class – X R
Roll no – 30

METAS ADVENTIST SCHOOL

Affiliated to CISCE, New Delhi (JH076)

METAS Campus, Bariatu Road, Ranchi - 834009

FIRST PRELIMINARY EXAMINATION: 2022 - 23

MATHEMATICS
STD. X A/B/C/D/E

Time: 2 Hrs
Full Marks: 100

Attempt all the question from section A and any 4 from section B.

Question 1.

i) **The circumference of the base of cylindrical vessel is 132 cm, and it height is 25 cm, the radius of cylinder is :**
   a) 20 cm
   b) 21 cm
   c) 22 cm
   d) non of these

ii) **Which term of AP 21, 42, 63, 84..... is 210.**
   a)9th
   b) 10th
   c) 11th
   d) 12th

iii) **When the roots of quadratic equation are real and equal then the discriminant of the quadrartic equation is :**
   a) Infinite
   b) Positive
   c) Zero
   d) Negative

iv) **If (x-1) is a factor of $2x^2 - ax - 1$, then the value of 'a' is:**
   a) -1
   b) 1
   c) 3
   d) -3

v) **57 , 54, 51, 48..... are in AP. The value of 8^{th} term is:**
   a) 36
   b) 78
   c)-36
   d) -78,

vi) **The volume of right circular cone with same radius and height as that of a right circular cylinder is 120 cm^3. The volume of cylinder is:**
   a) $240cm^3$
   b) $60\ cm^3$
   c) $360\ cm^3$
   d) $480\ cm^3$

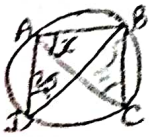
vii) **If the distance between the points (4,p) and (1,0) is 5 unit then the value of p is :**
   a) 4

b) -4
c) Both a and b
d) 0

viii) The probability of the sun rising from the east is P(S) the value of p(S) is:
a) P(S) = 0
b) P(S) <0
c) P(S)=1
d) P(S)>1

ix) The centroid of triangle ABC is G (6,7) . If the coordinate of vertices A,B and C are (a,5) (7,9) and (5,7), then the value of a is:
a) 9
b) 6
c) 3
d) 7

x) In the given figure AC is the diameter of the circle and angle ADB =35° the degree measure of x:
a) 55
b) 35
c) 45
d) 70



xi) A 20 m deep well be diameter 7 m is dug and the earth from digging is evenly spread out to form of platform 22 m, by 14 m. the height of platform is:
a) 2.5 m
b) 3.5m
c) 3 m
d) 2 m

xii) If the distance between the point (5,p) and (2,0) is 5 unit then the value of p is:
a) 4
b) -4
c) Both a and b
d) None of these

xiii) If an AP have eight as the first term and -5 as a common difference and its first 3 terms are 8 , A ,B then (A+B)=
a) 0
b) -1
c) 1
d) 2

xiv) A letter is chosen at random from the word 'MATHEMATICS'. What is probability that it will a vowel.
a) ½
b) 3/8
c) 3/11
d) 4/11

xv) Common difference of an AP whose nth term is $a_n = 3n + 7$ is:
a) 3
b) 7

c) 10
d) 6

Question 2:

i) Prove that $\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}=2\sec A$ [4]

ii) Using the factor theorem factorise completely the polynomial $3x^3+2x^2-19x+6$ [4]

iii) AB is diameter of circle with centre C = -2,5. If A =(3,-7) find [4]

a) Length of radius AC
b) Coordinate of B
c) Area of circle

Question3.

i) How many terms of AP 20 , $19\frac{1}{3}$, $18\frac{2}{3}$..... Must be taken so that there sum is 300. [4]

ii) If $f(x) = px^3 + 4x^2 - 3x + q$ is divisible by x2 -1, find the value p and q. [4]

iii) Find the mean of wages from the following data step deviation method. [5]

Wages	800	820	860	900	920	980	1000
Number of workers	7	14	19	25	20	10	5

SECTION B

Question4.

i) ABCD is a square where B(1,3) D(3,2) are the end point of diagonal BD find: [5]

a) The coordinate of point of intersection of diagonal AC and BD.
b) The equation of diagonal AC.

ii) Metallic cylinder has radius 3 cm height 5 cm, it is made of metal A. reduce its weight its conical hole is drilled in the cylinder .and its completely filled with a lighter metal B. the colinical hole has radius 3/2. And its depth is 8/9. Calculate the ratio of the volume of metal A to the volume of metal B. [5]

iii) ABC is a triangle and G (4,3) is the centroid of the triangle . if A(1,3) , B(4,b) and C(a,1).find a and B also find the length of side BC. [5]

Question5.

i) The first, last term and common difference of an AP are 98, 1001 and 7. Find the following for the given AP [5]

a) Number of term n
b) Sum of n terms

ii) A box contain sum green, yellow and white ball. The probability of selecting a green ball is ¼ and yellow ball is 1/3. If the box contain 10 white ball then find [5]

a) Total number of ball in the box
b) Probability of selecting white ball

iii) A cone and sphere having the same radius are melted and recast into a cylinder, the radius and height of cone are 3 cm and 12 cm. if the radius of cylinder so formed 2 cm find the height of cylinder. [5]

