TARUN CLASSES OF MATHEMATICS

MATHEMATICS –STANDARD (041)
Class X – 2019-2020

MAX. MARKS : 80   DURATION : 3HOURS

SECTION –A

Q 1- Q 10 are multiple choice questions. Select the most appropriate answer from the given options.

1) A positive integer n is divided by 9 gives 7 as the remainder , what will be the remainder when 3n-1 is divided by 9.

   (A)   1   (B)   2   (C)   3   (D)   4

2) Consider the data:

Height(cm)	150-155	155-160	160-165	165-170	170-175	175-180
No.of Students	15	13	10	8	9	5

   The sum of the lower limit of the modal class and upper limit of the median class is

   (A)   310   (B)   315   (C)   320   (D)   330

3) If $\sin\Theta$ & $\cos\Theta$ are roots of the equation $ax^2 - bx + c = 0$, Then a , b & c satisfy the relation :

   (A) $a^2 + b^2 + 2ac = 0$ (B) $a^2 - b^2 + 2ac = 0$ (C) $a^2 + c^2 + 2ac = 0$ (D) $a^2 - b^2 - 2ac = 0$

4) If $A(4, -3)$, $B(3, -2)$ and $C(2, 8)$ are vertices of a triangle, then the distance of it's centroid from the y-axis is :

   (A) $\sqrt{10}$ (B) 1   (C) 3   (D) $\frac{9}{2}$

5) If $\cos(\alpha + \beta) = 0$, then $\sin(\alpha - \beta)$ can be reduced to

   (A) $\cos\beta$ (B) $\cos 2\beta$ (C) $\sin\alpha$ (D) $\sin 2\alpha$

   If $\sin\Theta + \cos\Theta = \sqrt{2}\sin(90 - \Theta)$, find $\cot\Theta$.   (BONUS)

6) A circle drawn with origin as the centre passes through $\left(\frac{13}{2}, 0\right)$. The point which does not lie in the interior of the circle is :

   (A) $\left(\frac{-3}{4}, 1\right)$ (B) $\left(2, \frac{7}{2}\right)$ (C) $\left(5, \frac{-1}{2}\right)$ (D) $\left(-6, \frac{5}{2}\right)$ OR

   A line intersects the y-axis and x-axis at the points P and Q, respectively. If (2, –5) is the mid-point of PQ, then the coordinates of P and Q are, respectively   (BONUS)

   (A) (0, – 5) and (2, 0)   (B) (0, 10) and (– 4, 0)   (C) (0, 4) and (– 10, 0)   (D) (0, – 10) and (4, 0)

7) In a group of goats and hens, the tota l number of legs is 12 more than twice the total number of heads. The number of goats is :

   (A) 8   (B) 6   (C) 2   (D) 10   OR

   If the system of equations $2x + 3y = 7$, $2ax + (a + b)y = 28$ has infinitely many solutions, then
   (A) a = 2b   (B) b = 2a   (C) a + 2b = 0   (D) 2a + b = 0

8) 4 bells toll together at 9:00 am. they toll after 7,8,11 and 12 seconds respectively. How many times will they toll together again in next 3 hours.

   (A)   3   (B) 4   (C) 5   (D) 6

9) The perpendicular bisector of the line segment joining the points A (1, 5) and B (4, 6) cuts the y-axis at

   (A) (0, -13)   (B) (0, 13)   (C) (0, 12)   (D) (13, 0)

10) If $\sec\Theta = \frac{\sqrt{p^2+q^2}}{q}$, Then value of $\frac{p\sin\Theta - q\cos\Theta}{p\sin\Theta + q\cos\Theta}$ is :

   (A) $\frac{p}{q}$ (B) $\frac{p^2}{q^2}$ (C) $\frac{p^2-q^2}{p^2+q^2}$ (D) $\frac{p^2+q^2}{p^2-q^2}$

11) If a , b, c, d & e are in A.P. , then the value of a – 4b + 6c – 4d + e is ....

12) If $\alpha + \beta = 4$ & $\alpha^3 + \beta^3 = 44$, then polynomial having α, β are the zeroes is .... **Or**

   Find the value of k such that polynomial $x^2 - (k+6)x + 2(2k-1)$ has sum of its zeroes is equal to half of their product .

13) A cone of maximum size is carved out from a cube of edge 'a' cm. Find the surface area of the cone and of the remaining solid left out after the cone carved out.................................

14) A die has its six faces marked 0, 1, 1, 1, 6, 6. Two such dice are thrown together and the total score is recorded. How many different scores are possible? The probability of getting a total of 7 is ....

