

INTERNATIONAL INDIAN SCHOOL - DAMMAM
MODEL EXAMINATION JAN - 2016

GRADE : XI

SET - A

SUBJECT: MATHEMATICS

Max Marks : 100

Time: 3 hours

General Instructions:

1. *All questions are compulsory.*
2. *The question paper consists of 26 questions divided into three sections A, B, C. Section A contains 6 questions of 1 mark each, Section B is of 13 questions of 4 marks each and section C is of 7 questions of 6 marks each.*
3. *Use of calculator is not permitted.*

SECTION – A (6× 1 = 6 Marks)

- 1) Find the slope of the line perpendicular to the line joining the points (2 , 5) and (-3, 6)
- 2) Write the negation of the compound statement,
“ All the students completed their home work and the teacher is present.”
- 3) Find the sum to infinity of the G.P 6, 1.2, 0.24,
- 4) Write the contrapositive and converse of the following statement.
“A positive integer is prime only if it has no divisor other than one and itself.”
- 5) One card is drawn from a pack of 52 cards. Find the probability of the card drawn is either black or king.
- 6) Write the component statements and the connective of the compound statement
“A square is a quadrilateral and its four sides are equal.”

SECTION – B (13 x 4 = 52 Marks)

7) Prove that $\frac{1}{\tan 3\alpha + \tan \alpha} - \frac{1}{\cot 3\alpha + \cot \alpha} = \cot 4\alpha$

8) Find the equation of an ellipse with major axis along the X axis and passes through the points (4, 3) and (6, 2).

OR

Find the equation of the circle with radius 5, whose centre lies on X axis and passes through the point (2, 3).

9) If $A = \{1, 2\}$, $B = \{1, 2, 3\}$, $C = \{1, 5, 7\}$ and $D = \{2, 4, 7\}$. Verify that $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$.

10) Draw the graph of the function $f: R \rightarrow R$ defined by $f(x) = x^2 + 2$.

OR

Find the domain and range of the function $f(x) = \frac{x^2 - 9}{x - 3}$.

11) Let $f(x) = \begin{cases} 3ax + b, & x > 1 \\ 11, & x = 1 \\ 5ax - 2b, & x < 1 \end{cases}$ Find the value of a and b so that $\lim_{x \rightarrow 1} f(x) = f(1)$.

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

OR

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

13) Prove by using the principle of mathematical induction for all $n \in N$,

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

14) Find the coordinates of the foot of the perpendicular from the point (-1, 3) to the line $3x - 4y - 16 = 0$

15) Solve $\sin 2x + \cos x = 0$

OR

Prove that $\tan 4x = \frac{4 \tan x(1 - \tan^2 x)}{1 - 6 \tan^2 x + \tan^4 x}$

16) Differentiate the function $f(x) = \frac{x \cos x}{x \sin x + \cos x}$

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

18) 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) Exactly 3 girls (ii) At most 3 girls.

19) If the first and n^{th} term of a G.P are a and b respectively and if P is the product of n terms, then prove that $P^2 = (ab)^n$.

SECTION – C (7 x 6 = 42 Marks)

20) Find the sum of the following series up to n terms.

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

21) (a) A box contains 5 red marbles, 8 blue marbles and 7 green marbles. 3 marbles are drawn at random from the box, what is the probability that

- (i) All will be blue. (ii) None of them is red. (iii) At least one will be green.

(b) The probability that a student will pass the entrance test in both Maths and Physics is 0.3 and probability of passing neither is 0.2. If the probability of passing the Physics test is 0.6, what is the probability of passing the Maths test.

22) Prove that $\cos 2\theta \cdot \cos \frac{\theta}{2} - \cos 3\theta \cdot \cos \frac{9\theta}{2} = \sin 5\theta \cdot \sin \frac{5\theta}{2}$

OR

If $\tan x = \frac{3}{4}$ $\pi < x < \frac{3\pi}{2}$, find the values of $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$.

23) Find the mean, variance and standard deviation for the following frequency distribution.

Class	0 - 30	30 - 60	60 - 90	90 - 120	120 -150	150-180	180-210
Frequency	2	3	5	10	3	5	2

24) Solve the following system of inequalities graphically.

$$x + y \leq 5, \quad 4x + y \geq 4, \quad x + 5y \geq 5, \quad x \leq 4, \quad y \leq 3.$$

25) The coefficients of the $(r-1)^{\text{th}}$, r^{th} and $(r+1)^{\text{th}}$ terms in the expansion of $(x+1)^n$ are in the ratio 1 : 3 : 5 . Find n and r .

OR

Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5.\dots.(2n-1)}{n!} 2^n x^n$.

26) At break in a school 123 students go to canteen which sells cakes, ice cream, and buns . 42 students buy ice-cream, 36 buy buns and 10 buy only cakes. 15 buy ice-cream and buns, 10 buy ice-cream and cakes, 4 buy cakes and buns but not ice-cream and 11 buy ice-cream and buns but not cakes. Draw a venn diagram to illustrate the above information and find

- (i) How many students buy nothing at all?
- (ii) How many buy at least two items?
- (iii) How many buy all three items?