Question 6.

i) A card is drawn from a well shuffled deck of cards. Find the probability that card drawn is : [5]
   a) A card of club or ace
   b) Either king or jack
   c) Neither a jack nor a queen

ii) The sum of 3rd tem and 7th term of an AP is 6, the product is 8, find the sum of first 1 term of AP.[5]

iii) Factorise the expression to $2x^3 + 13x^2 + 17x - 12$ by factor theorem. [5]

Question 7.

i) Find the value of m, for which the equation $(m-1)x^2 + 2(m+1)x+9=0$ has equal roots.) [5]

ii) If A (1,2) B(11,9) are point of tri section of the line PQ find the coordinate of P. [5]

iii) When the polynomial $x^3 - px^2 + x + 6$ and $2x^3 - x2 - (p+3)x - 6$ divided by x-3, leave the same remainder, find the value of p. [5]

Question 8.

i) Prove that $(\text{cosec } A - \sin A)(\sec A - \cos A)\sec^2 A = \tan A$ [5]

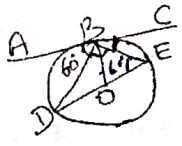
ii) A right triangle whose sides are 3 cm and 4 cm is made to revolve about its hypotenuse. Find the volume and surface area, of the double cone so formed. [5]

iii) A card marked with 1, 2, 3, 4.....14, 15 are well shuffled and card is drawn at random. what is the probability that the number of the card is : [5]
   a) Prime number
   b) Perfect square
   c) Divisible by 3

Question 9.

i) The angle of elevation of fighter jet from a point P on the ground is 60 degree, after 15 sec of flight, the angle of elevation is changes to 30 degree. If the jet is flight 720 km/h then find the height of which jet is flying: [5]

ii) In the given figure ABC is a tangent to the given circle. if angel ABD 60 degree and dD is the diameter then find : [5]



   a) BOD
   b) CBE
   c) Reflex BOD

iii) If $A = \begin{pmatrix} 3 & 2 \\ 1 & 0 \end{pmatrix}$ And $B = \begin{pmatrix} -1 & 3 \\ 0 & 1 \end{pmatrix}$ find $(A+B)^2$ [5]

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FIRST TERMINAL EXAMINATION: 2022 – 23

MATHEMATICS — **FULL MARKS: 80**
STD. X A/B/C/D/E — **TIME: 2½ Hrs.**

Section - A
Attempt all the questions from this Section

Q.1.i) In a transaction from Delhi to lucknow , MRP = Rs.10,000 discount = 10%, GST = 28%. Here IGST is :

(a) Rs. 2520 (b) Rs. 5040 (c) nil (d) none of these

(ii) A refrigerator was sold for Rs. 15,000 under intrastate transaction from station A to station B and the GST rate is 18%. CGST is equal to : (within the state)

(a) Rs. 1400 (b) Rs. 1350 (c) Rs. 1300 (d) Rs. 2700

(iii) A man deposited Rs. 1000 per month in a recurring deposit account for 3 years at 8% p.a. The maturity value is :

(a) Rs.44,000 (b) Rs.40,000 (c) Rs.40,440 (d) Rs. 44,444

(iv) A man deposited Rs. x per month for y years in a recurring deposit account. If at the time of maturity he got Rs. z as interest, then the total maturity amount is :

(a) Rs. (12xy + z) (b) Rs.12xyz (c) Rs. (xy + 12z) (d) Rs. $\frac{xyz}{12}$

(v) If $-x \geq -8$ then :

(a) $x \geq 8$ (b) $x \leq 8$ (c) $x \leq -8$ (d) $x = 8$

(vi) If $-3x + 1 \geq 19$, and $x \in I$, then the solution set is :

(a) $\{x \geq -6, x \in I\}$ (b) $\{x \leq 6, x \in I\}$
(c) $\{x \leq -6, x \in I\}$ (d) $\{-x \leq -6, x \in I\}$

(vii) The roots of $3x^2 - 5x + 1 = 0$ are :

(a) irrational (b) equal (c) imaginary (d) none of these

(viii) The roots of the quadratic equation $x^2 - 10x + 25 = 0$ are :

(a) Rational and unequal (b) Irrational and unequal

(c) rational and imaginary (d) equal and imaginary

(ix) The quadratic equation $x^2 + m(2x + m - 1) + 2 = 0$ has equal roots. Find the value of m is :

(a) 1 (b) 2 (c) -2 (d) 0

(x) x,y,z are in continued proportion , then : y^2 is equal to :

(a) x+z (b) xz (c) $\frac{x}{z}$ (d) none of these

(xi) If (x -2) is a factor of x^2 - 4x + m, then the value of m is :

(a) -4 (b) 4 (c) 0 (d) -1

(xii) If (x – 1) is a factor of $x^3 + 2x^2$ - x + k, then the value of k is :

