CHAPTER – 7
SYMBOLS AND NOTATIONS

The basic approach for the questions of this chapter is more or less similar to that of coding and decoding. As in the questions of coding and decoding, a basic word is coded in a particular way and the candidate is asked to code another word using the same logic.

Similarly in "Symbols and Notations", one has to study the symbols and their meanings carefully which are given against them. Then, the meanings given are to be used in place of those symbols in answering the questions. The word "Notation" basically stands for the meaning which each symbol will be assigned.

The questions can be based on Blood Relations or Mathematical Operations (or Operator based questions).

This chapter deals with Mathematical Operations.

Mathematical Operations:

Symbols for these types of questions stand for mathematical operations i.e. +, –, x, ÷, >, <, ≥, ≤, = and ≠. So one must replace the symbols by mathematical operations and apply the 'BODMAS' rule to find the value of the given expression. Symbols like Δ, ∇, $*$, @, \$ etc are used by giving a proper definition of the symbol used. An example belonging to this category is also explained below.

Worked out Examples:

1. If '–' stands for '×', '×' stands for '+', '+' stands for '÷' and '÷' stands for '–', then what is the value of $9 \div 18 \times 15 + 3 - 6 \times 12$?
(A) 24 (B) 30 (C) 33
(D) 42 (E) 48

Sol: The given expression is $9 \div 18 \times 15 + 3 - 6 \times 12$.
By converting the symbols according to the given definitions, we get $9 - 18 + 15 \div 3 \times 6 + 12$. Solving this by BODMAS rule, we get the value as 33.
Choice (C)

2. If $a \$ b = a^2b^2 - ab$, then $3 \$ 8$ =
(A) 600 (B) 552 (C) 576
(D) 625 (E) 676

Sol: Given $a \$ b = a^2b^2 - ab$.
$\Rightarrow 3 \$ 8 = 3^2 \times 8^2 - 3 \times 8 = 9 \times 64 - 24$
$= 576 - 24 = 552$. Choice (B)

3. If $p \oplus q = p^2 + q^2 - p - q$ and $p \Delta q = pq - p - q$, then $(6 \oplus 5) \Delta 5$ =
(A) 200 (B) 175 (C) 195
(D) 179 (E) 225

Sol: $6 \oplus 5 = 6^2 + 5^2 - 6 - 5 = 36 + 25 - 6 - 5 = 50$
$(6 \oplus 5) \Delta 5 = 50 \Delta 5 = 50 \times 5 - 50 - 5 = 195$.
Choice (C)

4. If $4 \odot 5 = 189$ and $10 \odot 8 = 1512$, then $6 \odot 9$ =
(A) 945 (B) 1148 (C) 983
(D) 764 (E) 932

Sol: $4^3 + 5^3 = 64 + 125 = 189 \Rightarrow 4 \odot 5$
$10^3 + 8^3 = 1000 + 512 = 1512 \Rightarrow 10 \odot 8$
Similarly, $6 \odot 9 = 6^3 + 9^3 = 216 + 729 = 945$.
Choice (A)

5. If 'Δ' means 'is less than', '\$' means 'is greater than' and '£' means 'is equal to' and given that $a \Delta b$, c £ d and $c \$ b$, then which of the following is true?
(A) $d \Delta a$ (B) $b \$ d$ (C) a £ c
(D) $a \Delta b \Delta c$ (E) $a \Delta c$

Sol: $a \Delta b \Rightarrow a < b$
$c \$ b \Rightarrow c > b \Rightarrow b < c$
c £ $d \Rightarrow c = d$
$\therefore a < b < c = d$
(A) $d \Delta a \Rightarrow d < a \rightarrow$ false
(B) $b \$ d \Rightarrow b > d \rightarrow$ false
(C) a £ $c \Rightarrow a = c \rightarrow$ false
(D) $a \Delta b \Delta c \Rightarrow a < b < c \rightarrow$ true Choice (D)

Exercise – 7

Directions for questions 1 to 5: In a certain code language, '+' means '×', '×' means '–', '–' means '÷' and '÷' means '+'.

