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FIRST REVISION TEST - JANUARY 2020
STANDARD - X
MATHEMATICS

TIME: 3.00 hours **MARKS: 100**

Part - I (Marks : 14)

Note: **(i) Answer all the 14 questions.** 14 x 1 = 14

(ii) Choose the most suitable answer from the given four alternatives and write the option code with the Corresponding answer.

(iii) Each question carries, 1 mark.

1. If the ordered pairs (a + 2,4) and (5, a + b) are equal then (a, b) is
   a) (2, -2) b) (5 , 1) c) (2 ,3) d) (3, -2)
2. $f(x) = (x+1)^3 - (x-1)^3$ represents a function which is
   a) linear b) cubic c) reciprocal d) quadratic
3. If x - 6 is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of K is
   a) 3 b) 5 c) 6 d) 8
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. Graph of linear polynomial is a
   a) straight line b) circle c) parabola d) hyperbola
6. If number of columns and rows are not equal in a matrix then it is said to be a
   a) diagonal matrix b) rectangular matrix
   c) Square matrix d) identity matrix
7. A tangent is Perpendicular to the radius the
   a) centre b) point of contact
   c) infinity d) chord
8. If (5, 7) , (3 , p) and (6, 6) are collinear, then the value of p is
   a) 3 b) 6 c) 9 d) 12
9. (2, 1) is the point of intersection of two lines,
   a) x -y - 3 = 0 ; 3x -y -7 = 0 b) x + y = 3 ; 3x + y = 7
   c) 3x + y = 3 ; x + y = 7 d) x + 3y -3 = 0 ; x - y -7 = 0
10. $a \cot\theta + b \operatorname{cosec}\theta = p$ and $b \cot\theta + a \operatorname{cosec}\theta = q$, then $p^2 - q^2$ is equal to
    a) $a^2 - b^2$ b) $b^2 - a^2$ c) $a^2 + b^2$ d) b - a
11. The curved surface area of a right circular cone of height 15cm and base diameter 16cm is
    a) 60π cm^2 b) 68π cm^2 c) 120π cm^2 d) 136π cm^2
12. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
    a) 1 : 2 : 3 b) 2 : 1 : 3 c) 1: 3 : 2 d) 3 : 1 : 2

13. The Sum of all deviations of the data from its mean is

a) Always positive b) Always negative

c) zero d) non - zero integer

14. If a letter is chosen at random from the English alphabets {a,b, ...z}, then the probability that the letter chosen procedes x

a) $\frac{12}{13}$ b) $\frac{1}{13}$ c) $\frac{23}{26}$ d) $\frac{3}{26}$

Part - II (Marks : 20)

Note : (i) Answer any TEN questions only 10 x 2 = 20

[Question No. 28 is Compulsory]

(ii) Each question carries Two Marks.

15. Let A = {1, 2, 3} and B = {x / x is a prime number less than10}. find A × B and B × A.
16. Find the domain of the function $f(x) = \sqrt{1+\sqrt{1-\sqrt{1-x^2}}}$
17. Find the indicated terms of the sequences whose n th term is given by

$a_n = \frac{5n}{n+2}$; a_6 and a_{13}

18. If 1 + 2 + 3 + ... + n = 666, then find n.
19. Solve $2x^2 - 3x - 3 = 0$ by formula method.
20. If $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{bmatrix}$ then verify $(A^T)^T = A$.

21. The length of the tangent to a circle from a point p, which is 25cm way from the centre is 24cm. What is the radius of the circle?
22. Two buildings of different heights are located at opposite sides of each other. If a heavy rod is attached joining the terrace of the buildings from (6,10) to (14,12) , Find the equation of the rod joining the buildinges?
23. Show that the straight lines x - 2y + 3 = 0 and 6x + 3y + 8 = 0 are Perpendicular.
24. Show that $\sec\theta - \cos\theta = \tan\theta \sin\theta$
25. If the base area of a hemispherical solid is 1386 sq. metres, then find its total surface area?

26. A solid sphere and solid hemisphere have equal total surface area. prove that the ratio of their volume is $3\sqrt{3}:4$.
27. Write the sample space for tossing three coins using tree diagram.
28. Find the standard deviation of first 21 natural numbers.

Part - III

Note: (i) Answer any TEN question only. 10 x 5 = 50

Question No. 42 is Compulsory.

(ii) Each question carries FIVE Marks.

