

First PUC Annual Examination, February - 2020

Time : 3-15 Hrs.

Subject - Basic Mathematics (75)

Max. Marks : 100

Instructions

1. The question paper consists of five parts, A, B, C, D and E.
2. Part-A carries 10 marks, Part-B carries 20 marks, Part-C carries 30 marks Part-D carries 30 marks and Part-E carries 10 marks.
3. Write the question numbers as indicated in the question paper.

Part - A

10 x 1 = 10

I Answer any TEN questions.

1. Write the imaginary part of the complex number $\frac{-3 + 4i}{5}$
2. If $A = \{a, b, c, d, e\}$ and $B = \{a, b, e, f\}$ find $A \cap B$
3. Simplify $\left(x^{\frac{1}{2}} + y^{\frac{1}{2}}\right) \left(x^{\frac{1}{2}} - y^{\frac{1}{2}}\right)$
4. Form the quadratic equation whose roots are (2, -3)
5. Find the 8th term of the sequence $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \dots$
6. Write $\log_8^{16} = \frac{4}{3}$
7. Define annuity.
8. Find the simple interest on Rs. 500 at 5% for 5 years.
9. Express $\frac{7\pi}{6}$ radians into degrees.
10. Convert 0.12 into percentage.
11. Find the slope of the line perpendicular to the line $3x - 4y + 5 = 0$
12. Find the value of $\sin 60^\circ + \cos 60^\circ$

Part - B

10 x 2 = 20

II Answer any TEN questions

13. Find the number of positive divisors of 360
14. Find the HCF of 18 and 24
15. If $A = \{a, b, c, d\}$ and $B = \{d, e, f, g, h, i\}$ find $A - B$ and $B - A$
16. Simplify $\frac{2^{n+1} + 2^{n-1}}{2^n + 2^{n+2}}$
17. If $K + 9$, $K - 6$ and 4 are in G. P. then find the value of k .
18. If α & β are the roots of the equation $x^2 + 5x + 6 = 0$ then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
19. The sum of two consecutive numbers is 23. Find the numbers.
20. Solve $2x + 6 < 0$, $x \in \mathbb{Z}$ the inequality in one variable and represent the solution on the number line.
21. Find the future value of an annuity of Rs. 5000 at 12% p. a. for 6 years.
22. The weight of 6 men are 90kg, 70.5kg., 56 kg., 45.5kg., 85kg and 78 kg. Find the average.
23. Prove that $\sqrt{\frac{1 + \cos x}{1 - \cos x}} = \operatorname{cosec} x + \cot x$
24. Evaluate $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} = \tan^2 \frac{\pi}{4} + \cot^2 \frac{\pi}{4}$
25. Find the distance between the parallel lines. $3x + 4y + 5 = 0$ and $6x + 8y + 20 = 0$

Part - C

10 x 3 = 30

III Answer any TEN questions

26. Prove that $\sqrt{3}$ is an irrational number.
27. If $A = \{1, 2\}$ $B = \{2, 3\}$ $C = \{3, 4\}$ Find $(A \times B) \cap (A \times C)$

28. Solve $3^{2x} - 10 \times 3^x + 9 = 0$
29. Prove that $\log_4^8 \times \log_2^{32} \times \log_{16}^4 = \frac{15}{4}$
30. Insert 4 Arithmetic means between 5 and 10
31. Divide Rs. 1600 between s, y and z so that y may have Rs. 100 more than x and z may have Rs. 200 more than y.
32. Solve the inequality $3x + 2y > 6$ graphically.
33. Preritha bought a car for Rs. 4,00,000 If it depreciates at the rate of 12% p. a. how much will it be worth after 10 years?
34. The average weight of a group of boys and girls is 38 kg. The average weight of the boys is 42 kg. and that of the girls is 33 kg. If the number of boys is 25. Find the number of girls.
35. A man buys an article at $(\frac{3}{4})^n$ of its cost price and sells it for 20% more than its cost price. What is his profit percentage?
36. Find the value of $3 \tan^2 30^\circ + \frac{4}{3} \cos^2 30^\circ - \frac{1}{2} \cot^2 45^\circ - \frac{2}{3} \sin^2 60^\circ + \frac{1}{8} \sec^4 60^\circ$
37. A point P which moves such that $(PA)^2 = 3(PB)^2$ If $A = (5, 0)$ and $B = (-5, 0)$ Find the equation of the locus of P.
38. Find the equation of the line passing through $(5, 2)$ and cutting off intercepts which are equal in magnitude but opposite in sign.

Part - D

IV Answer any SIX questions.

6 x 5 = 30

39. Out of 50 people, 20 people drink tea 10 take both tea & coffee. How many take at least one of the two drinks?
40. Evaluate $\frac{0.5679 \times 0.0789}{0.0073 \times 0.123}$
41. Find the sum of n terms of a G. P. $5 + 55 + 555 + \dots$
42. Find the integral root between -3 and 3 by inspection and then using synthetic division. Solve the equation $x^3 - 2x^2 - 5x + 6 = 0$
43. A sum of money amounts to Rs. 19,500 in 5 years and Rs. 22,200 after 8 years at the same rate of simple interest. Find the principal and the rate of interest.
44. If poornima deposits Rs. 600 at the beginning of every year for the next 15 years. Then how much will be accumulated at the end of 15 years if the interest rate is 7% p. a.
45. The price of a pair of trousers was decreased by 22% to Rs. 390 what was the original price of the trouser?
46. If $\cot \theta = \frac{5}{2}$ and θ is acute then prove that $\frac{3 \cos \theta + 2 \sin \theta}{3 \cos \theta - 4 \sin \theta} = \frac{19}{7}$
47. Show that the following points are the vertices of a square A (1, 1) B (4, 1), C (4, 4) D (1, 4)
48. Find 'a' so that the lines $x - 6y + a = 0$, $2x + 3y + 4 = 0$ and $x + 4y + 1 = 0$ are concurrent.

Part - E

V Answer any ONE questions.

1 x 10 = 10

49. a. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ $A = \{1, 2, 3, 4, 5\}$ $B = \{3, 4, 5, 6, 7\}$ show that $(A \cap B)' = A' \cup B'$ 4 Marks
- b. Insert 3 Geometric means between $\frac{1}{4}$ and $\frac{1}{64}$ 4 Marks
- c. Find the L. C m of $\frac{1}{3}, \frac{5}{6}, \frac{5}{7}$ 2 Marks
50. a. A manufacturer produces and sells balloons at Rs. 8 / unit His fixed cost is Rs. 6500 and the variable cost / balloon is Rs. 3.50 calculate.
- i) Revenue function ii) cost function iii) profit function iv) Revenue at BEP
- b. Find the foot of the perpendicular drawn from the point $(-2, -1)$ on the line $3x + 2y - 5 = 0$
- c. Find the equation of the locus of the point which moves such that it is equidistant from $(4, 2)$ and the x - axis.