Simplify the following expressions using the above directions, in which the mathematical operators are written according to the code language.

1. $9 + 4 - 6 \times 6 \div 8$
(A) 8·5 (B) 8 (C) 5·25 (D) 0 (E) 10

2. $10 + 10 \times 10 - 10 \div 10$
(A) 109 (B) 10 (C) 19
(D) 11 (E) 101

3. $16 \times 4 \div 4 + 14 - 2$
(A) 56 (B) 28 (C) 40 (D) 112 (E) 84

4. $16 - 2 + 4 \div 16 - 8 \times 2$
(A) –15 (B) 2 (C) 4 (D) 16 (E) 32

5. $2 \div 4 + 8 - 16 \times 32 \div 64 \times 128 \div 256$
(A) 4·5 (B) 164 (C) 4
(D) 163 (E) 27

Directions for questions 6 to 10: In a certain code language, '+' means '÷', '÷' means '×', '×' means '–', '–' means '+'.

Simplify the following expressions using the above directions, in which the expressions are given using the symbols in the code language.

6. $5 \times 10 - 15 \div 20 + 25 \div 30$
(A) 210 (B) 240 (C) 355
(D) 245 (E) 360

7. $(10 - 5) \div 50 \times (25 \times 5) \div 40$
(A) –50 (B) –550 (C) 50
(D) 550 (E) 650

8. $(10 - 2 \times 3) \div (4 - 5 \times 8) \times (2 - 3) \div 2$
(A) 90 (B) 0 (C) –1 (D) –34 (E) 100

9. $44 - 11 \div 2 \times 6 \div 6 + 2 - 12$
(A) 6·5 (B) 60 (C) 104
(D) 192 (E) 216

10. $(13 - 5 \times 8 + 4) \times (5 - 6 + 12 \times 3) \div (4 + 2)$
(A) 7.5 (B) 29 (C) 27
(D) –2·5 (E) 11

Directions for questions 11 to 15: These questions are based on the information given below.

\$ stands for addition.
↑ stands for subtraction.
⊕ stands for multiplication.
Δ stands for division.
@ stands for less than.
? stands for greater than.
☆ stands for equal to.

Choose the correct statement in each of the following questions.

11. (A) 18 \$ 6 Δ 3 @ 6 \$ 4 ⊕ 3
(B) 18 \$ 6 Δ 3 ☆ 6 ⊕ 4 ↑ 3
(C) 18 Δ 6 ⊕ 3 ? 6 Δ 4 \$ 3
(D) 18 ⊕ 6 ⊕ 3 @ 6 \$ 4 ⊕ 3
(E) None of these

12. (A) 4 ↑ 3 \$ 6 ? 4 ⊕ 8 Δ 4
(B) 4 Δ 3 ⊕ 6 ☆ 4 \$ 8 ↑ 4
(C) 4 ⊕ 3 Δ 6 ☆ 4 Δ 8 \$ 4
(D) 4 \$ 3 ⊕ 6 @ 4 ↑ 8 ⊕ 4
(E) None of these

13. (A) 2 ⊕ 4 \$ 8 ☆ 8 ⊕ 4 Δ 2
(B) 2 \$ 4 Δ 8 ? 8 Δ 4 \$ 2
(C) 2 ⊕ 4 ↑ 8 ? 8 ↑ 4 ↑ 2
(D) 2 \$ 4 ⊕ 8 @ 8 Δ 4 ⊕ 2
(E) None of these

14. (A) 7 ⊕ 2 ↑ 13 ? 5 \$ 11 ⊕ 7
(B) 7 \$ 2 Δ 13 * 5 Δ 11 ⊕ 6
(C) 7 ⊕ 2 \$ 13 ? 5 ⊕ 11 Δ 7
(D) 7 Δ 2 \$ 13 @ 5 ↑ 11 Δ 7
(E) None of these

