SAMPLE QUESTION PAPER MATHEMATICS
Class: X

Time: 3 hrs   **Marks: 80**

General Instructions

1. All questions are compulsory
2. The question paper consists of 25 questions divided in to three sections A, B and C .Section A
   contains 7 questions of 2 marks each .Section B is of 12 Questions of 3 marks each and section C of 6
   Questions of 5 marks each
3. There is no overall choice .However ,internal choice has been provided in two questions of
   two marks each, two questions of three marks each, two questions of five marks each
4. In question on construction, drawing should be neat exactly as per the given measurements.
5. Use of calculators is not permitted.

SECTION - A

Q1. If **x+3** is a factor of $x^3 + ax^2 + bx + 9$ and $a + b = 14$ find **a** and **b**

Q2. If **(x – α)** is the H.C.F of **x² + ax + b** and **x² + bx + a** then find the value of **α** and also find
the value of **a+b+1**

Q3. A mixi is available for **Rs 5,400** cash or **Rs 1,400** cash down payment followed by **Rs 4,240**
after **6 months** .Find the rate of interest charged under this instalment scheme.

Q4. Cards marked with all **2-digit numbers** are placed in a box and thoroughly mixed up. One card is
picked at random. Find the probability of getting
(i)   A number divisible by 10
(ii)   A perfect square

Q5. What is the difference between the **20ᵗʰ terms** of two AP with same common difference
and first terms **3** and **8**? Justify your answer.
OR
Find the number of terms of the AP **54, 51, 48 ...** so that their sum is **513**.

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Q6. Solve for x

$$4x^2 + 2(a-b)x - ab = 0$$

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

Solve for x:

$$x^2 - 4ax + 4a^2 - b^2 = 0$$

Q7. Prove that a cyclic parallelogram is a rectangle.

<div align="center">**SECTION - B**</div>

Q8. The height of a cylinder is 15 cm. the curved surface area is 660 cm². Find the radius .

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

The circumference of the edge of a hemispherical bowl is 132 cm. find the capacity of the bowl

Q9. Express the following expression as a rational expression in its lowest terms
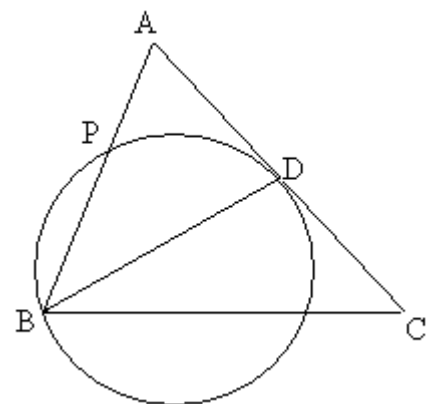
$$\frac{x^4 - 8x}{2x^2 + 5x - 3} \quad x \quad \frac{2x - 1}{x^2 + 2x + 4} \quad x \quad \frac{x+3}{x^2 - 2x}$$

Q10. In a flight of **2800 km**, an aircraft was slowed down due to bad weather. The average speed of the trip was reduced by **100 Km/hr** and the time increased by **30 minutes**. Find the original duration of the flight.

Q11. A computer is available for **Rs 39300** cash or for **Rs 12820** cash down payment and three equal half yearly installments .If the dealer charges interest at the rate of 20% per annum compounded semi annually , Calculate each installment

Q12. If a, b, c are pth, qth, rth terms of an AP then prove that

$$a(q-r) + b(r-p) + c(p-q) = 0$$

Q13. In the given figure ABC is a triangle in which $AB = AC$
A circle through B touches AC at D and intersects AB at P .If
D is the mid point of AC, show that $4AP = AB$

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Q14. Prove that $\dfrac{1+\cos\theta}{1-\cos\theta} = \dfrac{\tan^2\theta}{(\sec\theta-1)^2}$

OR

Without using trigonometric table evaluate

$$\dfrac{Cos\,58^0}{Sin\,32^0} + \dfrac{Sin\,22^0}{Cos\,68^0} - \dfrac{Cos\,38^0\,Co\sec\,52^0}{\tan\,18^0\,\tan\,35^0\,\tan\,60^0\,\tan\,72^0\,\tan\,55^0}$$

Q15. Prove that the points **(-2,-1)** ,**(1,0)** ,**(4,3)** and **(1,2)** are the vertices of parallelogram .Is it a rectangle.

