

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 $B = \{ x : x \text{ is an integer, } x^2 \leq 16. \}$
2. Evaluate $\tan \left(- \frac{25\pi}{4} \right)$
3. Evaluate $\cos 75^\circ$
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 $\lim_{x \rightarrow 0} \frac{\sin ax}{\cos bx}$

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 $n \in N$

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

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 $\frac{-16}{1+i\sqrt{3}}$ 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

$$0.5 + 0.55 + 0.555 + \dots$$

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 $36x^2 + 4y^2 = 144$.

OR

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

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.

SECTION – C

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,

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

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 $\frac{d}{dx} \left(\frac{\sin x + \cos x}{\sin x - \cos x} \right) = \frac{-2}{1 - \sin 2x}$

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

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