15. (A) 4 \$ 7 \$ 2 * 6 ⊕ 4 ↑ 11
(B) 4 ↑ 7 \$ 2 ? 6 Δ 4 ⊕ 6
(C) 4 ⊕ 7 Δ 2 @ 6 \$ 4 ↑ 6
(D) 4 Δ 7 ⊕ 2 ? 6 ↑ 4 \$ 6
(E) None of these

Directions for questions 16 to 20: These questions are based on the following information.

a + b means a is neither less than nor equal to b.
a – b means a is neither smaller nor greater than b.
a = b means a is not less than b.
a × b means a is not greater than b.
a ÷ b means a is neither greater than nor equal to b.

Each of the following questions consists of a statement followed by two conclusions.

Give your answer as
(A) if only conclusion (I) follows
(B) if only conclusion (II) follows
(C) if both conclusions (I) and (II) follow
(D) if neither (I) nor (II) follows
(E) if either conclusion (I) or (II) follows

16. Statement: A + B, B × C, C × D
Conclusions: I. A + D
II. A = C

17. Statement: P ÷ Q, Q – R, R + S
Conclusions: I. P = S
II. P ÷ R

18. Statement: X + Y, Y × Z, W = Z
Conclusions: I. Y × W
II. X + Z

19. Statement: E ÷ F, F + G, G – H
Conclusions: I. E + H
II. F + H

20. Statement: M × N, O = N, O × P
Conclusions: I. M × P
II. O = M

***Directions for questions 21 to 25*:** These questions are based on the following information.

a £ b means a is less than or equal to b.
a $ b means a is greater than or equal to b.
a ↑ b means a is less than b.
a ● b means a is greater than b.
a▲b means a is equal to b.

Each of the following questions consists of a statement followed by two conclusions.

Give your answer as
(A) if only conclusion (I) follows
(B) if only conclusion (II) follows
(C) if both conclusions (I) and (II) follow
(D) if neither (I) nor (II) follows
(E) if either conclusion (I) or (II) follows

21. Statement: w ● x, x £ y, y ↑ z
Conclusions: I. w ▲ y
II. w ↑ z

22. Statement: a ● b, b ▲ c, c $ d
Conclusions: I. d ↑ b
II. b▲d

23. Statement: m ▲ n, n £ o, o ● p
Conclusions: I. p ● m
II. m £ o

24. Statement: a $ b, b ● c, c ↑ d
Conclusions: I. a ▲ c
II. b £ d

25. Statement: e £ f, f ↑ g, e ▲ h
Conclusions: I. f $ h
II. g ● e

Directions for questions 26 to 30: These questions are based on the following information.

p ✡ q means p is neither less than nor equal to q.
p @ q means p is neither greater than nor equal to q.
p # q means p is not less than q.
p Δ q means p is not greater than q.
p □ q means p is neither smaller nor greater than q.

Each of the following questions consists of a statement followed by two conclusions.

Give your answer as
(A) if only conclusion (I) follows
(B) if only conclusion (II) follows
(C) if both conclusions (I) and (II) follow
(D) if neither (I) nor (II) follows
(E) if either conclusion (I) or (II) follows

26. Statement: k □ l, l Δ m, m @ n
Conclusions: I. l @ n
II. m # k

27. Statement: p # q, q ✡ r, r Δ s
Conclusions: I. s ✡ p
II. q @ s

28. Statement: a □ b, c Δ d, b ✡ c
Conclusions: I. a ✡ c
II. b # d

29. Statement: s ✡ r, q # p, r Δ p
Conclusions: I. q # r
II. s ✡ q

30. Statement: x ✡ y, y @ z, w ✡ x
Conclusions: I. w ✡ y
II. x @ z

Directions for questions 31 to 35: Study the following sequence carefully and answer the questions given below it.

