FIRST PRE BOARD EXAMINATION (2020-21)

CLASS: X

Subject: MATHEMATICS (BASIC - 241) **Date: 04.01.2021**

Time allowed: 3 Hours Maximum Marks: 80

General Instructions:

(1) This question paper contains two parts A and B.

(2) Both Part A and Part B have internal choices.

(3) Please check that this question paper contains **9** printed pages only.

Part – A:

(1) It consists of two sections- I and II

(2) Section I has 16 questions. Internal choice is provided in 5 questions.

(3) Section II has four case study-based questions. Each question has 5 casebased sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part – B:

(1) It consists of three sections- III, IV and V.

(2) Question No 21 to 26 are Very short answer Type questions of 2 marks each.

(3) Question No 27 to 33 are Short Answer Type questions of 3 marks each.

(4) Question No 34 to 36 are Long Answer Type questions of 5 marks each.

(5) Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

PART –A

Section – I **(16 x 1 = 16)**

(1) If HCF (a,b)=12 and axb=1800, then find LCM (a,b).

(2) Check whether 9^n can end with the digit 0, for any natural number n.

(OR)

What is the HCF of the smallest composite number and the smallest prime number?

(3) Express 3825 as the product of its prime factors.

(4) Write a quadratic polynomial, sum of whose zeroes is $\frac{1}{4}$ and product is -1.

(5) Find the roots of the quadratic equation $2x^2 - 5x + 3 = 0$

(6) Write a quadratic equation for the given situation:

To divide 16 into two parts such that twice the square of the larger part exceeds the square of the smaller part by 164.

(OR)

If $x = -3$ is a root of the quadratic equation $3x^2 + 7x + a = 0$, find the value of 'a'

(7) To divide the line segment BC internally in the ratio 4:3, we drew a ray BX such that ∠CBX is an acute angle. What will be the minimum number of points to be located at equal distances, on ray BX?

(8) Write the modal class of the following data:

Class interval	1-5	5-10	10-15	15-20	20-25
Frequency	6	8	2	9	5

(9) Find the distance of the point (4, 3) from the origin.

(10) XY is drawn parallel to the base BC of a triangle ABC cutting AB at X and AC at Y. If AB = 4BX and YC = 2cm, then find AY.

(OR)

ABC is an isosceles triangle right angled at C. Prove that $AB^2 = 2AC^2$.

(11) In a triangle ABC, right angled at C, $\angle A = \angle B$. Find cos B.

(12) Prove that $\cos^2\theta\ (1 + \tan^2\theta) = 1$

(13) In a lottery of 50 tickets numbered 1 to 50, one ticket is drawn. Find the probability that the drawn ticket bears a prime number. **(OR)**
A die is rolled twice. Find the probability that (i) 5 will not come up either time (ii) 5 will come up exactly one time.

(14) What is the probability that a leap year has 53 sundays?

(15) If an arc of length 20π cm subtends an angle of 144° at the centre of a circle, find the radius of the circle.

(16) Write the area of a sector of angle P (in degrees) of a circle with radius R.

(OR)

If the perimeter and the area of a circle are numerically equal, then find the radius of the circle.

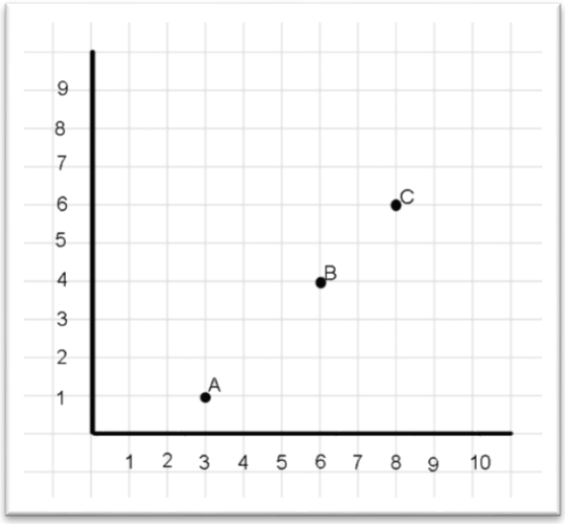
Section –II **(4 X 4 = 16)**

Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.

