AMRITA VIDYALAYAM

AMRITA II PRE BOARD EXAMINATION - 2017 - '18

Class : X **Marks : 80**

Time : 3 hrs

MATHEMATICS

General Instructions:

1. All questions are compulsory.

2. This question paper consists of 30 questions divided into four sections A, B, C and D.

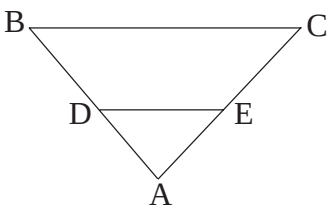
3. Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.

4. 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.

5. Use of calculators is not permitted.

SECTION - A

1. If the HCF (a, b) = 12 and ab = 1800, then find LCM (a, b).
2. If $\sin\theta = 1/3$ then find the value of $2\cot^2\theta + 2$.
3. For an AP if $a_{18} - a_{14} = 32$, then find the common difference d.
4. Find the coordinates of the centroid of a triangle whose vertices are (0, 6), (8, 12), (8, 0).
5. For what value of k will the system of linear equations has infinite number of solutions?
   Kx + 4y = k - 4, 16x + ky = k
6. In figure, DE || BC in ΔABC such that BC = 8cm, AB = 6cm and DA = 1.5cm. Find DE.



SECTION - B

7. Obtain the HCF of 420 and 272 by using Euclid's division algorithm and verify the same by using fundamental theorem of arithmetic.
8. The sum of 4^{th} and 8^{th} term of an AP is 24 and the sum of the 6^{th} and 10^{th} term is 44. Find the AP.
9. A letter is chosen at random from the letters of the word ASSASSINATION. Find the probability that the letter chosen is a a) vowel b) consonant.
10. If the roots of the equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ are equal, then prove that $2b = a + c$.
11. If the points (-2, 1), (a, b), (4, -1) are collinear and a - b = 1, then find the values of a and b.
12. Convert the following frequency distribution to a more than type cumulative frequency distribution.

Marks obtained	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
No. of students	5	9	12	8	6

SECTION - C

13. Obtain all the zeroes of the polynomial $4x^4 + x^3 - 72x^2 - 18x$ if two of its zeroes are $3\sqrt{2}$ and $-3\sqrt{2}$.

OR

If α and β are zeroes of the polynomial $3x^2 + 11x - 4$ find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

14. The length, breadth and height of a room are 8m 25cm, 6m 75cm and 4m 50cm respectively. Determine the longest rod which can measure the three dimensions of the room exactly.
15. The queen, the jack and 10 of spades are removed from a pack of 52 cards. A card is drawn from the remaining well shuffled pack. Find the probability of getting
    a) red card. b) king. c) black card.
16. Without using trigonometric tables, evaluate the following.

$$\frac{\cos^2 20^0 + \cos^2 70^0}{\sec^2 50^0 - \cot^2 40^0} + 2\,\text{cosec}^2\, 58^0 - 2\cot 58^0 \tan 32^0 - 4\tan 13^0 \tan 37^0 \tan 53^0 \tan 77^0.$$

OR

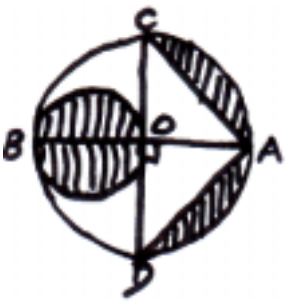
Prove that $\sqrt{\frac{\sec\theta - 1}{\sec\theta + 1}} + \sqrt{\frac{\sec\theta + 1}{\sec\theta - 1}} = 2\,\text{cosec}\theta$.

17. A rectangular water reservoir is 10.8m by 3.75m at the base. Water flows into it at the rate of 18m/s through a pipe having the cross section 7.5 cm by 4.5cm. Find the height to which the water will rise in the reservoir in 30 minutes.

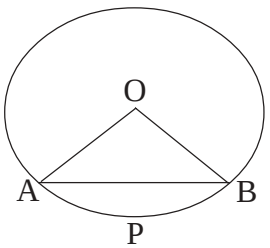
OR

A solid cylinder has a total surface area 462sq.cm. Its curved surface area is one-third of the total surface area. Find the volume of the cylinder.

18. A number consists of two digits. When it is divided by the sum of its digits the quotient is 6 with no remainder. When the number is subtracted by 9, the digits are reversed. Find the number.
19. In the given figure AB and CD are two diameters of a circle with centre O, which are perpendicular to each other. OB is the diameter of the smaller circle. If OA = 7cm, find the area of shaded region.



Find the area of a segment of a circle of radius 14cm if the length of the corresponding arc APB is 22cm.



20. For what value of k, (k > 0) is the area of the triangle with vertices (-2, 5), (k, - 4), (2k + 1, 10) equal to 53 sq units?
21. Draw a ΔABC with side BC = 6cm, AB = 5cm and angle ABC = 60^0. Construct a triangle similar to ΔABC such that its sides are 3/5 of the corresponding sides of ΔABC.
22. ABC is a triangle, right angled at B. AM and CL are two medians. If AC = 5cm and CL = $3\sqrt{5/2}$ cm,

find the length of AM.

SECTION - D

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

OR

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

24. If $\text{cosec}\theta - \sin\theta = m$ and $\sec\theta - \cos\theta = n$ prove that $(m^2n)^{2/3} + (mn^2)^{2/3} = 1$.
25. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangent at P and Q intersect at a point T. Find the length of TP.

26. The pilot of an aircraft flying horizontally at a speed of 1200 km / hr observes that the angle of depression of a point on the ground changes from 30^0 to 45^0 in 15 seconds. Find the height at which the aircraft is flying. ($\sqrt{3} = 1.732$)

OR

A pole of height 5m is fixed on the top of a tower. The angle of elevation of the top of the pole as observed from a point A on the ground is 60^0 and the angle of depression of the point A from the top of the tower is 45^0. Find the height of the tower.

27. The diameters of the lower and upper ends of a bucket in the form of a frustum of a cone are 10cm and 30cm respectively. If its height is 24cm, find
    a) the capacity of the bucket.
    b) the area of metal sheet used to make the bucket.
    c) Why we should avoid the bucket made by ordinary plastic? ($\pi = 3.14$)
28. A motor boat takes 2 hours more to cover a distance of 30 km upstream than it takes to cover the same distance downstream. If the speed of the stream is 2 km / hr, find the speed of the boat in still water.
29. The sum of the first 7 terms of an AP is 63 and the sum of its next 7 terms is 161. Find the 28^{th} term of this AP.

OR

If the sum of the m^{th} and n^{th} term are in the ratio $m^2 : n^2$ then show that m^{th} and n^{th} term are in the ratio $(2m - 1) : (2n - 1)$.

30. Draw less than ogive and more than ogive for the following distribution and hence find its median.

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