M 4 C @ F 7 1 $ A E N 9 H > 5 ↓ K ⊙ 3 ? B J ≠ G 8 D 6 I L 2

31. Find the next element in the following series.
M, @, A, ↓, _____
(A) G (B) N (C) ≠ (D) 9 (E) 8

32. Find the next term in the following series.
4 @ 7, $ E 9, > ↓ ⊙, _____
(A) 3 B ≠ (B) ? J G (C) 3 ? B
(D) J G D (E) ? D B

33. How many such symbols are there in the above sequence of elements which are immediately preceded by an alphabet and immediately following by a digit?
(A) Zero (B) One (C) Two
(D) Three (E) More than three

34. Which of the following is the tenth element to the right of the fifteenth element from the right?
(A) I (B) 6 (C) D (D) 8 (E) 9

35. If the elements in the first half of the above sequence from the left are written in the reverse order, then which element is the tenth to the left of the twentieth element from the left?
(A) 1 (B) 7 (C) F (D) @ (E) 3

Directions for questions 36 to 40: Study the following sequence carefully and answer the questions given below it.

R K 5 9 # B 2 % * E ? A 8 L $ I 4 S V 7 ! C 6 N @ H 1 3 & D

36. Four of the following are alike. Find the odd one.
(A) RKB (B) ALI (C) SVC
(D) NHD (E) BLI

37. How many consonants are there, which are immediately followed by a digit but not immediately preceded by a consonant?
(A) 3 (B) 2 (C) 1
(D) 0 (E) More than 3

38. Find the next term in the following series.
5#2, *?8, $4V, ____
(A) LIS (B) !6@ (C) I4S
(D) 13$ (E) 52*

39. Which is the 9th element to the right of the 19th element from the left end?
(A) 7 (B) 3 (C) V (D) H (E) A

40. How many letters are there, each of which are immediately followed and immediately preceded by a symbol?
(A) 1 (B) 3 (C) 2
(D) More than 3 (E) None of these

Directions for questions 41 to 45: Study the following sequence carefully and answer the questions given below it.

2 T # K 7 P N 3 R ? 5 Q 1 S A 9 @ 4 E G % 8 J B 6 M ! V 9 Z

41. Which is the 13th element to the left of the 8th element from the right end?
(A) # (C) T (C) K
(D) V (E) ?

42. How many digits are there which are immediately followed by a symbol but not immediately preceded by a consonant?
(A) 3 (B) 1 (C) 2 (D) 4 (E) 0

43. Find the next term in the following series.
86V, 2KN, ?19, _____
(A) A4% (B) 5S@ (C) E86
(D) 68E (E) None of these

44. Four of the following are alike. Find the odd one.
(A) 7PN (B) Q1S (C) 4GB
(D) 6M! (E) SA9

45. Which is the 4th element to the right of the 23rd element from the right end?
(A) Q (B) K (C) B
(D) # (E) J

Directions for questions 46 to 60: Select the correct alternative from the given choices.

