V11M

Virudhunagar District

Common Quarterly Examination - 2023

Standard 11

Time Allowed: 3.00 Hours **MATHEMATICS** Maximum Marks: 90

PART - I

i) **Answer all the questions.** **20×1=20**

ii) **Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.**

1) Let A and B be subsets of the universal set N, the set of natural numbers. Then $A' \cup [(A \cap B) \cup B']$ is ....

a) A b) A' c) B d) N

2) If $n(A) = 2$ and $n(B \cup C) = 3$ then $n[(A\times B)\cup(A\times C)]$ is

a) 2^3 b) 3^2 c) 5 d) 6

3) The function $f:[0, 2\pi] \to [-1, 1]$ defined by $f(x) = \sin x$ is

a) one to one b) on to

c) bijection d) cannot be defined

4) The range of the function $f(x) = \left| \lfloor x \rfloor - x \right|, x\in R$ is

a) [0, 1] b) $[0, \infty)$ c) [0, 1) d) (0, 1)

5) The value of $\log_3 11.\log_{11} 13.\log_{13} 15.\log_{15} 27.\log_{27} 81$ is ....

a) 1 b) 2 c) 3 d) 4

6) The solution of $5x-1 < 24$ and $5x+1 > -24$ is

a) (4, 5) b) (−5, 5)

c) (−5, −4) d) (−5, 4)

7) If a and b are the roots of the equation $x^2-kx+16 = 0$ and satisfy $a^2+b^2 = 32$ then the value of k is ....

a) 10 b) −8 c) −8, 8 d) 6

8) The value $16^{3/4}$ = ...

a) 8 b) $\frac{1}{8}$ c) 4 d) $\frac{1}{(4)^3}$

9) The value of $\cos 1^\circ+\cos 2^\circ+\cos 3^\circ+\ldots\ldots+\cos 179^\circ$ = ________.

a) 0 b) 1 c) −1 d) 89

10) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ = ________.

a) $\frac{\pi}{3}$ b) $\frac{\pi}{6}$ c) $\frac{\pi}{2}$ d) $\frac{\pi}{4}$

11) $\frac{1}{\cos 80^\circ} - \frac{\sqrt{3}}{\sin 80^\circ}$ = ________.

a) $\sqrt{2}$ b) $\sqrt{3}$ c) 2 d) 4

12) In a triangle ABC $\sin^2A+\sin^2B+\sin^2C = 2$ then the triangle is ________.

a) equilateral triangle b) isosceles triangle

c) right triangle d) scalene triangle

13) There are 10 points in a plane and 4 of them are collinear. The number of straight lines joining any two points is

a) 45 b) 40 c) 39 d) 38

14) The number of 5 digit numbers all digits of which are odd is ______.

a) 25 b) 5^5 c) 5^6 d) 625

15) The number of rectangles that a chessboard has

a) 81 b) 9^9 c) 1296 d) 6561

16) 1+3+5+7+.........+17 is equal to

a) 101 b) 81 c) 71 d) 61

17) The co-efficient of x^5 in the series e^{-2x} is ....

a) $\frac{2}{3}$ b) $\frac{3}{2}$ c) $\frac{-4}{15}$ d) $\frac{4}{15}$

18) If a is the arithmetic mean and g is the geometric mean of two numbers then

a) $a \leq g$ b) $a \geq g$ c) $a = g$ d) $a > g$

19) The remainder when 38^{15} is divided by 13 is

a) 12 b) 1 c) 11 d) 5

20) The value of 2+4+6+8+.........+2n is

a) $\frac{n(n-1)}{2}$ b) $\frac{n(n+1)}{2}$ c) $\frac{2n(2n+1)}{2}$ d) $n(n+1)$

PART - II

i) Answer any SEVEN questions only. **7×2=14**

ii) Q.No. 30 is compulsory.

21) If $n(A\cup B) = 10$ and $n(A\cap B) = 3$ then find $n[P(A\Delta B)]$.

22) The weight of the muscles of a man is a function of his body weight x and can be expressed as $w(x) = 0.35x$. Determine the domain of this function.

23) Construct a quadratic equation with roots 7 and −3.

24) Rationalize the denominator of $\frac{\sqrt{5}}{\sqrt{6}+\sqrt{2}}$.