(17) Three friends Anita, Bharti and Zubeda were sitting in their classroom as follows (from bottom):

Anita : First row and third column
Bharti : Fourth row and sixth column
Zubeda : Sixth row and eighth column

Teacher asked vinay, "Are they sitting in the same line?" Vinay took a ruler and tried to see whether they are in the same line or not. He was not sure as the ruler was too short for this purpose.



i) Co-ordinates of the position of Anita:

a) (6,4) b) (3,1) c) (8,6) d) (1,3) ii) The distance between the positions of Bharti and Zubeda is:

a) $5\sqrt{2}$ b) $4\sqrt{2}$ c) $3\sqrt{2}$ d) $2\sqrt{2}$ iii) The midpoint of the line segment joining A and C is:

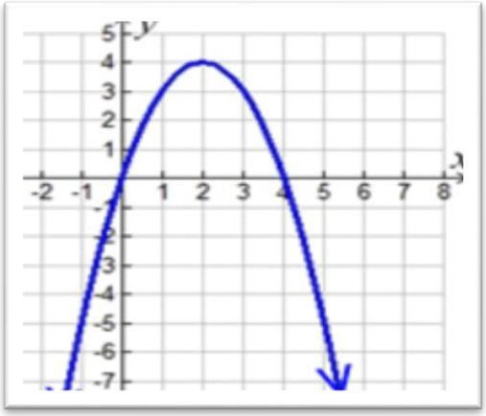
a) (7,5) b) $(\frac{9}{2}, \frac{5}{2})$ c) $(\frac{11}{2}, \frac{7}{2})$ d) (3,2) iv) The distance between the origin and the position of Zubeda:

a) 10 b) $2\sqrt{13}$ c) $\sqrt{10}$ d) 52

v) The midpoint of the line segment joining A and B is:

a) (7,5) b) $(\frac{9}{2}, \frac{5}{2})$ c) $(\frac{11}{2}, \frac{7}{2})$ d) (3,2)

(18) The Gateway Arch in St. Loius, Mo., USA, is part of the Jefferson National Expansion Memorial.



i) The graph of a quadratic polynomial is a:

a) straight line b) circle c) parabola d) ellipse

ii) The zeroes of the quadratic polynomial are:

a) 4 and 2 b) 4 and 4 c) 0 and 4 d) 1 and 2

iii) The quadratic polynomial corresponding to the given graph is:

a) $x^2 - 4x + 4$ b) $-x^2 + 4x$ c) $-x^2 + 4x + 4$ d) $x^2 + 4x$

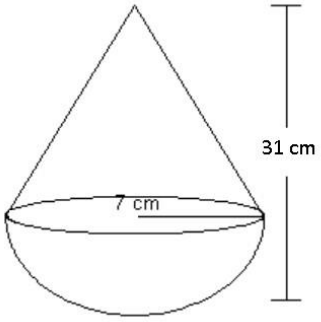
iv) For any quadratic polynomial $ax^2 + bx + c, a \neq 0$ the graph of the corresponding equation is open downward, if:

a) a>0 b) a=0 c) a<0 d) none of these

v) How many zeroes are there, if the arch is completely below the x-axis:

a) 1 b) 2 c) 3 d) 0

(19) Harshit donates some part of his income to an orphanage every month. In a particular month, he wishes to donate toys for the children. Each toy is in the form of a cone mounted on a hemisphere of common base radius 7cm. The total height of the toy is 31cm and the cost of painting the toy is ₹6 per cm^2.



i) Height of the cone is:

a) 38cm b) 24cm c) 17cm d) 25cm

ii) Slant height of the cone is:

a) 24cm b) 7cm c) 31cm d) 25cm

iii) Curved surface area of the hemisphere is:

a) 550cm^2 b) 308cm^2 c) 858cm^2 d) 242cm^2

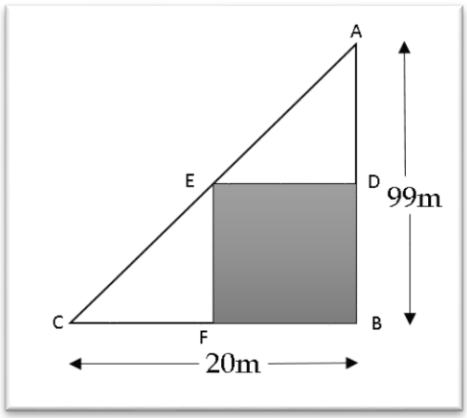
iv) Curved surface area of the cone is

a) 550cm^2 b) 150cm^2 c) 308cm^2 d) 300cm^2

v) Cost of painting 10 such toys is:

a) ₹54180 b) ₹51840 c) ₹52540 d) ₹51480

(20) A farmer has a field in the shape of a right triangle with legs of lengths 99m and 20m. He wants to leave a space in the form of a square of largest size inside the field for growing wheat and the remaining for growing vegetables.



