CLASS XI MATHS FULL LENGTH TEST

Time Allowed : 3 Hours **Max. Marks : 80**

General Instructions :

(a) All questions are compulsory.

(b) This question paper consists of **36 questions** divided into **four sections A, B, C and D**.

(c) Section A comprises of **20 questions of one mark** each (from Q01 – 20).
Section B comprises of **06 questions of two marks** each (from Q21 – 26).
Section C comprises of **06 questions of four marks** each (from Q27 – 32).
Section D comprises of **04 questions of six marks** each (from Q33 – 36).

(d) There is no overall choice. However, **internal choice** has been provided in **06 Question of Section A, 02 Questions of Section B, 02 Questions of Section C** and **01 Question of Section D, each**. You have to attempt only one of the alternatives in all such questions.

SECTION A

(Question numbers 01 to 20 carry 1 mark each.)

Choose the correct answer out of the given four options in each of the questions (from **Q01 – Q05**) :

Q01. Value of $\sqrt{i}$ is

(a) $\frac{1}{\sqrt{2}}-i\frac{1}{\sqrt{2}}$ (b) $-\frac{1}{\sqrt{2}}+i\frac{1}{\sqrt{2}}$

(c) $\frac{1}{\sqrt{2}}+i\frac{1}{\sqrt{2}}$ (d) Not possible to find

OR

The value of $\arg.(-1+i)$ is

(a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$

(c) $-\frac{\pi}{4}$ (d) $-\frac{3\pi}{4}$

Q02. The degree equivalent of $\frac{2\pi}{10}$ is

(a) 54° (b) 18°

(c) 56° (d) None of these

OR

The radian measure of angle 22.5° is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{5}$

(c) $\frac{\pi}{8}$ (d) $\frac{\pi}{6}$

Q03. Let $f(x)=\frac{1}{x^2-3}$. Then the Domain of f (x) is

(a) $x \in R-\{\pm\sqrt{3}\}$ (b) $x \in R-\{-\sqrt{3}\}$

(c) $x \in [-\sqrt{3},\sqrt{3}]$ (d) $x \in (-\sqrt{3},\sqrt{3})$

Q04. Let $R=\{(-1,0),(1,2),(3,4),(5,6),(7,8)\}$. Then the Range of relation R is

(a) $\{0,2,4,6,8\}$ (b) {1, 3, 5, 7}

(c) {2, 4, 6} (d) None of these

Q05. Let f be a function defined as $f(0)=1$, $f(2)=3$, $f(3)=4$, $f(4)=f(5)=5$. The roster from of f is

(a) {(2, 3), (3, 4), (4, 5), (5, 6)} (b) {(0, 1), (2, 3), (3, 4), (4, 5), (5, 5)}

(c) {(2, 3), (3, 4), (4, 5)} (d) None of these

Following questions are of **one word** or **short answer type** (from **Q06 – Q10**) :

Q06. Define a singleton set. Give an example in set builder form.

OR

Let $A=\{3,0,3\}$. Then write n(A).

Q07. If $\sin x=-\frac{1}{\sqrt{2}}$, $x \in$ III quadrant, then find x.

Q08. Write the value of ${}^{6}C_{3}$.

OR

Find the value of ${}^{5}P_{2}$.

Q09. Find the solutions of $2x-9 \geq 3$.

Q10. Find the value of an angle θ, in radians, which is made by an arc of length 22 cm at the centre of a circle, having a radius of 7 cm. Use $\pi=\frac{22}{7}$.

Consider the statements given below and justify if it is True/False (from **Q11 – Q15**) :

Q11. "Collection of all smart actors of Bollywood" is a set.

Q12. Let $A=\{2,3\}$ and, $B=\{1,2,3,4,5,6,7,8,9\}$. Then, $n(A \times B)=18$.

OR

For the function $f(x)=|x|$, the range is set of all positive real numbers.

Q13. For P(n) : $\cos\theta.\cos 2\theta.\cos 4\theta.....\cos(2^{n-1}\theta)=\frac{\sin(2^n\theta)}{2^n \sin\theta}$ $\forall$ $n \in N$, P(1) holds valid.

Q14. If $z=\frac{1}{1+i\sqrt{3}}$, then its multiplicative inverse is $1+i\sqrt{3}$.

