INTERNATIONAL INDIAN SCHOOL , DAMMAM
MODEL   EXAMINATION   2014
GRADE – 11
SUBJECT : MATHEMATICS

TIME : 3 HOURS   **Max. Marks : 100**

SET – A

General Instructions

1.All questions are compulsory.

2.The question paper consists of **26** questions divided into sections **A, B** and **C**. Section **A** comprises of **6** questions of one mark each, Section **B** comprises of **13** questions of four marks each and Section **C** comprises of **07** questions of six marks each.

3.All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

4.There is no overall choice. However, internal choice has been provided in **04** questions of four marks each and **02** questions of six marks each. You have to attempt only one of the alternatives in all such questions.

5.Use of calculator is not permitted. You may ask for logarithmic tables , if required.

SECTION – A

1. List all the elements of the set B = { x : x is an integer, $x^2 \le 16.$ }

2. Evaluate $\text{Tan} \left(-\dfrac{25\pi}{4} \right)$

3. Evaluate   Cos 75°

4. The sum of infinite G. P   is 6. If the first term is 2, find its common ratio.

5. Find the distance of the point (− 1 , 1) from the line
    5 (y − 2) = 12 (x + 6) .

6. Evaluate $\lim_{x \to 0} \dfrac{\sin ax}{\cos bx}$

SECTION – B

7. The function f is defined by $f(x) = \begin{cases} 1 - x, & x < 0 \\ 1 & x = 0 \\ x + 1 , & x > 0 \end{cases}$

    Draw a graph of $f(x)$. Hence find domain and range of the function.

8. Prove that $\cos 6x = 32 \cos^6 x - 48 \cos^4 x + 18 \cos^2 x - 1$

9. Find the principal and general solutions for
$$\cos 3x + \cos x - \cos 2x = 0$$

10. Prove the following by using the principle of mathematical induction for all $n \in N$
$$\frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \cdots + \frac{1}{(2n+1)(2n+3)} = \frac{n}{3(2n+3)}$$

OR

Prove the following by using the principle of mathematical induction for all $n \in N$, $3^{2n+2} - 8n - 9$ is divisible by 8.

11. Convert the complex number $\dfrac{-16}{1+i\sqrt{3}}$ into polar form.

12. Find the square root of $8 - 15i$.

OR

Find x and y if $(x - iy)(3 + 5i)$ is the conjugate of $(-1 - 3i)$.

13. Find the number of arrangements of the letter of the word 'ATTITUDE' If
   1) the words begin with D and end with E
   2) the vowels are not together.

14. In an examination, a question paper consists of 12 questions divided into two parts A and B containing 5 and 7 questions respectively. A student is required to attempt 8 questions in all, selecting at least 3 from each part. In how many ways can a student select the questions?

15. Find the sum to n terms of the series
   $0.5 + 0.55 + 0.555 + \ldots$

OR

Between 1 and 31, m numbers have been inserted in such a way that the resulting sequence is an A.P. and the ratio of 7th and (m− 1)th numbers is 5 : 9 . find the value of m.

16. Find the coordinates of foci , the vertices ,the length of major axis ,the minor axis ,the eccentricity and the length of latus rectum of the conic section $36\,x^2 + 4\,y^2 = 144$.

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Find the equation of the circle passing through the points (2 , 3) and (– 1 , 1) and whose centre lies on the line $x - 3\,y - 11 = 0$.

17. Using section formula ,prove that $P\,(\,3\,,2\,,-\,4\,)$, $Q\,(\,5\,,\ 4\,,-\,6\,)$ and $R\,(\,9\,,8\,,-\,10\,)$ are collinear.Find the ratio in which Q divides PR.

18. Write the   a) contrapositive , b) component statements, of the following compound statement;
: If you work hard, you will succeed ;
What qualities should we inculcate in life so that we are able to achieve our goals?

19. If $A = \{\,1\,,2\,,3\}$, $B = \{\,3\,,\ 4\,\}$ and $C = \{\,1\,,5\,,3\}$ find
$A \times (\,B \cup C)$, $(A \times B) \cap (A \times C)$
Write the set of four life skills which you would like to acquire.

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SECTION – C

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20. In a survey of 25 students ,it was found that 15 had taken mathematics ,12 had taken physics and 11 had taken chemistry ,5 had taken maths and chemistry, 9 had taken maths and physics ,4 had taken physics and chemistry and 3 had taken all the 3 subjects.Find the number of students that had   a) only chemistry , b) maths and physics but not chemistry , c) none of the subjects , d) at least one of the subjects.

21.   In a triangle ABC prove that,

$$(\,b^2 - c^2\,)\cot A + (\,c^2 - a^2\,)\,cotB + (a^2 - b^2)\cot C = 0\,.$$

22. Solve the following system of linear inequalities graphically,

$$x + y \leq 5, 4x + y \geq 4, x + 5y \geq 5, x \geq 0, y \geq 0.$$

OR

A solution of 8% boric acid is to be diluted by adding a 2 % boric acid solution to it .The resulting mixture is to more than 4% but less than 6% boric acid .If we have 640 litres of the 8% solution,how many litres of the 2% solution will have to be added ?

23. Find a , b and n in the expansion of $(a + b)^n$,if the first three terms of the expansion are 729 , 7290 , 30375 respectively.

24. Find the equation of the line through the point (0 , 2) making an angle of $2\pi/ 3$ with the positive x – axis. Also ,find the equation of line parallel to it and crossing the y-axis at a distance of 2 units below the origin.

OR

Assuming that straight lines work as the plane mirror for a point ,find the image of the point (1 , 2) in the line x – 3y + 4 = 0.

25. Prove that $\dfrac{d}{dx}\left(\dfrac{\sin x + \cos x}{\sin x - \cos x}\right) = \dfrac{-2}{1-\sin 2x}$

26. Find the sum of the following series up to n terms

$$\frac{1^3}{1} + \frac{1^3 + 2^3}{1+3} + \frac{1^3 + 2^3 + 3^3}{1+3+5} + \ldots$$