15) In the adjoining figure, XY is parallel to AC. If XY divides the triangle into equal parts, then the value of $\frac{AX}{BX}$.
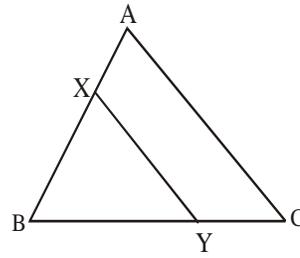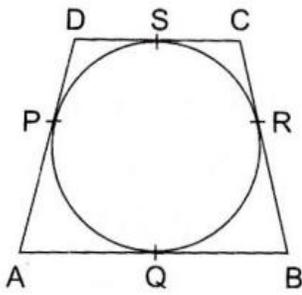
16) In the given figure, Quadrilateral ABCD is circumscribed, touching the circle at P, Q, R and S. If AP = 5 cm, BC = 7 cm and CS = 3 cm. Find the length AB .

OR

If the angle between two tangents drawn from an external point 'P' to a circle of radius 'r' and centre O is 60^0 , then find the length of OP.

17) What can you say about the sum & Product of two different irrational numbers. Justify it with an example . OR

Find a rational & Irrational number between $\sqrt{3}$ & $\sqrt{5}$. (BONUS)

18) Which term of Progression $20 , 19\frac{1}{4} , 18\frac{1}{2} , 17\frac{3}{4}$,.....................is first negative term ?

19) In figure ΔABC is right angled at C. DE perpendicular AB. if BC =12 cm, AD =3 cm and DC=2 cm, find AE .
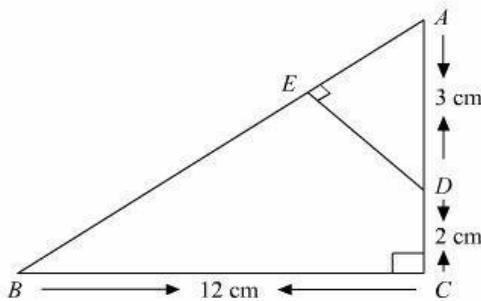
20) If $\frac{x}{1+x} + \frac{x+1}{x} = \frac{34}{15}$, Find x .

SECTION – B

21) Find the sum of all the numbers between 1 & 1000, which are divisible by 5 but not by 2 .

The houses of row are numbered consecutively from 1 to 49. Show that there is a value of x such that the sum of the b numbers of the houses preceding the house numbered x is equal to the sum of the numbers of the houses following it. Find the value of x ? (BONUS)

22) Two Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre.

23) The perpendicular AD on the base BC of a ΔABC intersects BC at D so that DB = 3CD , prove that : $2 AB^2 = 2 AC^2 + BC^2$.

OR

In the figure, if the line segment DF intersects The side AC of a triangle ABC at the point E such that E is the mid point of CA and ∠AEF = ∠AFE. Prove that $\frac{BD}{CD} = \frac{BF}{CE}$.
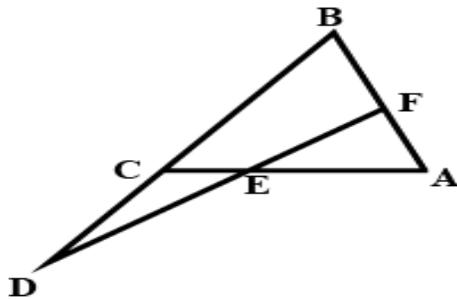
24) A tree is broken at certain height and its upper part 9 $\sqrt{2}$ m long not completely separated meet the ground at an angle of α such that cosec5 α = sec(135^0 − 6 α). Find the height of the tree before it was broken and also find the distance from the root of the tree to the point where the top of the tree meets the ground.

25) Jayanti throws a pair of dice and records the product of the numbers appearing on the dice. Pihu throws 1 dice and records the squares the number that appears on it. Who has the better chance of getting the number 36? Justify?

OR

Red queens and Black jacks are removed from a pack of 52 playing cards, a card is drawn at random from the remaining cards,after reshuffling them, find the probability that the drawn card is:
(i)a king (ii) Either Heart or queen (iii) Either face card or club (iv) a diamond

26) Water in a canal, 6 m wide and 1.5 m deep, is flowing at a speed of 4 km/h. How much area will it irrigate in 10 minutes, if 8 cm of standing water is needed for irrigation?
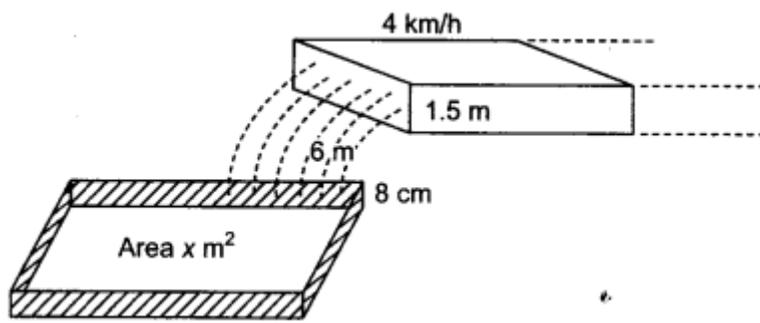
SECTION – C

27) In a seminar, the number of participants in hindi, english and maths are 60, 84, 108 respectively. Find the minimum no. of rooms required if in each room the same no of participants are to be seated and all of them being in the same subject.

