THE INDIAN SCHOOL
KINGDOM OF BAHRAIN
FIRST TERMINAL EXAMINATION – JUNE2009

STD: XI **MAX.MARKS: 100**
SUBJECT: MATHEMATICS **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.

PART A

1. A wheel makes 270 revolutions in one minute. Through how many radians does it turn in 1 second?
2. Check whether the statement 1.3+2.5+3.7+……n(2n+1)= n(n+1) is true or false
3. Find the value of tan 15^0
4. Find the multiplicative inverse of 2-2i
5. Solve $x^2+x+\frac{1}{\sqrt{2}} = 0$
6. Solve 8-3x < 2 when x is a natural number.
7. How many three digit even numbers can be formed with the digits 1,2,3,4,5,6,,7
8. Find x if $\frac{1}{9!} + \frac{1}{10!} = \frac{x}{11!}$
9. If ${}^nC_7 = {}^nC_3$ Find ${}^nC_2$
10. Expand $\left(x^2 + \frac{2}{x}\right)^5$ $x \neq 0$ using binomial theorem

PART B

11. Prove that $\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$
12. Solve $2\cos^2 x + 3\sin x = 0$
13. Prove that $\cos^2 x + \cos^2(x+120^0) + \cos^2(x-120^0) = 3/2$

OR

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

14. Prove using P.M.I that $1.3+2.3^2+3.3^3+\ldots\ldots\ldots\ldots n.3^n = \frac{(2n-1)3^{n+1}+3}{4}$

OR

Show that by Principle of mathematical induction that for any natural number n.,

$$\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \ldots\ldots\ldots\ldots\ldots + \frac{1}{(3n-2)(3n+1)} = \frac{n}{3n+1}$$

15. If $(x+iy)^{1/3} = a + ib$, show that $\frac{x}{a} + \frac{y}{b} = 4(a^2-b^2)$

16. Express $\frac{1+2i}{1-3i}$ in polar form

17. How many litres of water will have to be added to 1250 litres of 45% acid solution so that the resulting mixture is between 20% and 25%

18. Solve the following system of linear inequations and represent the solution on the number line $\frac{7x-1}{2} < -3$, $\frac{3x+8}{5} + 11 < 0$

19. If ${}^5P_r = {}^6P_{r-1}$ Find r.

20. How many ways the letters of the word INDEPENDENCE be arranged so that
    1) All the vowels are together.
    2) First letter is C and last letter is I

21. In an examination a question paper consists of 9 questions divided into two parts. Part A has 5 questions and part B has 4 questions. A student has to attempt 6 questions in all, selecting at least 2 questions from each section. In how many ways can the student select the questions?

OR

How many numbers greater than 10,00,00,000 can be formed using the digits 0,1,2,2,3,4,1,4,5

22. Find the value of 102^5 using binomial theorem

PART C

23. Prove that cos (A+B) = cosA cosB – sinA sinB

24. Prove that $\frac{Cos8A\cos 5A - \cos 12A\cos 9A}{\sin 8A\cos 5A + \cos 12A\sin 9A} = \tan 4A$

OR

Prove that $\cos 20^0 \cos 40^0 \cos 60^0 \cos 80^0 = \frac{1}{16}$

25. Prove that $x^{2n} - y^{2n}$ is divisible by x+y

26. If α and β are two different complex numbers so that $|\beta| = 1$ find $\left|\frac{\beta-\alpha}{1-\alpha^{-}\beta}\right|$

27. Solve the following linear inequalities graphically
    $3x-4y+12 \geq 0$; $2x+3y-12 \geq 0$ $2x-y+2 \geq 0$; $x \leq 4$; $y \geq 2$; $x \geq 0$; $y \geq 0$

28. The coefficient of three consecutive terms in the expansion of $(1+a^n)$ are in the ratio 1:7:42. Find n

OR

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

29. Find the coefficient of x^5 in the expansion of the product $(1+2x)^6(1-x)^7$ using binomial theorem.