

- 14) The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is
 (a) 3 (b) 15 (c) 5 (d) 225

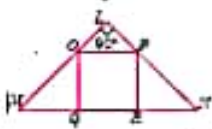
PART II

10 x 2 = 20

ANSWER ANY TEN ONLY.

QUESTION NUMBER 28 IS COMPULSORY.

- 15) Let f be a function from R to R defined by $f(x) = x - 5$. Find the values of a and b given that $(a, 4)$ and $(1, b)$ belong to f .
- 16) If $f(x) = 3x - 2$, $g(x) = 2x + k$ and if $f \circ g = f \circ f$, then find the value of k .
- 17) Find the next three terms of the sequences.
 $1, 0.1, 0.01, \dots$
- 18) Find the next three terms of the following sequence.
 $\frac{1}{4}, \frac{2}{9}, \frac{3}{16}, \dots$
- 19) Reduce each of the following rational expressions to its lowest form.
 $\frac{x^2 - 1}{x^2 + x}$
- 20) Find the LCM of the given expressions.
 $p^2 - 3p + 2, p^2 - 4$
- 21) If figure OPRQ is a square and $\angle MLN = 90^\circ$. Prove that



$$QR^2 = MQ \times RN$$

- 22) Find the value of 'a' for which the given points are collinear.
 $(2, 3), (4, a)$ and $(6, -3)$
- 23) prove that $\sqrt{\frac{1 + \cos \theta}{1 - \cos \theta}} = \operatorname{cosec} \theta + \cot \theta$
- 24) prove the following identities.
 $\cot \theta + \tan \theta = \sec \theta \operatorname{cosec} \theta$
- 25) The ratio of the volumes of two cones is 2:3. Find the ratio of their radii if the height of second cone is double the height of the first.
- 26) A 14 m deep well with inner diameter 10 m is dug and the earth taken out is evenly spread all around the well to form an embankment of width 5 m. Find the height of the embankment.
- 27) If the range and the smallest value of a set of data are 36.8 and 13.4 respectively, then find the largest value.
- 28) A and B are two events such that, $P(A) = 0.42$, $P(B) = 0.48$, $P(A \cap B) = 0.16$. Find (i) $P(\text{not } A)$ (ii) $P(\text{not } B)$ (iii) $P(A \text{ or } B)$

PART II

10 x 5 = 50

ANSWER ANY TEN ONLY.

QUESTION NUMBER 42 IS COMPULSORY.

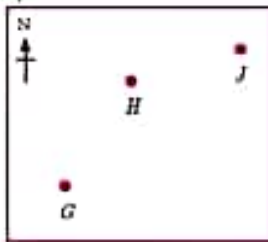
- 29) If the function $f: R \rightarrow R$ defined by

$$f(x) = \begin{cases} 2x + 7, & x < -2 \\ x^2 - 2, & -2 \leq x < 3 \\ 3x - 2, & x \geq 3 \end{cases}$$

- (i) $f(4)$
 (ii) $f(-2)$
 (iii) $f(4) + 2f(1)$
 (iv) $\frac{f(1) - 3f(4)}{f(-3)}$

- 30) Let $A = \{x \in W \mid x < 2\}$, $B = \{x \in N \mid x \leq 4\}$ and $C = \{3, 5\}$. Verify that
 $A \times (B \cap C) = (A \times B) \cap (A \times C)$
- 31) Find the 10th term of a G.P. whose 8th term is 768 and the common ratio is 2
- 32) Find the sum of
 $15^2 + 16^2 + 17^2 + \dots + 28^2$
- 33) A bus covers a distance of 90 km at a uniform speed. Had the speed been 15 km/hour more it would have taken 30 minutes less for the journey. Find the original speed of the bus.
- 34) If $A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix}$, $C = \begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$ verify that $A(B + C) = AB + AC$
- 35) Angle Bisector Theorem?
- 36) The graph relates temperatures y (in Fahrenheit degree) to temperatures x (in Celsius degree) Find the slope and y intercept
- 37) Find the equation of the median and altitude of ΔABC through A where the vertices are $A(6, 2)$, $B(-5, 1)$ and $C(1, 9)$
- 38) An Aeroplane sets off from G on bearing of 24° towards H , a point 250 km away, at H it changes course and heads towards J on a bearing of 55° and a distance of 180 km away.
 How far is H to the north of G ?

$$\begin{pmatrix} \sin 24^\circ = 0.4067 & \sin 11^\circ = 0.1908 \\ \cos 24^\circ = 0.9135 & \cos 11^\circ = 0.9816 \end{pmatrix}$$



- 39) A bird is flying from A towards B at an angle of 35° , a point 30 km away from A . At B it changes its course of flight and heads towards C on a bearing of 48° and distance 32 km away.
 How far is B to the North of A ?
 $[\sin 55^\circ = 0.8192, \cos 55^\circ = 0.5736, \sin 42^\circ = 0.6691, \cos 42^\circ = 0.7431]$
- 40) A shuttle cock used for playing badminton has the shape of a frustum of a cone is mounted on a hemisphere. The diameters of the frustum are 5 cm and 2 cm. The height of the entire shuttle cock is 7 cm. Find its external surface area.
- 41) A hemispherical bowl is filled to the brim with juice. The juice is poured into a cylindrical vessel whose radius is 50% more than its height. If the diameter is same for both the bowl and the cylinder then find the percentage of juice that can be transferred from the bowl into the cylindrical vessel.
- 42) The amount that the children have spent for purchasing some eatables in one day trip of a school are 5, 10, 15, 20, 25, 30, 35, 40. Using step deviation method, find the standard deviation of the amount they have spent.

PART IV

2 x 8 = 16

ANSWER ALL THE QUESTIONS.

- 43) a) Draw the graph of $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$
 (OR)
 b) Draw the graph of $y = 2x^2 - 3x - 5$ and hence solve $2x^2 - 4x - 6 = 0$
- 44) a) Construct a ΔPQR such that $QR = 6.5$ cm, $\angle P = 60^\circ$ and the altitude from P to QR is of length 4.5 cm.
 (OR)
 b) Draw a circle of radius 4 cm. At a point L on it draw a tangent to the circle using the alternate segment.