INTERNATIONAL INDIAN SCHOOL - DAMMAM
MODEL EXAMINATION JAN - 2016

GRADE : XI

SET - B

SUBJECT: MATHEMATICS

Max Marks : 100

Time: 3 hours

General Instructions:

1. *All questions are compulsory.*
2. *The question paper consists of 26 questions divided into three sections A, B, C. Section A contains 6 questions of 1 mark each, Section B is of 13 questions of 4 marks each and section C is of 7 questions of 6 marks each.*
3. *Use of calculator is not permitted.*

SECTION – A (6× 1 = 6 Marks)

1) Write the component statements and the connective of the compound statement

“A square is a quadrilateral and its four sides are equal.”

2) Find the sum to infinity of the G.P 6, 1.2, 0.24,

3) One card is drawn from a pack of 52 cards. Find the probability of the card drawn is either black or king.

4) Write the negation of the compound statement,
“ All the students completed their home work and the teacher is present.”

5) Find the slope of the line perpendicular to the line joining the points (2 , 5) and (-3, 6)

6) Write the contrapositive and converse of the following statement.

“A positive integer is prime only if it has no divisor other than one and itself.”

SECTION – B (13 x 4 = 52 Marks)

7) Differentiate the function $f(x) = \frac{x \cos x}{x \sin x + \cos x}$

8) Find the ratio in which Q divides PR if $P(3, 2, -4)$, $Q(5, 4, -6)$ and $R(9, 8, -10)$ are collinear.

9) Solve $\sin 2x + \cos x = 0$

OR

Prove that $\tan 4x = \frac{4 \tan x (1 - \tan^2 x)}{1 - 6 \tan^2 x + \tan^4 x}$

10) 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) Exactly 3 girls (ii) At most 3 girls.

11) If the first and n^{th} term of a G.P are a and b respectively and if P is the product of n terms, then prove that $P^2 = (ab)^n$.

12) Prove that $\frac{1}{\tan 3\alpha + \tan \alpha} - \frac{1}{\cot 3\alpha + \cot \alpha} = \cot 4\alpha$

13) Find the equation of an ellipse with major axis along the X axis and passes through the points $(4, 3)$ and $(6, 2)$.

OR

Find the equation of the circle with radius 5, whose centre lies on X axis and passes through the point $(2, 3)$..

14) If $A = \{1, 2\}$, $B = \{1, 2, 3\}$, $C = \{1, 5, 7\}$ and $D = \{2, 4, 7\}$. Verify that $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$.

15) Draw the graph of the function $f: R \rightarrow R$ defined by $f(x) = x^2 + 2$.

OR

Find the domain and range of the function $f(x) = \frac{x^2 - 9}{x - 3}$.

16) Let $f(x) = \begin{cases} 3ax + b, & x > 1 \\ 11, & x = 1 \\ 5ax - 2b, & x < 1 \end{cases}$ Find the value of a and b so that $\lim_{x \rightarrow 1} f(x) = f(1)$.

17) Find the square root of $-15 - 8i$

OR

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

18) Prove by using the principle of mathematical induction for all $n \in N$,

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

19) Find the coordinates of the foot of the perpendicular from the point $(-1, 3)$ to the line $3x - 4y - 16 = 0$

SECTION – C (7 x 6 = 42 Marks)

20) Solve the following system of inequalities graphically.

$$x + y \leq 5, \quad 4x + y \geq 4, \quad x + 5y \geq 5, \quad x \leq 4, \quad y \leq 3.$$

21) The coefficients of the $(r-1)^{th}$, r^{th} and $(r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ratio 1: 3: 5. Find n and r .

OR

Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5 \dots (2n-1)}{n!} 2^n x^n$.

22) At break in a school 123 students go to canteen which sells cakes, ice cream, and buns. 42 students buy ice-cream, 36 buy buns and 10 buy only cakes. 15 buy ice-cream and buns, 10 buy ice-cream and cakes, 4 buy cakes and buns but not ice-cream and 11 buy ice-cream and buns but not cakes. Draw a venn diagram to illustrate the above information and find

- (i) How many students buy nothing at all?
- (ii) How many buy at least two items?
- (iii) How many buy all three items?

23) Find the sum of the following series up to n terms.

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

24) (a) A box contains 5 red marbles, 8 blue marbles and 7 green marbles. 3 marbles are drawn at random from the box, what is the probability that

- (i) All will be blue. (ii) None of them is red. (iii) At least one will be green.

(b) The probability that a student will pass the entrance test in both Maths and Physics is 0.3 and probability of passing neither is 0.2. If the probability of passing the Physics test is 0.6, what is the probability of passing the Maths test.

25) Prove that $\cos 2\theta \cdot \cos \frac{\theta}{2} - \cos 3\theta \cdot \cos \frac{9\theta}{2} = \sin 5\theta \cdot \sin \frac{5\theta}{2}$

OR

If $\tan x = \frac{3}{4}$ $\pi < x < \frac{3\pi}{2}$, find the values of $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$.

26) Find the mean, variance and standard deviation for the following frequency distribution.

Class	0 - 30	30 - 60	60 - 90	90 - 120	120 - 150	150 - 180	180 - 210
Frequency	2	3	5	10	3	5	2