OR

If 'd' is the H.C.F of 963 & 657, Find the value of x & y satisfying d = 963x + 657y.

28) 150 workers were engaged to finish a job in a certain number of days. 4 workers dropped out on second day, 4 more workers dropped out on third day and so on. It took 8 more days to finish the work. Find the number of days in which the work was completed.

In an AP of 50 terms, the sum of first 10 terms is 210 & the sum of its last 15 terms is 2565. Find an AP. (BONUS)

29) If the polynomial $x^4 – 6x^3 + 16x^2 – 25x + 10$ is divided by another polynomial $x^2 – 2x + k$, the remainder comes out to be $x + a$, find k and a.

30) The median of the data is 52.5, Find the values x & y, If the total frequency is 100.

C.I	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	2	5	x	12	17	20	y	9	7	4

31) In given figure, an equilateral triangle has been inscribed in a circle of radius 6 cm, find the area of shaded region.
  [use П = 3.14]
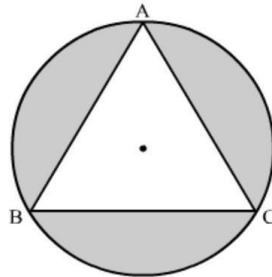
32) If tan A = n tanB & sin A = m sinB, Prove that : $\cos^2 A = \frac{m^2-1}{n^2-1}$.   OR

If cosec Θ - sin Θ = l, & sec Θ - cos Θ = m, Prove that : $l^2 m^2 (l^2 + m^2 + 3) = 1$.

33) Solve for x & y : bx + ay = a + b ;

$ax \left(\frac{1}{a-b} - \frac{1}{a+b}\right) + by \left(\frac{1}{b-a} - \frac{1}{a+b}\right) = \frac{2a}{a+b}$.   OR

An examination consists of 160 questions. One mark is given for every correct option. If one-fourth mark is deducted for every wrong option and half mark is deducted for every question left, then one person scores 79. And if half mark is deducted for every wrong option and one-fourth mark is deducted for every left question, the person scores 76, then find the number of questions he attempted correctly.

A shopkeeper sells a saree at 8% profit and a sweater at 10% discount, thereby, getting a sum Rs 1008. If she had sold the saree at 10% profit and the sweater at 8% discount, she would have got Rs 1028. Find the cost price of the saree and the list price (price before discount) of the sweater. (BONUS)

34) The area of a triangle is 5. Two of its vertices area(2, 1) and (3, -2). The third vertex lies on y = x + 3. Find the third vertex.

SECTION – D

35) In the given figure, M is the midpoint of side CD of a parallelogram ABCD. The line BM is drawn intersecting AC at L and AD produced at E. Proved that EL = 2BL.
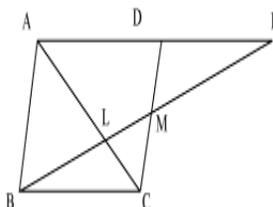
36) A pole has to be erected at a point on the boundary of a circular park of diameter 17 m in such a way that the differences of its distances from two diametrically opposite fixed gates A and B on the boundary is 7 metres. Find the distances from the two gates where the pole is to be erected.   OR

    Solve for x :

       i) $\frac{p}{(x-q)} + \frac{q}{(x-p)} = 2$

       ii) $\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$

37) Draw a triangle ABC with side BC = 7 cm, ∟ B = 45°, ∟ A = 105°. Then, construct a triangle whose sides are 1.6 times the corresponding sides of ΔABC.

<div align="center">OR</div>

  Given a rhombus ABCD in which AB = 4 cm and ∠ABC = 60°, divide it into two triangles say, ABC and ADC. Construct the triangle AB'C' similar to ΔABC with scale factor 2 /3. Draw a line segment C'D' parallel to CD where D' lies on AD. Is AB'C'D' a rhombus? Give reasons.

38) The distribution of heights in cm of 96 children is given below:

Height	124-128	128-132	132-136	136-140	140-144	144-148	148-152	152-156	156-160	160-164
Children	5	8	17	24	16	12	6	4	3	1

  Draw a less than type & more than type ogive from given data , Hence obtain median from the graph.

39) A metallic right circular cone 20 cm high and whose vertical angle is 60° is cut into two parts at the middle of its height by a plane parallel to its base. If the frustum so obtained be drawn into a wire of diameter $\frac{1}{16}$ cm , find the length of the wire.

<div align="center">OR</div>

  Water flows at the rate of 10 meter per minute through a cylindrical pipe having its diameter as 5mm. How much time will it take to fill a conical vessel whose diameter of base 40 cm & depth 24 cm .

40) A man on the top of a vertical observation tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45°, how soon after this will the car reach the observation tower. Give your answer correct to nearest seconds.