29. Let $f : A \to B$ be a function defined by $f(x) = \frac{x}{2} - 1$, where A= {2, 4, 6, 10, 12} B = {0, 1 , 2, 4, 5, 9} Represent by
    (i) set of ordered pairs (ii) an arrow diagram
    (iii) a table (iv) a graph
30. If $f(x) = x^2$, $g(x) = 3x$ and $h(x) = x - 2$ prove that (fog) oh = fo (goh)
31. Discuss the nature of solutions of the following system of equations.
    $x + 2y - z = 6$; $-3x - 2y + 5z = -12$; $x - 2z = 3$
32. Find the sum to n terms of the series $3 + 33 + 333 + \ldots\ldots\ldots$ to n terms.
33. Find the 12th term from the last term of the A.P -2, -4, -6, ... -100.
34. The internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the corresponding sides containing the angle, prove.
35. If $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{bmatrix}$ show that $(AB)^T = B^T A^T$.
36. Find the area of the qudrilateral whose vertices are at
    (-9, 0) , (-8 ,6) , (-1 , -2) and (-6 , -3)
37. A girl wishes to prepare birthday caps in the form of right circular cones for her birthday party, using a sheet of paper whose area is 5720 cm^2, how many caps can be made with radius 5cm and hight 12cm.
38. Find the equation of a straight line joining the point of intersection of $3x + y + 2 = 0$ and $x - 2y - 4 = 0$ to the point of intersection of $7x - 3y = -12$ and $2y = x + 3$
39. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter is 14cm and the height of the vessel is 13cm. Find the capacity of the vessel.
40. Find the co - efficent of variation of 24, 26, 33, 37, 29, 31.

41. A box contains cards numbered 3, 5, 7, 9, ... 35, 37. A card is drawn at random from the box. find the probability that the drawn card have either multiples of 7 or a prime number.

42. Two ships are sailing in the sea on either side of the lighthouse. The angles of depression of two ships as observed from the top of the light house are 60° and 45° respectively. If the distance between the ships is $200\left[\frac{\sqrt{3}+1}{\sqrt{3}}\right]$ metres, find the height of the light house.

Part - IV

Note : i) Answer both the questions. 2 x 8 = 16

ii) Each question carries 8 Marks.

43. a) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{4}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{4} > 1$)

(Or)

b) Draw Δ PQR such that PQ = 6.8cm, vertical angle is 50° and the bisector of the vertical angle meets the base at D where PD = 5.2 cm.

44. a) Graph the following quadratic equations and state their nature of solutions:
$(2x - 3)(x + 2) = 0$

(Or)

b) Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$

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TIRUVELVELI

2nd Revision Exam - 2020.

Answer key by A BALAIAH 9750493961

I. Choose :

1. d) (3, -2)
2. d) quadratic
3. b) 5
4. d) 11
5. a) straight line
6. b) rectangular matrix.
7. b) point of contact
8. c) 9
9. b) $x+y=3, 3x+y=7$
10. b) b^2-a^2
11. d) 136π cm^2
12. d) 3 : 1 : 2
13. c) Zero
14. c) $\frac{23}{26}$.

II. 2 marks

15. $A=\{1,2,3\}$, $B=\{2,3,5,7\}$

$A\times B = \{(1,2),(1,3),(1,5),(1,7),(2,2),(2,3),(2,5),(2,7),(3,2),(3,3),(3,5),(3,7)\}$

$B\times A = \{(2,1),(3,1),(5,1),(7,1),(2,2),(3,2),(3,3),(3,1),(5,1),(5,2),(5,3),(7,1),(7,2),(7,3)\}$.

16. Domain $= \{-1, 0, 1\}$

17. $a_6 = \frac{15}{4}$ $a_{13} = \frac{13}{3}$.

