8119

Register Number | | | | | | |

MATHEMATICS — Paper I

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

Instruction : Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

PART – I

Note : 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 $t_1 = n$, $t_2 = n + 1$, $t_3 = n + 2$ and so on, then t_n =

1) n 2) $2n - 1$

3) $2n + 1$ 4) $2n$.

2. The nth term of a GP is $\frac{2^{2n-1}}{3}$, then the common ratio is

1) 2 2) 3

3) 4 4) 5.

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3. If m, p, q are consecutive terms in an AP then P is

1) $\frac{mq}{2}$ 2) $\frac{m-q}{2}$

3) $\frac{m^2+q^2}{2}$ 4) $\frac{m+q}{2}$.

4. The value of $\frac{1^3+2^3+.....+10^3}{1+2+.....+10}$ is

1) 45 2) 55

3) 385 4) 285.

5. The relation between the volume 'v' of a sphere of radius 'r' and its surface area 's' is

1) $v=\frac{2}{3}rs$ 2) $v=\frac{r}{3}s$

3) $v=\frac{4}{3}sr$ 4) $v=4s$.

6. The ratio of radii and the ratio of heights of two cylinders is 1 : 4. The ratio of their volumes is

1) 1 : 16 2) 1 : 4

3) 64 : 1 4) 1 : 64.

7. If the ratio of the base of a cone is doubled and the height is tripled, then the volume is

1) made six times 2) made twelve times

3) made four times 4) made two times.

8. Identify the wrong statement(s).

I. set of whole numbers is a subset of set of real numbers

II. $f: R \to R$ defined by $f(x) = -x$ is one-one and into

III. $f: Z \to R$ defined as $f(x) = \frac{1}{x}$ is not a function

IV. $B - A = B$ if A and B are disjoint sets

1) (II) and (III) 2) (II) only

3) (III) only 4) (II) and (IV).

9. x-gene in a plant is responsible for red flowers and y-gene for white flowers. If both are present, then the flowers produced are pink. If 20 plants have x-gene, 20 plants have y-gene and there are 30 plants in all, then the total number of plants producing pink flowers is

1) 13 2) 10

3) 20 4) 30.

10. If A and B are any two sets then $A \cap B' =$

1) $A + B$ 2) $A - B$

3) $A \cup B$ 4) $A' \cap B$.

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

1) $4x$ 2) $4x + 2$

3) $2 - 4x$ 4) $4x - 2$.

12. The pre-image of 5 under the function $f = \{(2, -5), (3, 5), (4, -5), (5, 5)\}$ is

1) 2 and 3 2) 3 and 4

3) 3 and 5 4) 2 and 4.

13. A recurring deposit of Rs. 100 per month for 5 years at 8% simple interest per year yields an interest of

1) 100×5 2) $100 \times \frac{60 \times 61}{2 \times 12} \times \frac{8}{100}$

3) $80 \times \frac{69}{12} \times \frac{8}{100}$ 4) $80 \times 5 \times 12 \times \frac{8}{100}$.

14. The quarterly interest due on Rs. 1000 at 12% rate of interest is

1) Rs. 120 2) Rs. 40

3) Rs. 30 4) Rs. 60.

15. If the difference between CI and SI on Rs. 2000 for 2 years is Rs. 20, then the rate of interest is

1) 10% 2) 20%

3) 30% 4) 15%.

16. Sum of two natural numbers is 8 and the sum of their reciprocal is $\frac{8}{15}$, then the numbers are

1) 3 and 5 2) 6 and 2

3) 7 and 1 4) 4 and 4.

17. If $3x + 2$ is a factor of $P(x)$ then

1) $P\left(\frac{2}{3}\right) = 0$ 2) $P\left(\frac{-2}{3}\right) = 0$

3) $P\left(\frac{-3}{2}\right) = 0$ 4) $P\left(\frac{3}{2}\right) = 0$.

18. The LCM of 2^k, 2^{k+1}, 2^{k+5} where $k \in N$ is

1) 2 2) 2^k

3) 2^{k+5} 4) 2^{k+1}.

19. The partial fraction representation of $\frac{x}{(x+1)^2}$ is

1) $\frac{A}{x+1}$ 2) $\frac{A}{x+1} + \frac{B}{(x+1)^2}$

3) $\frac{Ax+B}{(x+1)^2}$ 4) $\frac{Ax+B}{(x+1)} + \frac{Cx+D}{(x+1)^2}$.

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

1) $a = c$ 2) $a = b$

3) $b = c$ 4) $c = 0$

SECTION – B

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

21. For what value of n, the nth terms of the series $3 + 10 + 17 + \ldots\ldots$ and $63 + 65 + 67 + \ldots\ldots$ are equal.

