Class – X

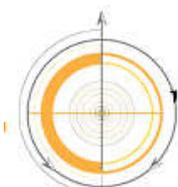**Time: 3hrs.**

M.M.: 80marks

SECTION – 'A' (carry one mark each)

1. A real number $\dfrac{2^2 \times 3^2 \times 7^2}{2^2 \times 5^2 \times 3^2 \times 7^2}$ will have:
   - (a) Terminating decimal
   - (b) Non-terminating decimal
   - (c) Non terminating & non-repeating decimal
   - (d) Terminating repeating decimal

2. If α and β are the zeroes of the polynomial $f(x) = x^2 + px + q$ then a polynomial having $\dfrac{1}{\alpha}$ and $\dfrac{1}{\beta}$ as its zeroes is:
   - (a) $x^2 + qx + p$
   - (b) $x^2 - px + q$
   - (c) $qx^2 + px + 1$
   - (d) $px^2 + qx + 1$

3. In equilateral ΔABC, AD is altitude on BC, then 4AD² equals:
   - (a) 2BD²
   - (b) 2DC²
   - (c) 2AB²
   - (d) 3AB²

4. If $2cot\theta = 5$, then $\dfrac{5sin\theta - 3cos\theta}{5sin\theta + 3cos\theta}$ is equal to:
   - (a) $\dfrac{5}{3}$
   - (b) $\dfrac{3}{5}$
   - (c) 0
   - (d) $\dfrac{4}{5}$

5. The value of $tan1° tan2° tan3° \dots \dots tan89°$ is equal to:
   - (a) 1
   - (b) 0
   - (c) -1
   - (d) $tan1°$

6. If $xtan45°cos60° = sin60°cot60°$, then x is equal to:
   - (a) 1
   - (b) $\sqrt{3}$
   - (c) $\dfrac{1}{2}$
   - (d) $\dfrac{1}{\sqrt{2}}$

7. According to the fundamental theorem of Arithmetic, if $p(prime\ number)$ divides b^2 and b is positive, then:
   - (a) b divides p
   - (b) b^2 divides p
   - (c) p^2 divides b^2
   - (d) p divides b

8. The value of k for which the system of equations:
   $2x + 3y = 5$; $4x + ky = 10$ has infinite number of solutions is:
   - (a) 1
   - (b) 3
   - (c) 6
   - (d) -3

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9. $\dfrac{sin\theta - 2sin^3\theta}{2cos^3\theta - cos\theta}$ is equal to:

(a) $\dfrac{sin^2\theta}{cos\theta}$

(b) $tan\theta$

(c) $\dfrac{cos^2\theta}{sin\theta}$

(d) $cot\theta$

10. $'More\ than'\ ogive$ is:

  (a) An ascending curve

  (b) A descending curve

  (c) First ascending curve and then descending curve

  (d) First descending curve and then ascending curve

SECTION – 'B' (carry two marks each)

11. Why 15^n cannot end with 0?

12. For what value of k , the polynomial $x^4 + 10x^3 + 25x^2 + 15x + k$ is exactly divisible by $(x + 7)$?

13. Solve : 41x + 53y = 135 ; 53x + 41y = 147

14. If $sin\ 3\theta = cos\ (\theta - 6°)$ where $3\theta\ and\ \theta - 6°$ are acute angles, $find\ \theta$.

OR

If $cos\ \alpha = \dfrac{1}{2}\ and\ tan\ \beta = \dfrac{1}{\sqrt{3}}$, find the value of $sin\ (\alpha + \beta)$ where α, β are the acute angles.

15. The area's of two similar Δ's ABC & DEF are $36cm^2$ & $81cm^2$ respectively. If $EF = 6.9cm$, find BC.

16. ΔABC is a Δ such that AB = AC & D is a point on the side AC such that $BC^2 = Ac \times CD$. Prove that BD = BC.

17. If the mean of the following data is 21.5, find the value of k.

x	5	15	25	35	45
y	6	4	3	k	2

18. The following distribution gives the daily income of 50 workers of a factory.

Daily income (in Rs)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

Convert the distribution above to a less than type cumulative frequency distribution and draw its ogive.

SECTION – 'C' (carry three marks each)

19. A sweetseller has 420 *kaju barfis* and 130 *badam barfis*. She wants to stack them in such a way that each stack has the same number, and they take up the least area of the tray. What is the maximum number of *barfis* that can be placed in each stack for this purpose?

20. Use Euclid's division lemma to show that the square of any positive integer is either of the form $3m$ or $3m + 1$ for some integer m.