Q16. **A (-1, 0), B (1, 2), C (5,-2)** are the three vertices of a rectangle ABCD. Find the coordinates of the point D.

Q17. Mukesh's monthly salary is **Rs18000**.He plans his budget for a month as given below

Item	Food	Rent	Education	Savings	Misc	Total
Amount(Rs)	5250	3500	3250	4000	200	18000

Represent the above data in a pie chart.

Q18. Construct Δ ABC having **perimeter 14 cm** and $\langle B = 60^0$,$\langle A = 30^0$ then construct the circumcircle of the triangle.

Q19. Solve the following system linear equations graphically **3x—4y = 12, 2x+y- 2 =0**. Also find the coordinates of the points where the lines meet the X axis

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SECTION – C

Q20. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.
Use the above theorem, to prove that
PR^2 = PQ^2 + QR^2 –2 QM .QR
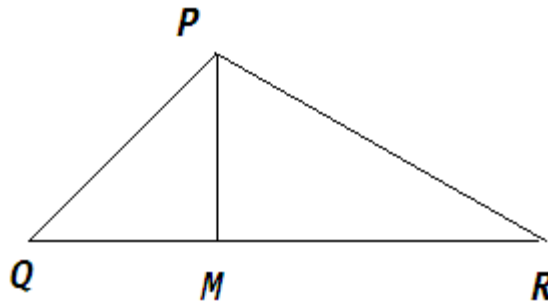
Q21. If a line touches a circle and from the point of contact, a chord is drawn, show that the angles which the chord makes with the given line are respectively equal to the angles formed in the corresponding alternate segment.
Using the above theorem, in fig **PQ II AB**, Given PQ is a tangent to the circle at X, Prove that **XA = XB**
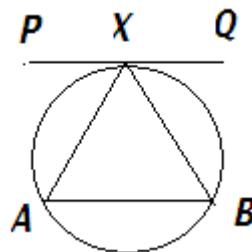
Q22. A cone of height **15 Cm** and diameter **7 Cm** is mounted on a hemisphere of the same diameter .Determine the volume of the solid thus formed .(use $\pi = \dfrac{22}{7}$)

OR

Find the number of bricks each measuring $25Cm \times 16Cm \times 10Cm$ required to construct a wall **24m long, 6m high and 0.4m thick** The mortar occupies $\dfrac{1}{10}^{th}$ of the volume of the wall.

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Q23. A person standing on the bank of a river observes that the angle of elevation of the top a tree standing on the opposite bank is 60^0 . When he moves 40m away from the bank, he finds the angle of elevation to be 30^0 . Find the height of the tree and the width of the river

OR

From the top of a building AB, **60 m high**, the angles of depression of the top and bottom of a vertical lamp post CD are observed to be 30^0 and 60^0 respectively find

(i) The horizontal distance between AD and CD.

(ii) The difference between the heights of the building and the lamp post.

Q24. The pie chart (as shown in the figure) represents the amount spent on different sports by a sports club in a year .If the amount spent by the club for hockey is **30,000** .Find the total amount spent and amount spent on each sports
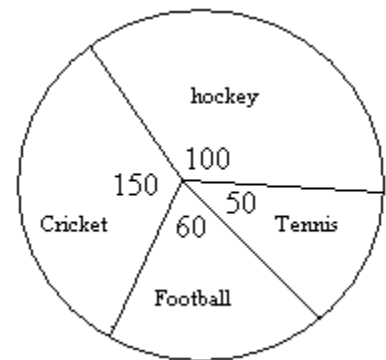
Q25. Monthly income of Mrs. Saritha, who is a Senior citizen, is **Rs35000**. She donates **Rs 25000** Prime Minister's Relief Fund (100% exemption) and **Rs 20000** to a charitable society (50% exemption) .She contributes **Rs 60000** towards PPF annually and pays a quarterly premium of **Rs 4500** towards life insurance .She also purchases NSC's for **Rs 30000** .Find the amount she has to pay towards income tax for the financial year
Use the following for calculating income tax
(a) Savings : 100% exemption for Savings up to Rs 100000
(b) Rate of Income Tax for Senior Citizen :

Slab	Income Tax
Up to 185000	No tax
From 185000 to Rs 250000	20% of the taxable income above Rs 185000
Above Rs 250000	Rs 13000+ 30% of the income exceeding Rs 250000

(c) Education Cess : 2 % of the income tax
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