7921 (N)

Register Number | | | | | | |

MATHEMATICS — Paper I

(New Syllabus)

Time Allowed : $2\frac{1}{2}$ Hours] [Maximum Marks : 100

PART – I

N. B. : i) This Part contains *two* Sections, **Section – A** and **Section – B**.

ii) **Section – A** contains Multiple Choice Questions. Answer *all* the 20 questions. Each question carries *one* mark.

iii) **Section – B** contains 15 questions. Answer any *ten* questions. Each question carries *two* marks.

SECTION – A

I. Choose the correct answer from the given alternatives : $20 \times 1 = 20$

1. If m, p, q are consecutive terms in an A.P., then p is

a) $\frac{mq}{2}$ b) $\frac{m-q}{2}$

c) $\frac{m^2+q^2}{2}$ d) $\frac{m+q}{2}$.

2. If $1^2 + 2^2 + 3^2 + \ldots\ldots + 10^2 = 385$, then $2^2 + 4^2 + 6^2 + \ldots\ldots + 20^2$ is

a) 770 b) 1150

c) 1540 d) 385×385.

3. The sum of the series $1 + 3 + 5 + \ldots\ldots + 399$ is

a) 200 b) 20000

c) 400 d) 40000.

4. The common ratio of the G.P., 17, – 17, 17, – 17, ... is

a) – 1 b) 1

c) – 17 d) 17.

5. The diameters of the base of two cones are equal. If their slant height in the ratio 5 : 4, the ratio of the curved surface areas is

a) 5 : 4 b) 5 : 6

c) 4 : 5 d) 3 : 1.

6. A solid sphere with total surface area 24 sq.cm is bisected 2 hemispheres. The total surface area of any one of the hemispheres is

a) 18 sq.cm b) 6 sq.cm

c) 24 sq.cm d) 36 sq.cm.

7. The internal and external diameters of a hollow cylinder are 24 cm a 28 cm respectively. The thickness of the material is

a) 2 cm b) 4 cm

c) 8 cm d) 6 cm.

8. $B - A$ is defined as

a) $\{x / x \in A,\ x \notin B\}$ b) $\{x / x \in B,\ x \notin A\}$

c) $\{x / x \in A,\ x \in B\}$ d) $\{x / x \in B,\ x \in A \text{ and } B\}$.

9. If $\{(4, 5), (5, x)\}$ represents a constant function, then the value of x is

a) 3 b) 4

c) 5 d) 6.

10. The pre-images of 3 in the function

$f = \{(-1, 1), (-2, 2), (-3, 3), (3, 3), (4, 4)\}$ are

a) -3 and 4 b) 4 and 1

c) -3 and 3 d) 2 and 4.

11. If $f : R \to R$ defined by $f(x) = 3x - 6$ and $g : R \to R$ defined by $g(x) = 3x + k$ and if $f \circ g = g \circ f$ then k is

a) -5 b) 5

c) 6 d) -6.

12. If $f(x) = x^2 - x$, then $f(x-1) - f(x+1)$ is

a) $4x$ b) $4x + 2$

c) $2 - 4x$ d) $4x - 2$.

13. Ram deposits Rs. 500 p.m. in R.D. for 6 years in a bank which pays 10% S.I. per annum. The effective period for the R.D. in years is

a) 6 b) 21

c) 216 d) 219.

14. The half-yearly interest received for Rs. 5,000 in a bank on a fixed deposit at the rate of interest 10% per annum for 2 years is

a) Rs. 250 b) Rs. 500

c) Rs. 750 d) Rs. 1,000.

15. If the difference between C.I. and S.I. on Rs. 2,000 for 2 years is Rs then the rate of interest per annum is

a) 10% b) 20%

c) 30% d) 15%.

16. If $4x + 5y = 83$ and $\frac{3x}{2y} = \frac{21}{22}$ then $y - x$ is

a) 3 b) 4

c) 7 d) 11.

17. Degree of the polynomial $x^4 + 2x^2 + x^6 + 2x + 7$ is

a) 1 b) 2

c) 4 d) 6.

18. If the remainder when $a - 2x + 5x^2$ divided by $x - 2$ is 7, then the va of a is

a) 9 b) -9

c) 7 d) -7.

19. The H.C.F. of $x^2 - 4$ and $x + 2$ is

a) $x^2 - 4$ b) $x + 2$

c) $x - 2$ d) $x + 3$.

20. If one root of the equation is the reciprocal of the other root $ax^2 + bx + c = 0$, then

a) $a = c$ b) $a = b$

c) $b = c$ d) $c = 0$.

