First Mock Examination – January 2018

Roll No.

Series XXX / 5   **Code No. 041 / 1 / 1**

Please check that this question paper contains 6 printed pages.

Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

Please check that this question paper contains 30 questions.

Please write down the serial number of the question before attempting it.

MATHEMATICS

Class : X   Time allowed : 3 hrs.

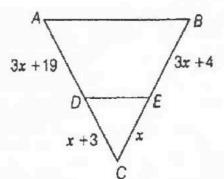Date : 14-01-2018   Maximum marks : 80

General Instructions :

1. All questions are compulsory.

2. The question paper consists of 30 questions into four sections A,B, C and D.
   Section-A comprises of 6 questions of 1 mark each;
   Section-B comprises of 6 questions of 2 marks each;
   Section-C comprises of 10 questions of 3 marks each;
   Section-D comprises of 8 questions of 4 marks each.

3. There is no overall choice. However , an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.

4. Use of calculator is not permitted.

SECTION-A

Question numbers 1 to 6 carry **one** mark each

1.   If two positive integers a and b are written as a = $x^3 y^2$ and b = xy^3; where x, y are prime numbers then find the HCF (a , b).

2.   Find the perimeter of a triangle whose vertices are (0 ,4), (0,0) and (3,0).

3.   In $\triangle$ABC , DE ‖ AB then, find the value of x.

4. If Δ ABC is right angled at C , then find the value of cos (A + B)

5. A cylindrical pencil sharpened at one edge is the combination of :

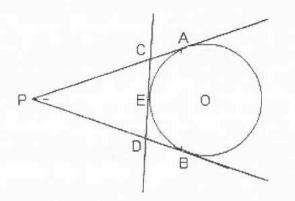6. A card is selected from a deck of 52 cards. Find the probability of its being a red face card.

SECTION-B

Question numbers 7 to 12 carry **two** marks each

7. The sum of first n terms of an AP is given by $S_n = 2n^2 + 3n$. Find the sixteenth term of the AP.

8. Show that the square of any positive integer is either of the form 4q or 4q+1 for some integer q.

9. Find the roots of the quadratic equation by the factorization method.

   $3\sqrt{2}x^2 - 5x - \sqrt{2} = 0$

10. Find the 20th term of an AP whose 7th term is 24 less than the 11th term, the first term being 12.

11. From an external point P, two tangents, PA and PB are drawn to a circle with center O. At one point E on the circle tangent is drawn which intersects PA and PB at C and D , respectively. If PA = 10cm, find the perimeter of the triangle PCD.

12. A paper is in the form of a rectangle ABCD in which AB = 20 cm. and BC = 14 cm. A semicircular position with BC diameter is cut off. Find the area of the remaining paper. (use π = 22/7)

SECTION- C

Question numbers 13 to 22 carry **three** marks each

13. Prove that $3 + 5\sqrt{2}$ is an irrational number.

14. Solve for x and y : $\dfrac{5}{x} + \dfrac{1}{y} = 2$; $\dfrac{6}{x} - \dfrac{3}{y} = 1$ where $x \neq 0$, $y \neq 0$

15. Construct a circle whose radius is equal to 4cm. Let P be a point whose distance from its center is 6 cm. Construct two tangents to it from P. Mention the steps of construction.

16. The line segment joining the points A(3,2) and B(5,1) is divided at the point P in the ratio 1:2 and P lies on the line 3x-18y+k=0. find the value of K.

OR

The points A(4, –2), B(7, 2), C(0, 9) and D(–3, 5) form a parallelogram. Find the length of the altitude of the parallelogram on the base AB.
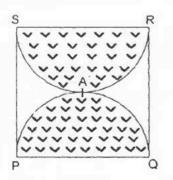
17. Prove that : $\dfrac{\tan\theta}{1-\cot\theta} + \dfrac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\ \text{cosec}\,\theta$

OR

If $\sin\theta + \cos\theta = \sqrt{2}$, then evaluate : $\tan\theta + \cot\theta$

18. The angles of elevation of the top of a tower from the points P and Q at distances of 's' and 't' respectively from the foot of the tower and in the same straight line with it are complementary. Prove that the height of the tower is $\sqrt{st}$

19. PQRS is a square land of side 28m. Two semicircular grass covered portion are to be made on two of its opposite sides as shown in figure. How much area will be left uncovered?
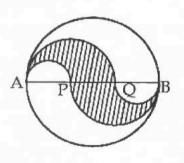
20. A tent is in the shape of a cylinder surmounted by a conical top of same diameter. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs 500 per m². (use $\pi = \frac{22}{7}$)

OR

Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minutes, if 8 cm of standing water is needed?

21. In the given figure, diameter AB is 12 cm long and AB is trisected at point P and Q. Find the area of the shaded region.

OR

In an equilateral triangle ABC, D is a point on side BC such that 4BD = BC.

prove that $16AD^2 = 13BC^2$

22. Two dice are thrown simultaneously. What is the probability that
    (i) 5 will not come up on either of them?
    (ii) 5 will come up on at least once?
    (iii) 5 will come up at both dice?

SECTION- D

Question numbers 23 to 30 carry **four** marks each

A train travels 360 km at uniform speed . If the speed had been 5 km / hr. more it would have taken 1 hour less for the same journey. find the speed of the train.

OR

Check whether the equation $5x^2 - 6x - 2 = 0$ has real roots and if it has, then find them by the method of completing the square. Also verify that roots obtained satisfy the given equation.
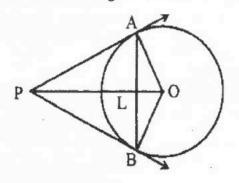
24. If Sn denotes the sum of first n terms of an A.P., prove that $S_{12}=3(S_8-S_4)$.

25. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

OR

Prove that in a triangle, if square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle.

26. The angles of depression of the top and bottom of a building 50 metres high as observed from the top of a tower are 30° and 60°, respectively. Find the height of the tower and also the horizontal distance between the building and the tower.

27. In the given fig. AB is a chord of a circle, with center O, such that AB= 16cm and the radius of circle is 10 cm . Tangents at A and B intersect each other at point P. Find the length of PA.

28. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its center. Draw tangent to the circle from these two points P and Q. Mention the steps of construction.

29. From a solid cylinder whose height is 8cm and the radius is 6cm, a conical cavity of height 8cm and of base radius 6cm is hollowed out. Find the volume and surface area of the remaining solid.

30. During the medical check-up of 35 students of a class their weights were recorded as follows:

Weight (in kg.)	No. of Students
38—40	03
40—42	02
42—44	04
44—46	05
46—48	14
48—50	04
50—52	03

Draw a less than type and a more than type ogive from the given data. Hence obtain the median weight from the graph. *OR*

OR

The following distribution shows the daily pocket allowance of children of a locality. The mean pocket allowance is ₹ 18. Find the missing frequency k.

Daily pocket allowance (in ₹)	11–13	13 –15	15 –17	17–19	19 –21	21 – 23	23 –25
Number of children	3	6	9	13	k	5	4

><><><><><><><