22. Express $0\cdot\overline{325}$ as a fraction.

23. Evaluate : $11^3 + 12^3 + 13^3 + \ldots\ldots + k^3$ where $k = 50$.

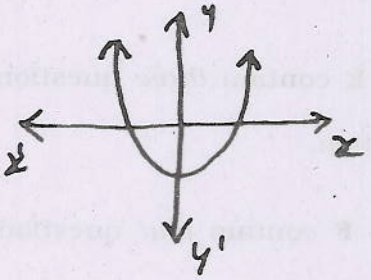
24. The volume of a cylinder is 98π cu.cm and its height is 8 cm. Find its lateral surface area.

25. Two cones have their heights in the ratio 5 : 3 and the radii of their bases in the ratio 2 : 1. Find the ratio of their volumes.

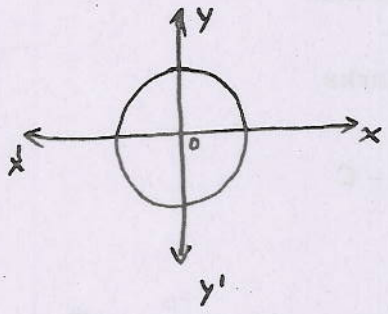
26. The surface area of the sphere is 1386 sq.cm. Find its volume.

27. Use the vertical line test to determine which of the graphs represent a function.

a)



b)



28. Given $f : Z \to N$ is defined by $f(x) = x + 1$ test whether this represents a function or not. Give reason.

29. If $f(x) = 2x^2$; $g(x) = 3x - 1$, find $f \circ g$ and $g \circ f$.

30. Find the difference between CI and SI on Rs. 8000 at 5% per annum for 3 years.

31. Radha made a fixed deposit with a bank for 3 years paying 11% p.a. If she takes quarterly interest, find the interest she gets on Rs. 1000 deposit.

32. Find the remainder when $f(x) = x^3 - 6x^2 + 2x - 4$ is divided by $1 - 3x$.

33. Factorise $x^3 + 6x^2 + 11x + 6$.

34. Find the sum and product of the roots of the equation $2x^2 - 4x + 1 = 0$.

35. Solve : $3x - \frac{8}{x} = 2$.

PART – II

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

ii) **Section – C** and **Section – E** contain *three* questions. Answer any *two* questions from each section.

iii) **Section – D** and **Section – F** contain *four* questions. Answer any *three* questions from each section.

iv) Each question carries *five* marks.

SECTION – C

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

36. Given that $(p+1)^{th}$ term of an A.P. is twice the $(q+1)^{th}$ term. Prove that $(3p+1)^{th}$ term is twice the $(p+q+1)^{th}$ term.

37. Find the sum to n terms of the series 6 + 66 + 666 + ...

38. In an A.P. the sum of first 10 terms is 175 and the sum of next 10 terms is 475. Find the A.P.

SECTION – D

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

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

40. Given $f(x) = x - 2$, $g(x) = 3x + 5$, $h(x) = 2x - 3$, verify that

$(g \circ h) \circ f = g \circ (h \circ f)$.

41. Ramya invested Rs. 500 every month for 2 years in a bank and collects Rs. 12,500 at the end of 2 years. Find the rate of simple interest paid by the bank on recurring deposit.

42. Which is better investment ?

Rs. 2000 in a fixed deposit with a bank for 3 years, the interest being compounded half-yearly at the rate of 10% **(or)** Rs. 60 per month in a recurring deposit with a bank paying simple interest of 10% per annum for 36 months.

SECTION – E

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

43. A hollow cylindrical iron pipe is 40 cm long. Its outer and inner diameters are 8 cm and 5 cm respectively. Find the volume of the material, and the weight of the pipe if 1 c.c. of iron weighs 7gm.

44. A sheet of metal in the shape of quadrant of a circle of radius 28 cm is bent into an open cone. Find the curved surface area of the cone.

45. An iron cone of diameter 8 cm and height 12 cm is melted and recast into lead shots of radius 2 mm. How many lead shots are obtained ?

SECTION – F

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

46. If $x^3 + ax^2 + bx + 6$ has $x - 2$ as a factor and leaves a remainder 3 when divided by $x - 3$, find a and b.

47. Decompose into partial fractions : $\frac{x^2 - 5x - 2}{(x-3)(x^2+1)}$.

48. Find the value of a and b if $49x^4 - 70x^3 + 109x^2 + 9x - b$ is a perfect square.

49. If α and β are the roots of the equation $x^2 + 8x = -15$, form the equation whose roots are $(\alpha + \beta)$ and $3\alpha\beta$.

PART – III

Note : This Section contains *two* questions. Answer any *one* question.

SECTION – G

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

50. Draw the graph of $y = x^2 + 2x - 3$ and hence solve the equation

$x^2 - x - 6 = 0$.

51. Solve graphically $x - \frac{3}{x} = 2$.