Mathematics

Class X

Max.Marks: 80

Section B has 6 questions of 2 marks each, Section C has 10 questions of 3 marks each and Section D has 8 questions of 4 marks each.

All questions are compulsory.

There is no overall choice. However, internal choices are given in 4 questions of 3 marks and 3 questions of 4 marks. Answer any one of the alternatives in such cases.

Section-A

1. 3^{rd} term of an A.P. is 11, 10^{th} term is 12 more than 6^{th} term. Find A.P.

   OR

   Check whether - 7o is a term of A.P. 5,2,-1,-4…..? If 'yes' which term?
2. Express $\frac{8}{625}$ as a decimal number.
3. Distance between (6,-3) and (2,y) is 2√5 units. Find 'y'.
4. ABCD is a trapezium with AB||DC and AB = 2CD. Diagonals intersect at 'O'. If area of ΔAOB = 84cm^2, find area of ΔCOD.
5. If *x = a and y =b* are solutions of systems of equation *x + y = 7 : x-2 y = 1* find '*a*' and '*b*'.
6. If tan A + cot A = 2 find $\tan^2 A + \cot^2 A$ **OR** If 2 $\sin^2 A$ = ½ , find A

Section-B

7. Prove that $n^2 - 1$ is divisible by 8 if 'n' is odd

OR.

Show that every odd positive integer is of the form 4q+1 or 4q +3 for some integer q.

8. The line segment joining points (4,-4) and (1,2) is trisected at P(a,-2) and Q(2,b). Find 'a' and 'b'.

9. A bag contains 8 red, 6 blue and some green balls. By adding 8 more green balls the probability of drawing a green ball becomes 5/4 times the probability of drawing a red ball. Find the original number of green balls.

10. If the zeroes of the polynomial $8x^3 - 42x^2 + 143x - 315$ are in A.P find the zeroes.

11. Find the zeroes of 4x2 – 3x - 1 by factorization. **OR** if α, β are zeroes of the polynomial 3x2 – 4x – 7 then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

12. All jacks from a well shuffled pack of cards are removed. One card is drawn at random. Find the probability that the drawn card is (i) a king (ii) a black card.

Section-C

13. If α,β are zeroes of polynomial $2x^2 - 3x - 4$, find a polynomial whose zeroes are 1 +2α and 1+2β.

OR

Find 'k' such that the pair of equations *x + 2y= 3 ; (k-1)x + (k+1)y = (k+2)* has no solution.

14. 336 Mathematics books, 192 English and 288 Science books are to be are to be arranged in rows in a shelf such that each row contains books of same subject. Find the number of books in each row and the number of rows required.

15. Vertices of a triangle are (1,k), (4,-3) , (-9,7) and its area is 15 sq,units. Find 'k'

OR

Vertices of a ΔABC are A(10,-6), B(2,5) and C(-1,1). Find the length of altitude on BC.

16. Prove that tangents from an exterior point are equal. Two circles touch each other externally at P. AB is a common tangent to circles touching them at A and B. A tangent through meets AB at C. Prove that C bisects AB.
17. ABC is an equilateral triangle. D is a point on BC such that BC=3BD. Prove that $9AD^2 = 7AB^2$
18. A field is in the form of an equilateral triangle of side 20 m. Three cows are tethered three corners with ropes of length 7 m. Find the ungrazed area of the field.(√3= 1.73)

OR

Find the area of minor segment of a sector of a circle of radius 3.5 cm and central angle 60° correct upto two places of decimal.

19. Find the modal mark of the following data:

Marks	0 &above	20& above	40&above	60&above	80&above	100&above
No.of students	50	47	40	20	5	0

20. Four times a two digited number is equal to seven times the number obtained by reversing the digits. If the sum of the digits is 9, find the number.
21. Evaluate : $\frac{3\cos 55^\circ}{7\sin 35^\circ} - \frac{4\cos 70^\circ \operatorname{cosec} 20^\circ}{7\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ}$

OR

Prove : $\frac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta - 1} + \frac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta + 1} = 2\sec^2\theta$

22. ΔABC is right angled at B. BC= 4 cm and AC = 5 cm. Using B as centre and radius equal to BC a quadrant is drawn and using AC as diameter a semicircle is drawn. Find the area enclosd between two circular parts. (π = 3.14).

Section-D

23. Two pipes together can fill a tank in $4\frac{4}{9}$ hours. If the pipe with larger diameter takes 2 hours less than the smaller pipe find the time taken by them individually to fill the tank.

OR

An aeroplane left 30 minutes late due to bad weather. In order to reach its destination 2400 kms away its speed was increased by 20km/h. Find the usual speed of the plane.

24. Ages of all boys in a group form an AP with common difference of 3 months. If the youngest is 12 years old and sum of their ages is 238 years, find the number of boys in the group.

OR

Solve for 'x' and 'y'. : $\frac{x}{a}+\frac{y}{b}=2$; $ax+by = a^2 - b^2$

25. . The mean of the following data is $166\frac{9}{26}$ find the missing frequencies if total observations 52

Class Int	140-150	150-160	160-170	170-180	180-190	190-200
Freq	5	X	20	y	6	2

26. A parachute descending vertically makes an angle45° and 60° at two observation points 100 m apart on his left side. Find the height he is falling from and the distance from the nearest point.

OR

A person standing on the deck of a boat 50 m above water level observes angle of elevation of a cloud to be 30° and angle of depression of its reflection in water to be 60°. Find the height of the cloud.

27. State and prove Pythagoras theorem. ABC is a right triangle right angled at B. D is the foot of the perpendicular from B. DM⊥ BC and DN⊥ AB. Prove $DM^2 = DN.MC$
28. A bucket is in the form of a frustum of a cone with a hemispherical lid. The top and bottom radii of the bucket are 42cm and 33cm. If its height excluding the lid is 40 cm find area of the metal used to make the bucket correct to two places of decimal.
29. If $\sin\theta = \frac{c}{\sqrt{c^2+d^2}}$, and $d > 0$ find the values of $\tan\theta$ and $\cos\theta$.
30. Construct a triangle ABC in which AB = AC= 4.5 cm BC = 3.5 cm and then construct another triangle whose sides are ⅓ of the original triangle.