

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, Part-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) $(x^{\frac{1}{2}} + y^{\frac{1}{2}}) \cdot (x^{\frac{1}{2}} - y^{\frac{1}{2}}) =$
a) $x - y$ b) $x + y$ c) $\sqrt{x} - \sqrt{y}$ d) $\sqrt{x} + \sqrt{y}$
- 3) The value of $\cos A \cdot \operatorname{cosec} A$ is
a) $\cos A$ b) $\sin A$ c) $\tan A$ d) $\cot A$
- 4) The value of $\tan 225^\circ$ is
a) -1 b) $\sqrt{3}$ c) 1 d) $\frac{1}{\sqrt{3}}$
- 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) $\left(\frac{5x^3}{y}\right)^2$ a) ~~96~~
- ii) $\log_2 \frac{1}{2} =$ b) ~~0.08~~
- iii) 6th element of GP. 3, 6, 12, ... is c) 157.5^v
- iv) 8% in decimal form is d) -1
- v) $\frac{7\pi}{8}$ in degrees is e) ~~$\frac{5x^6}{y^2}$~~
- f) ~~0.8~~

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

5x1=5

$\left[-\frac{1}{2}, \frac{1}{2}, 0.64, 64, 1, \frac{6}{11} \right]$

- 7) The imaginary part of the complex number $3 + 5i$ is _____.
- 8) If $\log_{0.1} 10 = x$, then x is _____.
- 9) If $\frac{1}{3}, x, \frac{3}{2}$ are in HP, then x is _____.
- 10) If $x\%$ of 125 is $\frac{4}{5}$, 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 $\sec \frac{7\pi}{3}$.
- 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 : $\frac{2^{7b-2a} \cdot 8^{2a-b}}{16^{a+b}}$.
- 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 $(\sin^2 \theta \cdot \cot^2 \theta) + (\cos^2 \theta \cdot \tan^2 \theta) = 1$.
- 25) If $A = 30^\circ$. Verify that $\sin 2A = \frac{2 \tan A}{1 + \tan^2 A}$.
- 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 $\sqrt[bc]{\frac{x^b}{x^c}} \times \sqrt[ac]{\frac{x^c}{x^a}} \times \sqrt[ab]{\frac{x^a}{x^b}}$.
- 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 $3 \tan^2 30^\circ + \frac{4}{3} \cos^2 30^\circ - \frac{1}{2} \cot^2 45^\circ - \frac{2}{3} \sin^2 60^\circ + \frac{1}{8} \sec^4 60^\circ$.
- 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 $\frac{y^{-1}}{x^{-1} + y^{-1}} + \frac{y^{-1}}{x^{-1} - y^{-1}} = \frac{2xy}{y^2 - x^2}$.

(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 $\frac{5.6348 \times 25.645}{12.72}$
- 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 : $\frac{\sin 150^\circ - 5 \cos 300^\circ + 7 \tan 225^\circ}{\tan 135^\circ + 3 \sin 210^\circ}$
- 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 $7 + 77 + 777 + \dots$
- 45) If $\tan A = -\frac{12}{5}$ and $270^\circ < A < 360^\circ$. Find the value of $\frac{3 \sin A - 2 \cos A}{9 \cos A + 4 \sin A}$.
- 46) For what value of 'a' the points $(1, 4)$, $(a, -2)$, $(-3, 16)$ are collinear.