46. If 4 + 5 = 41 and 10 + 12 = 244, then 6 + 8 =
(A) 100 (B) 200 (C) 88
(C) 96 (E) 64

47. If 6 $ 3 = 9 and 9 $ 4 = 17, then 8 $ 3 =
(A) 39 (B) 37 (C) 35 (D) 33 (E) 41

48. If 5 ? 8 = 27 and 7 ? 2 = 5, then 11 ? 8 =
(A) 58 (B) 77 (C) 69
(D) 60 (E) 82

49. If 8 ÷ 4 = 48 and 15 ÷ 6 = 189, then 12 ÷ 3 =
(A) 135 (B) 144 (C) 156
(D) 153 (E) 173

50. If 3 @ 4 = 50 and 7 @ 10 = 298, then 6 @ 9 =
(A) 192 (B) 234 (C) 152
(D) 200 (E) 256

51. If 4 × 3 = 55 and 5 × 9 = 44, then 10 × 10 =
(A) 900 (B) 99 (C) 77
(D) 999 (E) 1111

52. If $2^{6-4} = 48$ and $2^{8-5} = 224$, then 2^{10-6} =
(A) 360 (B) 720 (C) 880
(D) 960 (E) 1024

53. If 5 @ 6 = 1331 and 3 @ 4 = 343, then 4 @ 5 =
(A) 512 (B) 729 (C) 1000
(D) 2197 (E) 3375

54. If 8 Δ 3 = 120 and 10 Δ 6 = 255, then 12 Δ 5 =
(A) 286 (B) 380 (C) 360
(D) 324 (E) 288

55. If 3 ⊙ 2 = 23 and 4 ⊙ 3 = 229, then 5 ⊙ 4 =
(A) 2869 (B) 3142 (C) 2653
(D) 2968 (E) 3630

56. If a Δ b = a + b + ab and a $ b = $a^2 + b^2$, then (3 Δ 4) $ 5 =
(A) 386 (B) 1625 (C) 336
(D) 436 (E) 784

57. If $p > q = p^2 + q^3$ and $p < q = p^3 - q^2$ then (1>2) < 3 =
(A) 503 (B) 720 (C) 648
(D) 960 (E) 1024

58. If $x > y = x^3 + y^3$ and $x @ y = x^3 - y^3$ then 3 > (2 @ 1) =
(A) 756 (B) 702 (C) 440
(D) 490 (E) 370

59. If $E \downarrow F = (E + F)^2 + (E - F)^2$ and $E \uparrow F = (E + F)^2 - (E - F)^2$, then (2 ↓ 5) ↑ (4 ↓ 3) =
(A) 7808 (B) 15616 (C) 11600
(D) 23200 (E) 9600

60. If $m \neq n = m^2 - mn + n^2$ and m? n = $(m + n)^2 - mn$, then (2 ? 3) ≠ (5 ≠ 3) =
(A) 900 (B) 361 (C) 642
(D) 729 (E) 810

Directions for questions 61 to 65: In a certain instruction system the different computation processes are written as follows.

(a) 'A % B ! C' means 'A is added to the product of B and C'.
(b) 'A © B * C' means 'the product of B and C is subtracted from A.'
(c) 'A # B @ C' means 'the product of A and B is divided by C.'
(d) 'A • B $ C' means 'C is multiplied by the sum of A and B'.

You have to find out what will come in the place of question mark (?) in each question following the computation processes.

61. 100 © 20 * 3 = a
a % 40 ! 5 = ?
(A) 140 (B) 240 (C) 340
(D) 360 (E) 720

62. 16 • 14 $ 4 = t
t # 10 @ 12 = ?
(A) 700 (B) 300 (C) 400
(D) 200 (E) 100

63. 100 © 5 * 16 = q
q % 4! 12 = ?
(A) 140 (B) 68 (C) 98
(D) 102 (E) 210

64. 50 # 40 @ 200 = p
16 % 12 ! p = ?
(A) 112 (B) 136 (C) 126
(D) 226 (E) 326

65. 12 • 13 $ 5 = r
10 © 4 * r = ?
(A) 120 (B) –430 (C) –490
(D) 720 (E) None of these

Directions for questions 66 to 70: In a certain instruction system the different computation processes are written as follows.

(a) 'P × Q + R' means 'the product of Q and R is added to P'.
(b) 'P < Q > R' means 'the sum of P and Q is divided by one-fourth of R'.
(c) 'P £ Q $ R' means 'R is subtracted from the product of P and Q'.
(d) 'P Δ Q □ R' means 'R is multiplied by the difference of P and Q'.

You have to find out what will come in the place of the question mark (?) in each question following the computation processes.

