THE INDIAN SCHOOL, BAHRAIN

II TERM EXAMINATION, 2010

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

SUB: MATHEMATICS **TIME : 3 HOURS**

General Instructions:

1. All questions are compulsory.
2. The question paper consists of 29 questions divided into 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.

SECTION A

1. Find the value of cos 15° .
2. Find the multiplicative inverse of $2 - 3i$.
3. Solve $x^2 - x + 2 = 0$.
4. Solve : $-5 \le \frac{2-3x}{4} \le 9$
5. How many six digit telephone numbers can be formed if each number starts with 176 and no digit appears more than once.
6. Find the number of terms in the expansion of $(1 + 2x + x^2)^{20}$.
7. For what values of x, the numbers $-\frac{2}{7}$, x, $-\frac{7}{2}$ are in G.P.?
8. Find the distance between the parallel lines $3x + 4y + 7 = 0$ and $6x + 8y + 18 = 0$.
9. Find the coordinates of the focus of the parabola $3y^2 + 8x = 0$.
10. Three vertices of a parallelogram are (3, 4, 6), (-1, 0, 6) and (5, 2, 0). Find the coordinates of the fourth vertex.

SECTION B

11. Solve graphically $x + 2y \le 10$, $x - y < 0$, $x \ge 0$, and $y \ge 0$.
12. Find the locus of a point which is equidistant from the points (0, 2, 3) and (2, -2, 1).

13. Find the equation of the hyperbola whose foci are $(0, \pm\sqrt{10})$ and passing through the point $(2, 3)$.

14. Prove the following by the principle of mathematical induction, for any natural number n

$$\frac{1}{3.5}+\frac{1}{5.7}+\frac{1}{7.9}+.....+\frac{1}{(2n+1)(2n+3)}=\frac{n}{3(2n+3)}$$

OR

$$1.3+2.3^2+3.3^3+...+n.3^n=\frac{(2n-1)3^{n+1}+3}{4}$$

15. Convert the complex number into polar form: $\frac{-16}{1+i\sqrt{3}}$.

16. Find the sum of the sequence 8, 88, 888, 8888, ------- to n terms.
OR
Find the sum of n terms of the series $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \ldots$

17. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of: i)at least 3 girls. ii) atmost two girls
OR
If ${}^nC_{r-1} = 36$, ${}^nC_r = 84$ and ${}^nC_{r+1} = 126$, find the values of n and r.

18. If a and b are the lengths of the perpendiculars from the origin to the lines x cosθ - y sinθ = k cos2θ and x secθ + y cosecθ = k ,respectively, prove that $a^2 + 4b^2 = k^2$.

19. Two lines passing through the points (2,3) intersect each other at an angle of 60^0. If slope of one line is 2, find the equation of the other line.

20. Find the equation of a line passing through (2,2) and cutting off intercepts on the axes whose sum is 9.

21. Find the coordinates of the foci, the vertices, the lengths of major & minor axes and the eccentricity of the ellipse $9x^2 + 4y^2 = 36$.

22. Find the coordinates of the points which trisect the segment joining the points
$P(4, 2, -6)$, & $Q(10, -16, 6)$.
OR
Find the ratio in which the line segment joining the points (2, 4, 5) and (3, 5, -4) is divided by the yz-plane. Also find the coordinates of the point of division.

SECTION C

23. Prove that $\dfrac{\sin x\sin 2x+\sin 2x\sin 5x+\sin 3x\sin 10x}{\sin x\cos 2x+\sin 3x\cos 6x+\sin 2x\cos 11x}=\tan 7x$

24. Find the image of the point (-8, 12) with respect to the line 4x + 7y + 13 = 0.

25. Find the equation of the circle passing through the vertices of the triangle whose sides are x + y – 4 = 0, x – y = 2 and 2x – y – 2 = 0.

26. Find n, if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2}+\dfrac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6}:1$.

OR

Find the term independent of x in the expansion of $\left(\sqrt[3]{x}+\dfrac{1}{2\sqrt[3]{x}}\right)^{18}$ $x>1$

27. The sum of two numbers is 6 times their geometric mean. Show that the numbers are in the ratio $3+2\sqrt{2}:3-2\sqrt{2}$

OR

Let S be the sum, P the product and R the sum of reciprocals of n terms in a G.P.
Prove that $P^2R^n = S^n$

28. Find the equation of the line passing through the intersection of the lines 2x + 3y - 2 = 0 and x – 2y + 1 = 0 and perpendicular to the line 5x – 4y + 1 = 0.

29. An arch in the shape of a semi ellipse is 10 m wide at the base and 4 m high at the centre.. Find the height of the arch at a point 2 m from one of the ends.