

SHARADA P.U COLLEGE, MANGALURU

I PU BASIC MATHS – MODEL PAPER

MAX. MARKS: 100

Time: 3 HOUR

Instruction:

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 properly as indicated in the question paper.

Part - A

I. Answer any ten questions from the following:

10 X 1 = 10

1. Find the largest integer which divides 105 and 315.
2. If $A = \{a, b, c, d\}$, $B = \{a, b, c\}$ find $A \cap B$.
3. Simplify: $(5)^{(5^0)} + (5^2)^0$.
4. Find the value of $\log_{10} 1000$.
5. Find the sum to infinity of the series: $3, -1, \frac{1}{3}, -\frac{1}{9}, \dots$
6. Find the nature of the roots without solving the equation $x^2 - x + 1 = 0$.
7. Solve for x if $(x + 2)(x + 3) = (x - 2)(x - 4) + 20$.
8. What percent is 64 m of 12 km?
9. Define annuity immediate.
10. Convert 315° into radians.
11. Find the average of all the numbers between 7 and 32 which are divisible by 5.
12. If the slope of the line AB is $\frac{3}{4}$ and $AB \perp CD$ then find the slope of CD.

Part - B

II. Answer any ten questions from below:

10 X 2 = 20

13. Find the number which when divided by 36, 40 and 48 leaves the same remainder 5.
14. If $A = \{a, b, c, d\}$ and $B = \{d, e, f, g\}$ then find $(A - B) \times A$.
15. Find the sum of positive divisors of 1200.
16. Prove that $\frac{1}{1+x^{p-q}} + \frac{1}{1+x^{q-p}} = 1$.
17. Prove that $\log_4 8 \cdot \log_2 32 \cdot \log_{16} 4 = \frac{15}{4}$.
18. How many terms of the GP 1, 3, 9, will amount to 364?
19. Find the compound interest on Rs. 7,000 at 5% p.a for 8 years.
20. Kiran and Govinda went up a hill at a speed of 20 kmph. And both of them came tumbling down the same distance at a speed of 30 kmph. Find the average speed for the round trip.
21. By selling 8 erasers a trader going the selling price of 1 erases. Calculate the gain percent..
22. Find the value of $\sin^2 \frac{5\pi}{6} + \cos^2 \frac{5\pi}{6} - \tan^2 \frac{\pi}{4}$.
23. Find the locus of a point which moves such that it is equidistant from (5, 0) and (-5, 0).
24. Derive the equation of the straight line in the form $y = mx + c$.
25. What is the value of x so that the line joining (4, 1) and (x, 3) is perpendicular to the line joining (1, 6) and (-1, 2).

Part – C

III. Answer any ten questions from below:

10 X 3 = 30

26. In a group of 600 people, 150 students were found to be taking tea, 225 take coffee, 100 take both tea and coffee. Find out how many were taking neither tea nor coffee?
27. If $R^{-1} = \{(2, 4), (1, 2), (3, 1), (3, 2)\}$. Find R. Also find its domain and range.
28. Prove that $\sqrt{5}$ is an irrational number.
29. Show that $\sum \frac{1}{1 + x^{a-b} + x^{a-c}} = 1$
30. Evaluate $3 + 5 + 7 + \dots + 61$.
31. A father's age is 28 years older than the son's age, after 5 years the father's age will be 7 years more than twice that of the son. Find their present ages.
32. Three equal principals amount to Rs. 3720 after 3, 4 and 5 years at simple interest 6% p.a. Find the principal.
33. Solve the linear inequalities graphically $x + y \leq 6$, $x + y \geq 4$.
34. Vani decides to save 10,000 every six months for the next 5 years and deposit it in a bank which offers 7% p.a interest compounded half yearly. How much will Vani have in her account after 5 years?
35. By selling an article for Rs. 825 a man loses amount equal to $\frac{1}{3}$ of its selling price find the
 (i) Cost price of the article
 (ii) Gain % or loss % if the same article is sold for Rs. 1265.
36. Find the value of x, if $x \cdot \sin 45^\circ \cdot \tan 60^\circ = \frac{\sin 30^\circ \cdot \cot 30^\circ}{\cos 60^\circ \cdot \operatorname{cosec} 45^\circ}$.
37. Find the equation of the line passing through (-1, -1) and perpendicular to the line whose slope is $\frac{-2}{5}$.
38. Show that the straight lines $2x - 3y = 7$, $3x - 4y = 13$ and $8x - 11y = 33$ are concurrent. Also find the point of concurrence.

Part – D

IV. Answer any six questions from below:

6 X 5 = 30

39. In a survey it was found that 21 people liked product A, 26 liked product B and 29 liked product C. If 14 people liked products A and B, 12 people liked products C and A, 14 people liked products B and C and 8 liked all the three products. Find how many people like atleast one of the products. Also find how many liked product C only.
40. a) Show that the relation "is congruent to" is an equivalence relation on set T of triangles.
 b) Show that the function $f: R \rightarrow R$ defined by $f(x) = 3x + 5$ is one-one.
41. Evaluate $\frac{12.567 \times 15.674}{0.5968 \times 19.78}$ using logarithmic table.
42. If α & β are the roots of the equation $2x^2 - 10x + 5 = 0$ then find the value of
 (i) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ (ii) $\alpha^4\beta + \alpha\beta^4$.

43. a) Prove that $\frac{\cos \theta}{1 - \tan \theta} + \frac{\sin \theta}{1 - \cot \theta} = \cos \theta + \sin \theta$. **(3)**
 b) If $\cos x = -\frac{1}{2}$, x lies in third quadrant, then find the values of $\sin x$ and $\sec x$. **(2)**
44. The difference in compound interest and simple interest on a sum for 2 years at 10% p.a. when compound interest is compounded annually is 16. Find the difference in the compound interest and simple interest if compound interest is compounded half yearly.
45. How much should you invest today at 8% p.a compound interest c quarterly so that you get Rs. 3000 every 3 months for the next 7 years.
46. An aeroplane flies once round a square whose side is 100 km long taking the first at 100 kmph, second at 200 kmph, third at 300 kmph and the fourth at 400 kmph. Find the average speed of the plane in its flight along the square.
47. (a) Amitha sold her bag at a loss of 7%. Had she been able to sell it at a gain of 9% it would have fetched Rs. 64 more than it did. **(2)**
 (b) By how much percent should the use of tea be increased if the price of tea is decreased by 10% so that the expenditure remains unchanged. **(3)**
48. Find the coordinate of the foot of the perpendicular from $(-6, 2)$ on the line $3x - 4y + 1 = 0$.

Part – E

V. Answer any one from below:

1 X 10 = 10

49. (a) Let $f = \{(1, 1), (2, 3), (0, -1)\}$ be a function from Z to Z defined by $f(x) = ax + b$, for some integers a & b . Determine a & b . **(3)**
 (b) If $f(x) = 2x + 1$ and $g(x) = x^2 + 2x + 1$ find (i) $f \circ g(2)$ (ii) $g \circ f(3)$ **(2)**
 (c) Find the sum to n terms of the GP $4 + 44 + 444 + \dots$. **(5)**
50. (a) A manufacturer produce and sells bags at Rs. 8 unit. His fixed cost of is Rs. 5550 and variable cost per bag is Rs. 2.45. Find
 (i) Revenue function. (ii) Cost function (iii) Profit function. (iv) BEP in unit.
 (v) Find the number of units that must be sold so that, the manufacturer incur no loss. **(5)**
 (b) Find the equation of locus of a point such that the sum of its distance from $(0, 2)$ and $(0, -2)$ is 6. **(5)**
