# I PUC MID-TERM EXAMINATION, OCTOBER-2023 (SET-1)

**Time : 3 Hrs. 15 Mins.**    SUBJECT : BASIC MATHEMATICS (75)    **Max Marks : 80**

**Instructions :**
1) The question paper has 5 parts A, B, C, D and E. Answer all the parts.
2) Part-A carries 20 marks, Part-B carries 12 marks, Part-C carries 15 marks, Pard-D carries 25 marks and Part-E carries 8 marks.
3) Write the question number properly as indicated in the question paper in the margin.

## PART - A

**I**    Choose the correct answer (Each question carries 1 mark) :    5x1=5

1) The number of positive divisors of 60 are
   a) 21    b) 12    c) 6    d) 16

2) $\left(x^{1/2} + y^{1/2}\right) \cdot \left(x^{1/2} - y^{1/2}\right) =$
   a) $x - y$    b) $x + y$    c) $\sqrt{x} - \sqrt{y}$    d) $\sqrt{x} + \sqrt{y}$

3) The value of cos A.cosec A is
   a) cos A    b) sin A    c) tan A    d) cot A

4) The value of tan 225° is
   a) $-1$    b) $\sqrt{3}$    c) 1    d) $\dfrac{1}{\sqrt{3}}$

5) The reflection of $(4, -8)$ with respect to y-axis is
   a) $(-4, 8)$    b) $(4, 8)$    c) $(-4, -8)$    d) $(4, -8)$

**II**    Match the following :          5x1=5

6) i) $\left(\dfrac{5x^3}{y}\right)^2$        a) 96

    ii) $\log_2 \dfrac{1}{2} =$        b) 0.08

    iii) $6^{th}$ element of GP. 3, 6, 12, ...... is    c) 157.5 ✓

    iv) 8% in decimal form is        d) $-1$

    v) $\dfrac{7\pi}{8}$ in degrees is        e) $\dfrac{5x^6}{y^2}$

                               f) 0.8

**III**    For the question numbers 7 to 11, choose the appropriate answer from the answer given in the bracket    5x1=5

$$\left[-1, 5, 0.64, 64, 1 \ \dfrac{6}{11}\right]$$

7) The imaginary part of the complex number 3 + 5i is _____.

8) If $\log_{0.1} 10 = x$, then x is _____.

9) If $\dfrac{1}{3}$, x, $\dfrac{3}{2}$ are in HP, then x is _____.

10) If x% of 125 is $\dfrac{4}{5}$, then the value of x is ____

11) The value of $(1 + \tan^2 A) \cdot \cos^2 A$ is ____

(P.T.O.)

**IV    Answer the following questions :**                                    5x1=5

12) Express $2^5 = 32$ in the logarithmic form.

13) The first term of an AP is 3 and the common difference is $-2$. Find the 11th term.

14) Prove that $\sin A \cdot \sec A = \tan A$.

15) Find the value of $\sec \dfrac{7\pi}{3}$.

16) Find the equation of the locus of a point which moves such that the sum of its distance from co-ordinate axes is 5.

## PART -B

**V    Answer any SIX of the following questions :**                          6x2=12

17) Find the HCF of 55 and 210.

18) Simplify : $\dfrac{2^{7b-2a} \cdot 8^{2a-b}}{16^{a+b}}$.

19) Find the number of digits in the integral part of $3^{20}$.

20) How many terms of the G.P. 1, 3, 9, ......... will amount to 364 ?

21) When 40% of a number is added to 42, the result is the number itself. Find the number.

22) The S.P. of an article is ₹ 3680 and profit percent is 15%. Find the cost price.

23) Prove that $\tan^2 A + \sec^2 B = \sec^2 A + \tan^2 B$.

24) Prove that $\left(\sin^2\theta \cdot \cot^2\theta\right) + \left(\cos^2\theta \cdot \tan^2\theta\right) = 1$.

25) If $A = 30°$. Verify that $\sin 2A = \dfrac{2\tan A}{1 + \tan^2 A}$

26) Find the co-ordinates of the point P which divides the line joining the points $(-1, 2)$ and $(5, -7)$ in the ratio $3:4$ internally.

27) A point P moves such that $PA^2 = 3PB^2$. If $A = (5, 0)$ and $B = (-5, 0)$. Find the equation of the locus of P.

## PART - C

**VI    Answer any FIVE of the following questions :**                        5x3=15

28) Prove that $\sqrt{5}$ is an irrational number.

29) Simplify $\sqrt[bc]{\dfrac{x^b}{x^c}} \times \sqrt[ac]{\dfrac{x^c}{x^a}} \times \sqrt[ab]{\dfrac{x^a}{x^b}}$.

30) The sum of three numbers in AP is 15 and their product is 105. Find the numbers.

31) A sells a bicycle to B at a profit of 20% and B sells to C at a profit of 25%. If C pays ₹ 225 for the bicycle what did 'A' pay for it. https://www.karnatakaboard.com

32) The difference of two angles is 45° and their sum is 90°. Find the angles in degrees and Radians.

33) Find the value of $3\tan^2 30° + \dfrac{4}{3}\cos^2 30° - \dfrac{1}{2}\cot^2 45° - \dfrac{2}{3}\sin^2 60° + \dfrac{1}{8}\sec^4 60°$.

34) Find the equation of locus of a point such that the sum of its distance from $(0, 2)$ and $(0, -2)$ is 6.

## PART - D

**VII    Answer any FIVE of the following questions .**                        5x5=25

35) If $a^x = bc$, $b^y = ca$ and $c^z = ab$, show that $xyz = x + y + z + 2$.

36) Show that $\dfrac{y^{-1}}{x^{-1} + y^{-1}} + \dfrac{y^{-1}}{x^{-1} - y^{-1}} = \dfrac{2xy}{y^2 - x^2}$.

(P.T.O.)

37) If $m^2 + n^2 = 15mn$, show that $2 \log (m-n) = \log 13 + \log m + \log n$.

38) Using logarithmic tables find the value of $\dfrac{5.6348 \times 25.645}{12.72}$

39) A person buys a used car for ₹ 1,50,000 he pays ₹ 1,00,000 cash and agrees to pay the balance in annual installments of ₹ 5,000 plus 8% interest on the unpaid amount. How much will the Car cost for him ?

40) Venu gives 50% of his salary to his wife 40% of the remaining he spends on recreation 20% of the remaining he gives to his daughter as pocket money and still saves ₹ 12,000. What is Venu's income ? Also find the amount he gives his wife and daughter.

41) If $\tan A + \sin A = m$ and $\tan A - \sin A = n$ show that $(m^2 - n^2)^2 = 16mn$.

42) Simplify : $\dfrac{\sin 150° - 5\cos 300° + 7\tan 225°}{\tan 135° + 3\sin 210°}$

43) Show that the points $(-2, -1)$, $(1, 0)$, $(4, 3)$ and $(1, 2)$ are the vertices of a parallelogram

## PART - E

**VIII Answer any TWO of the following questions :**                    2x4=8

44) Find the sum of 'n' terms of the series $7 + 77 + 777 + \ldots\ldots\ldots$

45) If $\tan A = -\dfrac{12}{5}$ and $270° < A < 360°$. Find the value of $\dfrac{3\sin A - 2\cos A}{9\cos A + 4\sin A}$.

46) For what value of 'a' the points $(1, 4)$, $(a, -2)$, $(-3, 16)$ are collinear.

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