

APEEJAY SCHOOL SHEIKH SARAI-I
FIRST TERMINAL EXAMINATION, 2016-17

SS-26

CLASS-XI
MATHEMATICS

Time allowed : 3 Hrs.

M.M. : 100

General Instructions :

- (i) All questions are compulsory.
- (ii) Question paper consists of 29 questions.
- (iii) Questions 1-4 carry 1 mark each.
- (iv) Questions 5-12 carry 2 marks each.
- (v) Questions 13-23 carry 4 marks each.
- (vi) Questions 24-29 carry 6 marks each.

(SECTION—A)

- 1. Evaluate $i^{35} + \frac{1}{i^{65}}$.
- 2. Find the value of $\sin 765^\circ$.
- 3. Write the solution set of the equation $x^2 + x - 2 = 0$ in roster form.
- 4. Find r , if ${}^{15}C_{3r} = {}^{15}C_{r+3}$.

(SECTION—B)

- 5. Let $U = \{1, 2, 3, 4, 5, 6\}$, $A = \{2, 3\}$ and $B = \{3, 4, 5\}$. Show that $(A \cup B)' = A' \cap B'$.
- 6. Let $A = \{9, 10, 11, 12, 13\}$ and Let $f : A \rightarrow N$ be defined by $f(n) =$ the highest prime factor of n . find the range of f .
- 7. A wheel makes 360 revolutions in two minutes. Through how many radians does it turn in one second ?
- 8. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$.
- 9. Find the value of $\tan \frac{13\pi}{12}$.
- 10. How many 3-digit even numbers can be made using the digits 1, 2, 3, 4, 6, 7 if no digits is repeated ?
- 11. Find a positive value of m for which the coefficient of x^3 in the expansion of $(i+x)^m$ is 6.

P.T.O.

- ✓ 12. Find the number of (i) Triangles and (ii) Straight lines that can be formed from a set of 12 points, seven of which lie on the same straight line.

(SET—C)

- ✓ 13. In a school of 500 students, 125 like chess and 160 like badminton, 45 students like chess and badminton both. Find how many students like neither chess nor badminton. Write the importance of sports in our life.

14. Find the domain of real function f defined by $f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$.

15. Prove that

$$(b+c)\cos\left(\frac{B+C}{2}\right) = a\cos\frac{B-C}{2}$$

16. Prove the following by Principle of Mathematical Induction.

$$1.2+2.3+3.4+\dots+n(n+1) = \frac{n(n+1)(n+2)}{3}$$

- ✓ 17. Convert $-1+\sqrt{3}i$ in Polar form.

- ✓ 18. Solve the following system of inequalities graphically :

$$3x+4y \leq 60, x+3y \leq 30, x \geq 0, y \geq 0$$

19. Find $(a+b)^4 - (a-b)^4$. Hence, evaluate $(\sqrt{3}+\sqrt{2})^4 - (\sqrt{3}-\sqrt{2})^4$.

20. If ${}^n P_r = {}^n P_{r+1}$ and ${}^n C_r = {}^n C_{r-1}$. Find the values of n and r .

- ✓ 21. Find the value of :

$$\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right)$$

22. Define signum function. Draw graph of signum function. Find domain and range of signum function.

23. Solve :

$$\sqrt{3}\cos x - \sin x = 1$$

(SECTION—D)

- ✓ 24. Prove the following by principle of mathematical Induction :

$$3^{2n+2} - 8n - 9 \text{ is divisible by } 8.$$

- ✓ 25. Solve : $2x^2 - (3+7i)x - (3-9i) = 0$.

- ✓ 26. How many litres of water will have to be added to 1125 litres of the 45% solution of acid so the resulting mixture will contain more than 25%, but less than 30% acid content ?

of 12

27. A Group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has (i) no girl? (ii) at least one boy and one girl? (iii) at least 3 girls?

chess

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28. Find n in the binomial $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^n$ if the ratio of 7th term from the beginning to the 7th term from the end is $\frac{1}{6}$.

29. Prove that :

$$\cos^2 x + \cos^2\left(x + \frac{\pi}{3}\right) + \cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$$

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per latest CBSE circular 30% internal choice should be given in 4 and 6 marks questions. Hence optional questions are attached here under.

Choice for

- Q16. Using mathematical induction prove that
 $(2n + 7) < (n + 3)^2, n \in N$
- Q20. The letters of the word "RANDOM" are written in all possible orders and the words are written as in a dictionary. Find the rank of the word RANDOM.
- Q21. Prove that
 $a \cos A + b \cos B + c \cos C = 2a \sin B \sin C$
- Q24. Using Principal of mathematical induction show that :
 $x^{2n} - y^{2n}$ is divisible by $(x - y)$
- Q28. Find the co-efficient of x^5 in the product of $(1 + 2x)^6 (1 - x)^7$ using binomial theorem.
- Q29. Prove that $\sin^3 x + \sin^3\left(\frac{2\pi}{3} + x\right) + \sin^3 x + \sin^3\left(\frac{4\pi}{3} + x\right) = -\frac{3}{4} \sin 3x$