i) $\angle ADE$=……

$\frac{1980}{99}$

a) 45° b) 90° c) 75° d) 60°

ii) $\Delta ADE \sim \Delta ABC$ by ---------- similarity criteria:

a) SSA b) AA c) RHS d) none of these

iii) Length of AC is:

a) 100m b) 119m c) 79m d) 101m

iv) Length of EF is:

a) $\frac{1980}{}$ m b) $\frac{}{1980}$ m c) $\frac{1980}{}$ m d) $\frac{1980}{}$ m

119 101 199

v) Length of BE is

a) $\frac{1980}{99}\sqrt{2}$ m b) $\frac{1980}{99}\sqrt{3}$ m c) $\frac{1980}{119}\sqrt{2}\,m$ d) $\frac{1980}{119}\sqrt{3}\,m$

PART B

All questions are compulsory. In case of internal choices, attempt anyone.

SECTION -III (6 x 2 = 12)

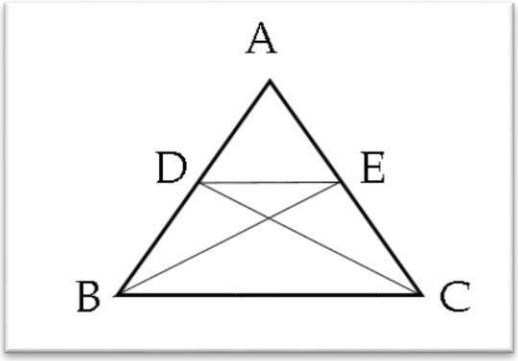
(21) How many 2-digit numbers are divisible by 4?

(22) In what ratio does the point (-4, 6) divide the line segment joining the points A(-6,10) and B(3, -8).

(OR)

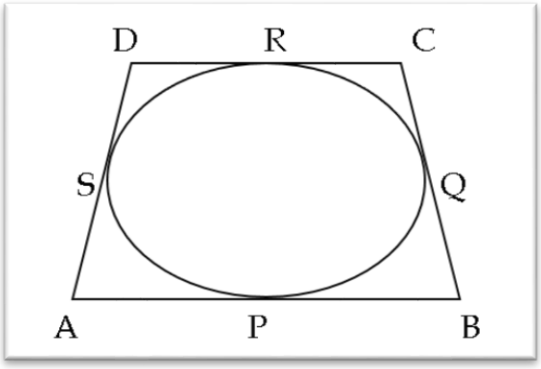
Prove that the points (0, 0), (5, 5) and (-5, 5) are the vertices of an isosceles triangle.

(23) If ΔABE ≅ ΔACD, show that ΔADE~ΔABC



(24) Draw a circle of radius 6cm. From a point 10cm away from its centre, construct the pair of tangents to the circle and measure their lengths.

(25) A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB+CD=AD+BC.



(26) If $\sin(A-B) = \frac{1}{2}$, $\cos(A+B) = \frac{1}{2}$, $0° < A+B \leq 90°$, $A>B$, find A.

(OR)

Find the value of $4\,\text{cosec}^2 60 - 16\tan^2 30$

SECTION- IV **(7 x 3 = 21)**

(27) Prove that $\sqrt{2}$ is an irrational number.

(28) If the 2nd term of an AP is 8 and the 5th term is 17, find its 19th term.

(29) Draw the graphs of 2x+y=6 and 2x-y+2=0. Shade the region bounded by these lines and x-axis. Find the area of the shaded region.

(OR)

Solve the following system of linear equations graphically:

x - y = 1 and 2x + y = 8

(30) Prove that: $\frac{cotA-cosA}{cotA+cosA} = \frac{cosecA-1}{cosecA+1}$

(31) The diameter of a metallic sphere is 6 cm. The sphere is melted and drawn into a long wire of uniform circular cross- section. If the length of the wire is 36 cm, find its radius.

(32) Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

(33) One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting

a) the queen of diamonds
b) a face card
c) a spade

(OR)

Sum of digits of a 2-digit number is 11.

a) Find the probability that such a number is even.
b) Find the probability that such a number is greater than 50.
c) Find the probability that such a number is divisible by 11.

SECTION-V **(3 x 5 = 15)**

(34) The sum of first six terms of an AP is 42, the ratio of 10^{th} term to its 30^{th} term is 1: 3. Calculate the first term and the 13^{th} term of the AP.

(35) The angle of elevation of a cloud from a point 60m above a lake is 30° and the angle of depression of the reflection of cloud in the lake is 60°.

Find the height of the cloud.

(OR)

A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30^0 to 60^0 as he walks towards the building. Find the distance he walked towards the building.

(36) Find the mean and mode of the following frequency distribution:

Class interval	0-20	20-40	40-60	60-80	80-100
Frequency	15	18	21	29	17

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