SECTION – B

II. Answer any *ten* questions : $10 \times 2 = 20$

21. The first term of A.P. is 6 and the common difference is 5. Find the A.P. and its general term.

22. Find the sum to infinity of the G.P. 10, – 9, 8·1, ...

23. Find the sum of $26 + 27 + 28 + ... + 65$.

24. The curved surface area of a cylindrical pillar is 264 sq.m. and its volume is 924 cu.m. Find the radius of the pillar.

25. A cone of base radius 5 cm and height 12 cm is opened out into a sector of a circle. Find the central angle of the sector.

26. A hemispherical bowl has volume of material $\frac{122\,\pi}{3}$ c.c. Its external diameter is 10 cm. Find its thickness.

27. Find the domain and range of M where

$$M = \{ (1, 2), (2, 3), (3, 4), (4, 5), (5, 6) \}.$$

28. Using Venn diagram, represent $(A \cup B)'$.

29. Given : $f(x) = 3x - 2$, $g(x) = kx + 3$, find k so that $f \circ g = g \circ f$.

30. The difference between the S.I. and C.I. on a certain sum of money at $6\frac{2}{3}\%$ per annum for 3 years is Rs. 184. Find the sum.

31. Arun deposits Rs. 300 per month for 2 years in a bank which pays 10% S.I. per annum on R.D. Find the amount he gets at the end of 24 months.

32. If $P = \frac{4x}{x^2 - 1}$ and $Q = \frac{x + 1}{x - 1}$, find PQ.

33. If $M(x + 3) + N(x - 2) \equiv 8x + 9$, find the values of M and N.

34. Solve $x^2 - 4x + 1 = 0$.

35. Find the values of k for which the equation $12x^2 + 4kx + 3 = 0$ has real and equal roots.

PART – II

N. B. : i) This Part contains *four* Sections, **Section – C**, **Section – D**, **Section – E** and **Section – F**.

ii) **Section – C** and **Section – E** contain 3 questions each. Answer any *two* questions in each Section.

iii) **Section – D** and **Section – F** contain 4 questions each. Answer any *three* questions in each Section.

iv) Each question carries *five* marks.

SECTION – C

III. Answer any *two* questions : $2 \times 5 = 10$

36. In an A.P. the sum of the first 11 terms is 44 and that of the next 11 terms is 55. Find the A.P.

37. Find 3 numbers in G.P. such that their sum is $17\frac{1}{3}$ and the product of their reciprocals is $\frac{1}{64}$.

38. Find the sum of n terms of the series $11 + 103 + 1005 + \ldots\ldots$.

SECTION – D

IV. Answer any *three* questions : $3 \times 5 = 15$

39. Using Venn diagram, verify $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

40. Given $A = \{-3, -1, 1, 3\}$, $B = \{0, 1, 2, 3, 4\}$ and $f : A \to B$ is defined by $f(x) = \frac{3 - x}{2}$. Represent f as (a) an arrow diagram, (b) a set of ordered pairs, (c) a table and (d) a graph.

41. Avinash deposited Rs. 200 at the beginning of every month in recurring deposit and received Rs. 19,656 at the end of 6 years. Find the rate of simple interest per annum paid by the bank.

42. Sheba deposited Rs. 14,000 as a special deposit for 3 years and the interest was compounded yearly at the rate of 10% p.a. Find the maturity value of the deposit.

SECTION – E

V. Answer any *two* questions : $2 \times 5 = 10$

43. A hollow cylinder has a total surface area of 1320 sq.cm. If its internal diameter is 8 cm and height is 7 cm, find its external radius.

44. The curved surface area of a cone is 550 sq.cm and the total surface area is 704 sq.cm. Find the radius and height of the cone.

45. A hollow sphere of internal and external diameters 4 cm and 8 cm respectively is melted and cast into a cone of diameter 8 cm. Find the height of the cone.

SECTION – F

VI. Answer any *three* questions : $3 \times 5 = 15$

46. If $x^2 - 9$ is a factor of $x^3 + px^2 + qx - 45$, find p and q.

47. Find the square root of $\frac{4x^2}{y^2} + \frac{8x}{y} + 16 + \frac{2y}{x} + \frac{9y^2}{x^2}$.

48. The hypotenuse of a right angled triangle is 17 cm and the difference between other two sides is 7 cm. Find the other two unknown sides.

49. Resolve into partial fractions : $\frac{x+3}{(x^2-4)(x+1)}$.

PART – III

N. B. : i) This Section contains 2 questions. Answer any *one* question.

ii) Each question carries *ten* marks.

SECTION – G

VII. Answer any *one* question : $1 \times 10 = 10$

50. Draw the graph of $y = x^2 - 9$ and hence solve the equation $x^2 - 2x - 8 = 0$.

51. Solve graphically the equation : $x^2 - x - 12 = 0$.