25) Show that $\tan(45^{\circ}+A) = \frac{1+\tan A}{1-\tan A}$.

26) Find the general solution of $\sin\theta = \frac{-\sqrt{3}}{2}$.

27) If $\frac{1}{7!}+\frac{1}{8!}=\frac{A}{9!}$ then find the value of A.

28) A polygon has 90 diagonals. Find the number of its sides.

29) Find the value of 98^4.

30) Find four numbers G_1, G_2, G_3, G_4, so that the sequence $12, G_1, G_2, G_3, G_4, \frac{3}{8}$ is in geometric progression.

PART - III

i) **Answer any SEVEN questions only.** **7x3=21**

ii) **Q.No. 40 is compulsory.**

31) How many three digit numbers, which are divisible by 5, can be formed using the digits 0, 1, 2, 3, 4, 5 if (i) repetition of digits are not allowed (ii) repetition of digits are allowed.

32) Find the range of the function $f(x) = \frac{1}{1-3\cos x}$.

33) Consider the functions (i) $f(x) = x^2$ (ii) $f(x) = x^2+1$ (iii) $f(x) = (x+1)^2$

34) Solve: $x = \sqrt{x+20}$ for $x \in R$

35) Solve: $\frac{3(x-2)}{5} \le \frac{5(2-x)}{3}$

36) Express $\cos 5\theta \cos 2\theta$ as a sum or difference.

37) Find the area of the triangle whose sides are 13 cm, 14 cm and 15 cm.

38) Find the co-efficient of x^{15} in $\left(x^2 + \frac{1}{x^3}\right)^{15}$.

39) Find $\sqrt[3]{65}$

40) Find the distinct permutations of the letters of the word MISSISSIPPI.

PART - IV

Answer the following all questions: **7x5=35**

41) Let $X = \{a, b, c, d\}$ and $R = \{(a, a), (b, b), (a, c)\}$. Write down the minimum number of ordered pairs to be included to R to make it (i) reflexive (ii) symmetric (iii) transitive (iv) equivalence.

(OR)

If $A + B + C = \frac{\pi}{2}$ prove that $\sin 2A+\sin 2B+\sin 2C = 4 \cos A \cos B \cos C$.

42) i) Prove $\log\frac{a^2}{bc} + \log\frac{b^2}{ca} + \log\frac{c^2}{ab} = 0$.

ii) Simplify: $\sqrt{x^2 - 10x + 25}$

(OR)

If the letters of the word TABLE are permuted in all possible ways and the words thus formed are arranged in the dictionary order (alphabetical order). Find the ranks if the words (i) TABLE (ii) BLEAT.

43) State and prove Napier's formula.

(OR)

Find the sum $1 + \frac{4}{5} + \frac{7}{25} + \frac{10}{125} + \ldots\ldots\ldots$

44) Resolve into partial fraction $\frac{x+1}{x^2(x-1)}$.

(OR)

Prove that $C_0^2 + C_1^2 + C_2^2 + \dots\dots\dots + C_1^2 = \frac{(2n)!}{(n!)^2}$.

45) If $\sin A = \frac{3}{5}$ and $\cos B = \frac{9}{41}$, $0<A<\frac{\pi}{2}$; $0<B<\frac{\pi}{2}$. Find the values of sin(A+B) and cos(A−B).

(OR)

Write the values of f at −4, 1, −2, 7, 0 if $f(x) = \begin{cases} -x+4 & \text{if } -\infty < x \le -3 \\ x+4 & \text{if } -3 < x < -2 \\ x^2 - x & \text{if } -2 \le x < 1 \\ x - x^2 & \text{if } 1 \le x < 7 \\ 0 & \text{otherwise} \end{cases}$

46) Simplify: $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2}$

(OR)

Use Mathematical induction, prove that for n≥1

$1^3 + 2^3 + 3^3 + \dots\dots + n^3 = \frac{n^2(n+1)^2}{4}$

47) Prove that $\frac{(2n)!}{n!} = 2^n(1.3.5\dots\dots(2n-1))$

(OR)

If x is so large. Prove that $\sqrt[3]{x^3+6} - \sqrt[3]{x^3+3}$ is approximately equal to $1/x^2$.
