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SET C



INDIAN SCHOOL MUSCAT  
FINAL TERM EXAMINATION  
MATHEMATICS

CLASS: X  
18.11.2018

Sub.Code: 041

Time Allotted: 3 Hrs  
Max.Marks: 80

**General Instructions:**

1. All the questions are **compulsory**.
2. The questions paper consists of **30** questions divided into 4 sections A, B, C and D.
3. **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.
4. There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, 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.
5. Use of calculators is not permitted.

**SECTION – A**  
**(Questions 1 to 6 carry 1 mark each)**

1. Find the area (in square units) of the triangle formed by the points A(a,0), O(0,0) and B(0,b).

**(OR)**

If  $\left(3, \frac{3}{4}\right)$  is the mid-point of the line segment joining the points (k, 0) and  $\left(7, \frac{3}{2}\right)$ , then find the value of k.

2. After how many decimal places will the decimal expansion of  $\frac{26}{2^4 \times 5^3}$  terminate?
3. If  $\sin \theta = \frac{1}{3}$ , then find the value of  $(2 \cot^2 \theta + 2)$

**(OR)**

If  $\sec(7^\circ - 2\theta) = \operatorname{cosec}(5\theta - 7^\circ)$  then find the value of  $\theta$ .

4. Write a quadratic polynomial, the product and sum of whose zeroes are  $\frac{-9}{2}$  and  $\frac{-3}{2}$  respectively
5. Find the mode of the data, using an empirical formula, when it is given that median = 24 and mean = 28
6. If tangents AB and AC from a point A to a circle with centre O are inclined to each other at an angle of  $70^\circ$ , then find  $\angle AOB$

**SECTION – B**  
**(Questions 7 to 12 carry 2 marks each)**

7. Two coins are tossed simultaneously. Find the probability of getting (i) exactly one head (ii) at least one tail.
8. For the following cumulative frequency distribution, find the modal class.

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of students	3	12	27	57	75	80

9. If  $\tan (3x + 30)^\circ = 1$ , then find  $x$ .

**(OR)**

If in  $\triangle ABC$ ,  $\angle A = 90^\circ$  then find the value of  $\cos^2 B + \cos^2 C$ .

10. If a tower 30 m high, casts a shadow  $10\sqrt{3}$  m long on the ground, then what is the angle of elevation of the sun?
11. Draw a circle of radius 3.5 cm. From a point P, 6cm away from its centre, construct a pair of tangents to the circle.

**(OR)**

Draw a line segment AB of length 7 cm. Using ruler and compasses, find a point P on AB such that  $\frac{AP}{AB} = \frac{2}{5}$

12. Given that  $\sin \theta = \frac{15}{17}$ , find the value of  $\frac{3-4 \sin^2 \theta}{4 \cos^2 \theta - 3}$

**SECTION – C**  
**(Questions 13 to 22 carry 3 marks each)**

13. Prove that  $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$

**(OR)**

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

14. In a hospital used water is collected in a cylindrical tank of diameter 4 m and height 5 m. After recycling, this water is used to irrigate a park of hospital whose length is 25 m and breadth is 20 m. If tank is filled completely then what will be the height of standing water used for irrigating the park.

**(OR)**

The radii of internal and external surfaces of a hollow spherical shell are 3 cm and 5 cm respectively. It is melted and recast into a solid cylinder of diameter 14 cm. Find the height of the cylinder

15. Prove that  $\sqrt{5}$  is an irrational number.
16. Solve the following system of equations for x and y:  $\frac{5}{x-1} + \frac{1}{y-2} = 2$ ,  $\frac{6}{x-1} - \frac{3}{y-2} = 1$
17. A top is shaped like a cone surmounted by a hemisphere. The entire top is 7 cm in height and the diameter of the top is 6 cm. If a child wants to colour the top, find the area he has to colour.  
(Take  $\pi = \frac{22}{7}$ )
18. Find the ratio in which the line segment joining the points A (-6,3) and B (2,-5) is divided by y-axis . Also find the co-ordinates of the point of division.
19. Show that  $\triangle ABC$ , where A(-2, 0), B(2, 0), C(0, 2) and  $\triangle PQR$  where P(-4, 0), Q(4, 0), R(0, 4) are similar triangles.

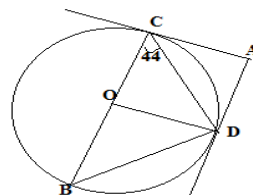
**(OR)**

Show that the points A(3,5), B(6,0), C(1,-3) and D(-2, 2) are the vertices of a square.

20. Cards marked with numbers 1, 3, 5... 49 are placed in a box and mixed thoroughly. One card is drawn from the box. Find the probability that the number on the card is (i) a composite number (ii) Not a perfect square (iii) Multiple of 3 and 5.
21. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that  $\angle PTQ = 2\angle OPQ$

**(OR)**

In the given figure, AC and AD are tangents to a circle with centre O, at C and D respectively. If  $\angle BCD = 44^\circ$ , then find  $\angle CAD$ ,  $\angle CBD$  and  $\angle ACD$



22. Use Euclid's Division Algorithm to find the HCF of 306 and 657.

### SECTION D (Questions 23 to 30 carry 4 marks each)

23. A drinking glass is in the shape of a frustum of a cone of height 14 cm. The diameters of its two circular ends are 16cm and 12cm. Find the capacity and surface area of the glass. (Use  $\sqrt{2} = 1.4$ ,  $\pi = \frac{22}{7}$ )
24. Find all the zeroes of  $2x^4 - 3x^3 - 3x^2 - 2 + 6x$ , if two of its zeroes are  $\sqrt{2}$  and  $-\sqrt{2}$

25. Draw 'less than Ogive' for the following distribution and hence find its median.

Class	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
Frequency	8	12	24	6	10	15	25

26. Construct a  $\triangle ABC$  in which  $BC = 5$  cm,  $AB = 4$  cm and  $AC = 6$  cm. Construct another triangle whose sides are  $\frac{5}{3}$  of the corresponding sides of  $\triangle ABC$
27. If the mean of the following frequency distribution is 65.6, find the missing frequencies:

Class	10 – 30	30 – 50	50 – 70	70 – 90	90 – 110	110 – 130	Total
Frequency	5	8	$f_1$	20	$f_2$	2	50

(OR)

The median of the following data is 32.5. Find the values of x and y, if the total frequency is 40.

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	x	5	9	12	y	3	2

28. Prove that the lengths of tangents drawn from an external point to a circle are equal.
29. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km downstream. Determine the speed of the stream and that of the boat in still water.

(OR)

2 men and 7 women can do a piece of work in 4 days. It is done by 4 men and 4 women in 3 days. How long would it take for one man or one woman to do it?

30. From the top of a 60 m high building, the angles of depression of the top and the bottom of a tower are observed to be  $30^\circ$  and  $60^\circ$  respectively. Find the height of the tower.

(OR)

The angle of elevation of the top of a tower from certain point is  $30^\circ$ . If the observer moves 20 m towards the tower, the angle of elevation of the top increased by  $15^\circ$ . Find the height of the tower.

**End of the Question Paper**