(a) 1 (b) 2 (c) -2 (d) -1

(xiii) If $3\begin{bmatrix} 2 & x \\ 1 & 0 \end{bmatrix} + 2\begin{bmatrix} 4 & 3 \\ y & 2 \end{bmatrix} = \begin{bmatrix} z & -3 \\ 15 & 4 \end{bmatrix}$, then : The value of x is :

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

(xiv) The nth term of an AP 5 , 11 , 17 , 23 , ... is :

(a) 6 m – 1 (b) 6 m + 1 (c) 5 m – 1 (d) 6 n – 1

(xv) If x, 2x + p, 3x + 6 are in AP , then then value of p is :

(a) 2 (b) 3 (c) 5 (d) 7

Q2.i.) when divided by (x – 3), the polynomials x^3- px^2 + x +6 and $2x^3$-x^2-(p+3)x -6 leave the same remainder . Find the value of p . Also find the remainder in each case. **[4]**

(ii) 3,9,m,81 and n are in continued proportion. Find the value of `m' and `n'. **[4]**

(iii) If $A = \begin{bmatrix} 2 & -6 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 4 & 0 \\ 0 & 2 \end{bmatrix}$, find the matrix `x' such that A + 2x = 2B + C.

[4]

Q3.i.) If x,y,z are in continued proportion , prove that $\frac{(x+y)^2}{(y+z)^2} = \frac{x}{z}$. **[4]**

(ii) The sum of the first three terms of an Arithmetic Program is 42 and the product of the first and third term is 52 . Find the first term and the common difference. **[3]**

(iii) Find the image of each of the following points when reflected in x – axis

(a) (5 , 8) (b) (3 , -4) (c) (-6, -2).

SECTION - B

Q4.I) Solve for 'x' $\frac{x-1}{x-2}+\frac{x-3}{x-4}=3\frac{1}{3}$. [3]

(II) Solve the following inequation and write the solution set. Also represent it on the number line. $13x-5<15x+4<7x+12$. [4]

(III) Mohan has a recurring deposit account in a bank for 2 years at 6% per Annum simple interest. If he gets Rs.1200 as interest at the time of maturity, find

(I) the monthly installment

(II) the amount of maturity [3]

Q5.I) A retailer purchases an air conditioner for Rs. 35,000 from a company. He sold it to a consumer at a profit of Rs. 5000 . Calculate the , tax liability of the retailer if the GST rate on air conditioner is 28%.

[4]

(II) Solve the following quadratic equation and calculate the answer correct to two decimal places

$$x^2-5x-10=0.$$ [3]

(iii) What least number must be added to each of the numbers 6 , 15 , 20, and 43 , so that the resulting numbers are proportional. [3]

Q6.I) Kiran deposited ₹ 200 per month for 36 months in a bank's recurring deposit account. If the bank pays interest at 11% per annum, find the amount she gets on maturity. [4]

(II) Using the properties of proportion, find the value of x when $\frac{x^4+1}{2x^2}=\frac{17}{8}$. [3]

(iii) The sum of the first three terms of an A.P is 42 and the product of the first and third term is 52. Find the first term and common difference. [3]

Q7.I) Solve for x $\sqrt{3}x^2+10x-8\sqrt{3}=0$. [3]

(II) Using Componendo and Dividendo find the value of x $\frac{\sqrt{3x+4}+\sqrt{3x-5}}{\sqrt{3x+4}-\sqrt{3x-5}}=9$. [4]

(III) Find x and y if $x+y=\begin{bmatrix}7 & 0\\ 2 & 5\end{bmatrix}$ and $x-y=\begin{bmatrix}3 & 0\\ 0 & 3\end{bmatrix}$. [3]

Q8.I) Using Remainder Theorem. Find the value of k if on dividing $2x^3+3x^2-kx+5$ by $(x-2)$ leaves a remainder 7.

(II) How many terms of AP 7, 11,15,19,23 ..... must be taken to get the sum 250? [3]

(III) Find the value of 'k' for which $x=3$ is a solution of the quadratic equation $(k+2)x^2-kx+6=0$ Thus, find the other root of the equation. [3]

Q9.I.) Which term of AP 5, 12,19,26,33 .....will be 35 more than its 12^{th} term. [4]

(II) Using factor Theorem factorize $3x^3+2x^2-19x+6$. [3]

(iii) Without solving the given Quadratic Equation find the value of p for which it has real and equal Roots. **[3]**

Q10.i.) Sharukh opened a recurring deposit account in a bank and deposited Rs. 800 per month for $1\frac{1}{2}$ Yrs Rs.15084 at the time of maturity, find the rate of interest per annum. **[4]**

(ii) If $A = \begin{matrix} 2 & 5 \\ 1 & 3 \end{matrix}$, $B = \begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$ and I is the identity matrix of the same order and A^t is the transfer of A . Find $A^tB + BI$. **[3]**

(iii) Find the nature of the roots of quadratic equation $3x^2 - 4\sqrt{3}x + 4 = 0$ and hence solve it . **[3]**