Q15. Total no. of ways of selecting 3 students from a class of 10 students is given as 60.

Fill in the blanks in the following (from **Q16 – Q20**) :

Q16. Value of $\sin\frac{7\pi}{6}+\cos\frac{13\pi}{3}$ is _____.

OR

Let $y = 3\sin x + 4\cos x + 5$, then the maximum value of y is _____.

Q17. If $\frac{x}{9!}=\frac{1}{8!}+\frac{1}{7!}$, then x is _____.

Q18. For $\left(\frac{1}{x}+x^2\right)^{18}$, the term independent of x is _____ term.

Q19. The roster form of $\{x : x \text{ is a root of } x^2 - x - 2 = 0,\ x \in N\}$ is _____.

Q20. For $\tan x - \cot(90^\circ + x) = 2$, the principal solutions are _____.

SECTION B

(Question numbers 21 to 26 carry 2 marks each.)

Q21. In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl, if each cricket team of 11 must include exactly 4 bowlers?

OR

Find n, if ${}^nP_4 = 20\ {}^nP_2$.

Q22. Expand $(2x - y)^5$, using Binomial theorem. Hence, write the coefficient of 3rd term.

OR

In the expansion of $(1+a)^{m+n}$, prove that the coefficients of a^m and a^n are equal.

Q23. In how many ways can 8 Indians, 6 Americans and 4 Englishmen be seated in a row so that all the persons of the same nationality sit together?

Q24. Write the powerset of A = {x, y}. How many proper subsets are possible for set A?

Q25. Let A and B be two sets such that n (A) = 5 and n (B) = 2. If (a_1, b_1), (a_2, b_2), (a_3, b_1), (a_4, b_2), (a_5, b_1) are in $A \times B$ and a_1, a_2, a_3, a_4, a_5, b_1 and b_2 are distinct, find A and B.
Hence find $B \times A$.

Q26. Let $R = \{(x, y) : x^2 + y^2 = 25, \text{ where } x, y \in W\}$ be a relation. Write the domain of R.

SECTION C

(Question numbers 27 to 32 carry 4 marks each.)

Q27. Let A, B, and C be the sets such that A ∪ B = A ∪ C and A ∩ B = A ∩ C. Show that B = C.

Q28. Solve : $3\tan^2\theta + 2\sqrt{3}\tan\theta - 3 = 0$.

OR

If $\sin x = -\frac{2\sqrt{6}}{5}$ and x lies in III quadrant, find the values of sin 2x, cos 2x and tan 2x.

Q29. A solution of 8% boric acid is to be diluted by adding a 2% boric acid solution to it. The resulting mixture is to be 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?

Q30. Find the polar form of $\frac{1+7i}{(2-i)^2}$.

Q31. In how many ways can the letters of the word PERMUTATIONS be arranged if

(a) the words starts with P and end with S

(b) the vowels are all together

(c) there are always 4 letters between P and S?

OR

How many words, with or without meaning, each of 3 vowels and 2 consonants can be formed from the letters of the word INVOLUTE?

Q32. Find the range of $f(x)=\frac{1}{2x^2-x-3}$.

SECTION D

(Question numbers 33 to 36 carry 6 marks each.)

Q33. Prove that $\cos^2 x+\cos^2\left(x+\frac{2\pi}{3}\right)+\cos^2\left(x-\frac{2\pi}{3}\right)=\frac{3}{2}$.

OR

If $\cot x=-\frac{3}{4}$, where x lie in II Quadrant, find the value of $\operatorname{cosec}\frac{x}{2}$, $\sec\frac{x}{2}$ and $\cot\frac{x}{2}$.

Q34. In a town of 10000 families, it was found that 40% families buy newspaper A, 20% buy newspaper B and 10% buy newspaper C. Also 5% families buy newspapers A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers, find the number of families which buy the newspaper

(a) A only
(b) none of A, B and C
(c) exactly two newspapers
(d) exactly one newspaper
(e) A and C but not B.

Q35. Solve the following system of inequalities, graphically :

$x+y\le 5$,

$4x+y\ge 4$,

$x+5y\ge 5$,

$x\le 4,\ y\le 3$.

Q36. Using induction, show that the product of three consecutive natural numbers is always divisible by 6.