

THE INDIAN SCHOOL, KINGDOM OF BAHRAIN

FIRST TERMINAL EXAMINATION –JULY 2010

STD: XI
SUBJECT: MATHEMATICS

MAX.MARKS: 100
TIME: 3HOURS

General Instructions

1. All questions are compulsory
 2. The question paper consists of **29** questions divided in to three sections A, B and C.
 3. Question numbers **1 to 10** are of **1** mark each, Question numbers **11 to 22** are of **4** marks each and Question numbers **23 to 29** are of **6** marks each.
 4. All the questions in section **A** are to be answered in one word, one sentence or as per the exact requirement of the question.
 5. This question paper contains 3 printed pages
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SECTION A

1. Find the value of $\tan 15^\circ$
2. Find the value of $\sin\left(\frac{-19\pi}{3}\right)$
3. Find the general solution of $\sin 3x = 0$
4. Express $\frac{3-i}{5+6i}$ in standard form
5. Solve $x^2 - 2x + \frac{3}{2} = 0$
6. Solve $4x + 3 < 6x + 7$ for real x
7. State the fundamental theorem of counting
8. Find the middle term(s) in the expansion of $\left(x + \frac{1}{x}\right)^{10}$
9. Find k so that $3k-1, k+1, k+3$ are in A.P
10. Which term of $18, -12, 8, \dots$ is $\frac{512}{729}$

SECTION B

11. Prove that $\frac{\sin 3x + \sin 5x + \sin 7x + \sin 9x}{\cos 3x + \cos 5x + \cos 7x + \cos 9x} = \tan 6x$

OR

If $\tan A = k \tan B$, show that $\sin(A + B) = \frac{k+1}{k-1} \sin(A - B)$

12. Solve $2 \cos^2 x + 3 \sin x = 0$

13. Prove using PMI that $\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \dots + \frac{1}{(3n-2)(3n+1)} = \frac{n}{3n+1}$ For $n \in N$

OR

Prove using PMI that $1.2 + 2.2^2 + 3.2^2 + \dots + n.2^n = (n-1)2^{n+1} + 2$ For $n \in N$

14. Convert into polar form $\frac{1+3i}{1-2i}$

15. If $a+ib = \frac{c+i}{c-i}$, show that $a^2 + b^2 = 1$ and $\frac{b}{a} = \frac{2c}{c^2-1}$

16. A manufacturer has 600 litres of 12% acid solution. How many litres of 25% acid solution should be added to it so that acid content in the resulting mixture is kept between 15% and 18%

OR

Solve the following inequalities and represent the solution on the number line

$5(2x-7) - 3(2x+3) \leq 0$, $2x+19 \leq 6x+47$

17. Find the number of sides of a polygon having 44 diagonals.

18. Find r if ${}^5P_r = 6 {}^5P_{r-1}$

OR

Find the number of permutations of the letters of the word MISSISSIPPI. In how many of them will all the vowels together.

19. Find $(a+b)^4 - (a-b)^4$ and hence find $(\sqrt{3} + \sqrt{2})^4 - (\sqrt{3} - \sqrt{2})^4$

20. Find the term independent of x in the expansion of $\left(x^2 + \frac{1}{2x}\right)^{12}$

21. Find sum to n terms of $3 \times 8 + 6 \times 11 + 9 \times 14 \dots$

22. Find the value of n so that $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ be the Geometric mean of a and b

SECTION C

23. If $\tan((\alpha + \theta) = n \tan(\alpha - \theta))$, Show that $(n+1)\sin 2\theta = (n-1)\sin 2\alpha$

Or

If $\tan x = -\frac{4}{3}$ and x in second quadrant, find the values of $\sin x/2$, $\cos x/2$ and $\tan x/2$

24. Prove using PMI for $n \in N$ $3^{2n+2} - 8n - 9$ is divisible by 8

25. If a and b are two complex numbers such that $|b| = 1$ find the value of $\left|\frac{b-a}{1-\bar{a}b}\right|$

26. Solve graphically $x + 2y \leq 10$, $x + y \geq 1$, $x - y \leq 0$, $x \geq 0$, $y \geq 0$

27. A group consists of 4 girls and 6 boys. In how many ways can a team of 4 members be selected if the team has

- a) At most 2 girls b) at least one boy and one girl c) at least 2 girls

28. Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5.7\dots(2n-1)2^n x^n}{n!}$

OR

The coefficients of the $(r-1)^{th}$, r^{th} , $(r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ratio 1:7:42 Find n and r

29. Find the sum to n terms of the series $3 + 7 + 13 + 21 + 31 + \dots$