18. $\frac{n(n+1)}{2} = 666$

$n^2+n-1332=0$

$n = 36$ (or) $n = -37$

$\therefore \boxed{n=36}$

$n^2+n+\frac{1}{2})^2 = 1332+(\frac{1}{2})^2$

$(n+\frac{1}{2})^2 = \frac{5329}{4}$

$n+\frac{1}{2} = \pm\frac{73}{2}$

19. $x = \frac{-(-3)\pm\sqrt{(-3)^2-4(2)(-3)}}{2(2)}$

$= \frac{3\pm\sqrt{33}}{4}$

$x = \left\{\frac{3+\sqrt{33}}{4}, \frac{3-\sqrt{33}}{4}\right\}$

20. $A^T = \begin{bmatrix} 5 & -\sqrt{17} & 8 \\ 2 & 0.7 & 3 \\ 2 & 5/2 & 1 \end{bmatrix}$

$(A^T)^T = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix} = A$

21. $r = \sqrt{25^2-24^2}$

$= \sqrt{625-576} = 7$ cm

22. $\frac{y-10}{12-10} = \frac{x-6}{14-6}$

$\frac{y-10}{2} = \frac{x-6}{8}$

$8y-80 = 2x-12$

$2x-8y+68=0$

$\boxed{x-4y+34=0}$

23. $m_1 = \frac{-1}{-2} = \frac{1}{2}$

$m_2 = \frac{-6}{3} = -2$

$m_1 \times m_2 = \frac{1}{2}\times -2 = -1$

$\therefore$ They are $\perp^r$.

24. $\sec\theta - \cos\theta$

$= \frac{1}{\cos\theta} - \cos\theta = \frac{1-\cos^2\theta}{\cos\theta}$

$= \frac{\sin^2\theta}{\cos\theta} = \frac{\sin\theta}{\cos\theta}\cdot\sin\theta$

$= \tan\theta \cdot \sin\theta$

25. $\pi r^2 = 1386$

$\therefore$ TSA $= 3(1386) = 4158$ m^2

26. $4\pi r_1^2 = 3\pi r_2^2$

$\left(\frac{r_1}{r_2}\right)^2 = \frac{3}{4}$

$\frac{r_1}{r_2} = \frac{\sqrt{3}}{2}$

ratio of volumes: $\frac{\frac{2}{3}\pi r_1^3}{\frac{2}{3}\pi r_2^3}$

$= 2\left(\frac{r_1}{r_2}\right)^3 = 2\left(\frac{\sqrt{3}}{2}\right)^3$

$= 2\left(\frac{3\sqrt{3}}{8}\right) = \frac{3\sqrt{3}}{4}$

∴ ratio = $3\sqrt{3} : 4$

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27. $S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$.

28. $\sigma = \sqrt{\frac{21^2-1}{12}} = \sqrt{\frac{440}{12}} = \sqrt{36.67}$

$\simeq 6.06$

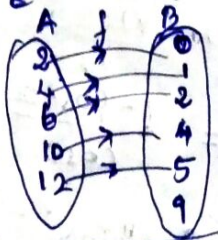
Part - III

29. $f(2) = 2/2 - 1 = 0$, $f(4) = 1$, $f(6) = 2$

$f(10) = 4$, $f(12) = 5$

i) $f = \{(2,0), (4,1), (6,2), (10,4), (12,5)\}$

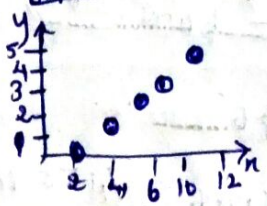
ii)



iii)

x	2	4	6	10	12
f(x)	0	1	2	4	5

iv)



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30. $fog = 9x^2$

$(fog)oh = 9(x-2)^2 \longrightarrow ①$

$goh = 3(x-2)$

$fo(goh) = 9(x-2)^2 \longrightarrow ②$.

Hence proved.

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31. $x + 2y - z = 6$

$3x - 2y + 5z = -12$

$-2x + 4z = -6 \rightarrow ④$

$-2x + 4z = -6$

③×2 $2x - 4z = 6$

$0 = 0$

∴ It has infinitely many solution.

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32. $3 + 33 + 333 + \ldots$ n terms

$= 3(1 + 11 + 111 + \ldots$ n terms$)$

$= \frac{3}{9}(9 + 99 + 999 + \ldots$ n terms$)$

$= \frac{1}{3}[(10 + 100 + \ldots$ n terms$) - (n)]$

$= \frac{1}{3}\left[\frac{10(10^n - 1)}{10 - 1} - n\right]$

$= \frac{10}{27}(10^n - 1) - \frac{n}{3}$ //

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33. $-100 \ldots\ldots -6, -4, -2$.