OR

Prove that $\sqrt{2} - \sqrt{5}$ is irrational.
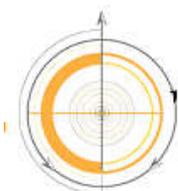
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21. A man sold a table & chair together for Rs. 850 at a loss of 10% on the table and gain of 10% on the chair. By selling them together for Rs. 950, he would have a profit of 10% on the table & loss of 10% on the chair find cost price of each.
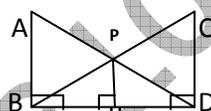
OR

If twice the son's age in yrs is added to the father's age, the sum is 70. But if twice the father's age is added to the son's age, the sum is 95. Find the ages of father & son.

22. Find a quadratic polynomial whose one zero is 5 & product of zeroes is 30.

23. Prove that $(\sec A + \tan A - 1)(\sec A - \tan A + 1) = 2\tan A$

24. If $sin\,\theta + cos\,\theta = p$ and $sec\,\theta + cosec\,\theta = q$; show that $q(p^2 - 1) = 2p$

25. In the fig. ΔABC at $\angle B = 90°$. If $AB = x, CD = y$ & $PQ = z$,

then prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$.

26. Prove that the areas of two similar Δ's are in the ratio of the squares of the corresponding altitudes.

27. The mean of the following distribution is 25. If the total frequency is 106, find the missing frequencies:

| x	19	21	23	25	27	29	31
y	13	15	f_1	18	16	f_2	13

OR

A life insurance agent found the following data for distribution of ages of 100 policy holders. Calculate the median age, if the policies are only given to persons having age 18 years onwards but less the 60 years:

Age(in years)	Number of policy holders
Below 20	2
Below 25	6
Below 30	24
Below 35	45
Below 40	78
Below 45	89
Below 50	92
Below 55	98
Below 60	100

28. The following distribution gives the height of the student of the class. Calculate the modal height.

Height(in cm)	160-163	163-166	166-169	169-172	172-175
No. of students	15	118	142	127	18
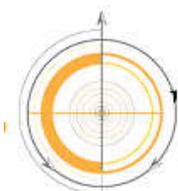
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SECTION – 'D' (carry four marks each)

29. Obtain all the zeroes of $2x^4 - 2x^3 - 7x^2 + 3x + 6$, if two of its zeroes are $\pm\sqrt{\frac{3}{2}}$.

30. In a ∆ABC, P divides the side AB such that $AP:PB = 1:2$, Q is a point on AC such that PQ || BC. Find the ratio of the area of ∆APQ & trapezium BPQC.

OR

D, E, F are the mid-points of side BC, CA & AB respectively of a ∆ABC. Determine the ratio of the areas of ∆DEF & ∆ABC.

31. If $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ and $\frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1$;

Prove that $\left(\frac{x}{a}\right)^2 + \left(\frac{y}{b}\right)^2 = 2$

OR

Evaluate: $2\frac{\cos 67°}{\sin 23°} - \frac{\tan 40°}{\cot 50°} - \cos 0° + \tan 15° \tan 25° \tan 60° \tan 65° \tan 75°$

32. Find A and B, if:

(i) $\sin(A + 2B) = \frac{\sqrt{3}}{2}$ and $\cos(A + B) = \frac{1}{2}$

(ii) $\tan(A + B) = 1$ and $\sin(2A - B) = 1$

33. Draw the graph of the system of equations $x + y = 5$ & $2x - y = 2 = 0$. Shade the region bounded by these lines & the x-axis. Find the area of the shaded region.

34. Draw a 'less than' and also a 'more than' ogive for the data given below and hence find the value of the median:

Marks	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
No. of students	9	42	61	140	260	102	71	23	2
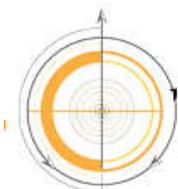
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Answers:

1. (a)
2. (c)
3. (d)
4. (c)
5. (a)
6. (a)
7. (d)
8. (c)
9. (b)
10.(b)
12. k=-91
13. X=2,x=4
14. $\theta = 24°$ **OR** 1
15 BC=46cm
17. k=5
19. HCF=10
21.cost of a tab =Rs70,cost f a chair=Rs200 **OR** 15yrs,40yrs
22. x^2-11x+30
27. f_1=16, f_2=15 **OR** 35.76yrs
28. 167.85cm
29. (2,-1)
30. 1:8 **OR** 1:4
31. **OR** $\sqrt{3}$
32. (i) A=60°, B=0°
(ii) A=45°, B=0°

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