

14/Sept./2017

Set - B

FIRST TERM EXAMINATION (14 SEPT 2017)
MATHEMATICS
Class - X

Time Allowed: 3 hours

Maximum Marks: 80

1.

SECTION-A

Question numbers 1 to 6 carry one mark each

1. If a and b are relatively prime numbers, then what is their HCF? 1
2. If the product of zeroes of the quadratic polynomial $f(x) = x^2 - 4x + k$, then find k . 1
3. Find the value of k for which the system of equations $kx - y = 2$; $6x - 2y = 3$ has no solution. 1
4. If the common difference of an AP is -2 find the value of $a_{10} - a_5$. 1
5. If a, b, c are in A.P. Find b . 1
6. Find the value of θ if $2 \cos 3\theta = 1$. 1

SECTION-B

Question numbers 7 to 12 carry two marks each.

7. Can the number 6^n , n being a natural number, end with the digit 0? Give reason. 2
8. Use Euclid's division algorithm to find HCF of 1756 and 144. 2
9. If α and β are the zeroes of the quadratic polynomial $p(y) = 5y^2 - 7y + 1$ then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ 2
10. Determine the 10th term from the end of an AP 4, 9, 14, 254. 2
11. If $\tan A = \sqrt{2} - 1$, show that $\sin A \cos A = \frac{\sqrt{2}}{4}$ 2
12. If $\tan 3A = \cot(A - 26)$, $3A < 90^\circ$ then find the value of $\angle A$ 2

SECTION-C

Question numbers 13 to 22 carry three marks each.

13. Prove $\sqrt{5}$ is an irrational number hence show that $3 + 2\sqrt{5}$ is an irrational number. 3
14. If the zeroes of the polynomial $f(x) = x^3 - 3x^2 + x + 1$ are $a - b, a, a + b$ find a and b . 3
15. A fraction becomes $\frac{4}{5}$, if 1 added to both numerator and denominator. If, however 5 is subtracted from both numerator and denominator the fraction becomes $\frac{1}{2}$, what is the fraction? 3

16. Which term of the sequence $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \dots$ is the first negative term? 3

17. Without using trigonometric tables, evaluate

$$\frac{\sec 39^\circ}{\operatorname{cosec} 51^\circ} + \frac{2}{\sqrt{3}} \tan 17^\circ \tan 28^\circ \tan 60^\circ \tan 52^\circ \tan 73^\circ - 3 (\sin^2 31^\circ + \sin^2 59^\circ)$$

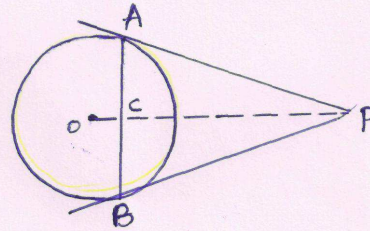
18. If $\sin(A+B) = 1$ and $\sin(A-B) = \frac{1}{2}$, $0^\circ < A+B < 90^\circ$, $A > B$ Find the value of A and B. 3

19. ABCD is a rhombus. Prove that $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$ 3

20. If AD and PM are the medians of triangles $\triangle ABC$ and $\triangle PQR$, respectively where $\triangle ABC \sim \triangle PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$ 3

21. P and Q are the mid points of the sides CA and CB respectively of a $\triangle ABC$, right Angled at C. Prove that $4(AQ^2 + BP^2) = 5AB^2$ 3

22. From an external point P, two tangents PA and PB are drawn to circle with centre O. Prove that OP is the perpendicular bisector of AB. 3



SECTION-D

Question numbers 23 to 30 carry four marks each.

23. Show that the cube of any positive integer is of the form $4m$, $4m+1$, or $4m+3$ for some integer m . 4

24. What must be added to $f(x) = 4x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is divisible by $g(x) = x^2 + 2x - 3$. 4

25. Solve graphically: $x - y = 1$ 4
 $2x + y = 8$

Shade the area bounded by two lines and y-axis. Also, determine this area

26. Show $a_1, a_2, a_3, \dots, a_n$ form an A.P. where a_n is defined as $a_n = 9 - 5n$. Also find the sum of the first 15 terms. 4

27. Prove that, $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$ 4
28. If $\sin \theta = \frac{a}{b}$, find $\sec \theta + \tan \theta$ in term of a and b. 4
29. (i) Prove that ratio of the areas of two similar triangles are equal to the ratio of the squares of any two corresponding sides. 4
(ii) Hence if $\triangle ABC \sim \triangle DEF$ such that $AB = 1.2\text{cm}$ and $DE = 1.4\text{cm}$. Find the ratio of areas of $\triangle ABC$ and $\triangle DEF$
30. Prove that the parallelogram circumscribing a circle is rhombus.