$d = -2 - (-4) = 2$

$\therefore a = -100$, $n = 12$

$t_{12} = -100 + 11(2)$

$= -100 + 22 = -78$

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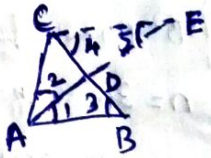
34. Proof

To prove: $\frac{AB}{AC} = \frac{BD}{DC}$



Proof:

$\angle 3 = \angle 4$

$\angle 1 = \angle 5 \rightarrow ①$ (corresponding angles)

$\therefore \triangle ABD \sim \triangle DCE$

$\frac{AB}{CE} = \frac{BD}{DC}$

$\angle 1 = \angle 2$ (bisector)

$\angle 2 = \angle 5$ (from ①)

$\therefore AC = CE$ (opposite sides to equal angles)

$\therefore \frac{AB}{AC} = \frac{BD}{DC}$

Hence proved //.

35. $AB = \begin{bmatrix} 0 & 9 \\ 5 & -4 \end{bmatrix}$

$AB^T = \begin{bmatrix} 0 & 5 \\ 9 & -4 \end{bmatrix}$ — ①

$B^T A^T = \begin{bmatrix} 0 & 5 \\ 9 & -4 \end{bmatrix}$ — ②

Hence proved.

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36. Area $= \frac{1}{2}\begin{Vmatrix} -8 & -9 & -6 & -1 & -8 \\ 6 & 0 & -3 & -2 & 6 \end{Vmatrix}$

$= \frac{1}{2}\{33 + 35\} = 34$ sq units.

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37. $r = 5$ cm, $h = 12$ cm, $l = \sqrt{144+25}$

$= 13$ cm.

CSA of cone $= \pi r l = \frac{22}{7} \times 5 \times 13$.

No of caps $= \frac{5720}{\frac{22}{7} \times 5 \times 13} = \frac{5720}{22 \times 5 \times 13} \times 7$

$= 4 \times 7 = 28$

$= 28$ caps //

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38. Solve ① & ②, we get $(0, -2)$

Solve ③ & ④, we get $\left(\frac{-15}{11}, \frac{9}{11}\right)$

equation is $\frac{y+2}{\frac{9}{11}+2} = \frac{x-0}{\frac{-15}{11}-0}$

$\frac{y+2}{31/11} = \frac{x}{-15/11}$

$-15y - 30 = 31x$

$\therefore 31x + 15y + 30 = 0$ //

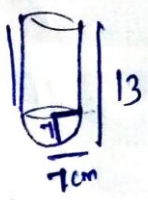
39.

capacity $= \pi r_1^2 h + \frac{2}{3}\pi r_2^3$

$= \pi r^2 (h + \frac{2}{3} r)$

$= \frac{22}{7} \times 7 \times 7 \left(6 + \frac{2}{3} \times 7\right)$

$= 1642.67 \text{ cm}^3$



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40. $\bar{x} = \frac{180}{6} = 30$

$\sigma = 4.319 \simeq 4.32$

$C.V = \frac{4.32}{30} \times 100\ \%$

$= 14.4\ \%$.

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41. $n(S) = 18$

$A = \{7, 21, 35\}$

$B = \{3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37\}$

$A \cup B = \{3, 5, 7, 11, 13, 17, 19, 21, 23, 29, 31, 35, 37\}$

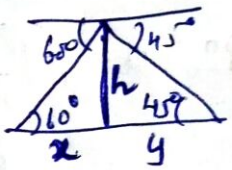
$n(A \cup B) = 13$

$P(A \cup B) = \frac{13}{18}$ //

42.

given

$x + y = 200\left(\frac{\sqrt{3}+1}{\sqrt{3}}\right)$



$\tan 60^\circ = \frac{h}{x}$

$\sqrt{3} = h/x$

$\therefore \boxed{x = h/\sqrt{3}}$

$\tan 45^\circ = \frac{h}{y}$

$1 = h/y$

$\boxed{y = h}$

$\therefore \frac{h}{\sqrt{3}} + h = 200\left(\frac{\sqrt{3}+1}{\sqrt{3}}\right)$

$h\left[\frac{1}{\sqrt{3}} + 1\right] = 200\left(\frac{\sqrt{3}+1}{\sqrt{3}}\right)$

$h\left[\frac{1+\sqrt{3}}{\sqrt{3}}\right] = 200\left(\frac{\sqrt{3}+1}{\sqrt{3}}\right)$

$\boxed{h = 200 \text{ m}}$

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43) Practical Geometry

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44 a) nature of solutions.

The roots are real and unequal

b) solution is $\{-4, 1\}$.