66. 25 £ 10 $ 5 = y
y × 15 + 3 = ?
(A) 240 (B) 390 (C) 290
(D) 140 (E) 490

67. 12 < 8 > 16 = b
b Δ 94 □ 4 = ?
(A) 428 (B) 1006 (C) 200
(D) 356 (E) 1600

68. 10 Δ 8 □ 4 = n
n £ 6 $ 38 = ?
(A) 10 (B) 80 (C) 20
(D) 22 (E) None of these

69. 16 < 8 >12 = m
m × 12 +2 = ?
(A) 46 (B) 42 (C) 32
(D) 40 (E) 38

70. 10 Δ 30 □ 5 = q
12 < q > 16 = ?
(A) 30 (B) 40 (C) 28
(D) 34 (E) None of these

Directions for questions 71 to 75: Select the correct alternative from the given choices:

71. Which of the following symbols should replace the question mark in the given expression in order to make the expressions 'B>E' and 'A≥F' definitely true?
A ≥ B = C ? D ≥ F > E
(A) > (B) ≥
(C) = (D) Either (A) or (B)
(E) Either (B) or (C)

72. Which of the following set of letters should replace the question marks in the same order in the given expression in order to make the expressions 'K > F' and 'I ≥ J' definitely true?
? < ? ≤ ? = ? < ? ≤ ?
(A) F,G,K,J,I,H (B) G,J,I,K,H,F (C) F,G,H,K,J,I
(D) J,H,G,F,K,I (E) K,F,G,H,J,I

73. Which of the following set of symbols should replace the question marks in the same order in the given expression in order to make the expressions 'L > P' and 'Q < M' definitely true?
L ? M ? N ? O ? P ? Q
(A) ≥, ≥, =, =, ≥ (B) =, ≥, =, ≥, =
(C) =, <, ≥, >, = (D) =, ≥, >, =, ≥
(E) =, ≥, ≥, =, ≤

74 Which of the following expressions is definitely true in order to make the expressions 'R ≥ V' and 'S > W' definitely true?
(A) R > S = T ≥ U ≥ V ≥ W
(B) S > R = U > T ≥ V > W
(C) W = R ≥ S > T = U ≥ V
(D) R ≥ S = T > U ≥ V = W
(E) None of these

75. Which of the following expressions is definitely true in order to make the expressions 'J > Z' and 'Y < I' definitely false?
(A) I > J ≥ K > X = Y > Z
(B) I = J ≤ K < X ≥ Y = Z
(C) J ≥ K > I > Y > X = Z
(D) All of the above
(E) None of these

Directions for questions 76 to 80: In the questions given below, the relationship between different elements is shown in the statements. Among the choices, find out which does not follow from the statements.

76. Statement: M ≥ R = N < O = P ≤ G.
(A) N ≤ M (B) R < P
(C) G > R (D) O ≤ M
(E) None of these

77. Statement: A = B < C ≤ D = K ≥ E = F.
(A) K ≥ C (B) D ≥ F (C) B ≤ K
(D) D ≤ E (E) Both (C) and (D)

78. Statement: G > R = K = Q ≥ N ≤ P = B ≤ M.
(A) Q < G (B) R ≥ N (C) N ≥ P
(D) P ≤ M (E) N < G

79. Statement: X < A = V ≤ S ≤ H < N = P.
(A) A ≤ H (B) X < S (C) A ≤ N
(D) H < P (E) P > S

80. Statements: A ≥ B = C = D > E; P ≤ Q = B ≤ F < G.
(A) Q = D (B) F ≥ A (C) Q ≤ A
(D) P ≤ D (E) G > E

Key

1. B	9. B	17. B	25. C	33. C	41. E	49. A	57. B	65. C	73. D
2. A	10. E	18. A	26. C	34. C	42. B	50. B	58. E	66. C	74. E
3. C	11. C	19. B	27. D	35. B	43. C	51. A	59. C	67. D	75. E
4. E	12. B	20. C	28. A	36. E	44. C	52. D	60. B	68. A	76. D
5. B	13. A	21. D	29. A	37. A	45. A	53. B	61. B	69. C	77. E
6. C	14. C	22. E	30. C	38. B	46. A	54. E	62. E	70. C	78. C
7. A	15. A	23. B	31. E	39. B	47. B	55. A	63. B	71. E	79. C
8. C	16. D	24. D	32. B	40. A	48. C	56. A	64. B	72. C	80. B