CHAPTER – 10
SYMBOLS AND NOTATIONS

INDTRODUCTION:

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, $\div$, $>$, $<$, $\geq$, $\leq$, $=$ and $\neq$. 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:

10.01. If '$-$' stands for '$\times$', '$\times$' stands for '$+$', '$+$' stands for '$\div$' and '$\div$' 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

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)

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

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)

10.03. 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

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)

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

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)

10.05. 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) $a \Delta b \Delta c$

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)

Directions for questions 10.06 to 10.10: In the questions given below, certain symbols are used with the following meanings.

A @ B means A is greater than B.
A # B means A is less than B.
A \$ B means A is than equal to B.
A © B means A is either greater than or equal to B.
A + B means A is either less than or equal to B.

In each of these questions four statements are given, followed by four conclusions marked I, II, III, and IV. Find which of the conclusions follow the given statements and choose the proper answer choice.

10.06. Statement: K@L; L@M; M@N; N@P

Conclusions: I.   M # K
                    II.   N # K
                   III.   N # L
                   IV.   P # K
(A) Only I, II, and III follow
(B) Only II, III and IV follow
(C) Only I, III and IV follow
(D) All follow

10.07. Statements: P @ Q, Q @ R, R \$ S, S # T

Conclusions: I.   P @ R
                    II.   Q \$ S
                   III.   R # T
                   IV.   Q @ T
(A) Only I and II follow
(B) Only I and III follow
(C) Only II and IV follow
(D) Only III and IV follow

10.08. Statements: E#D; G ©F; F \$ E; M @ G

Conclusions: I.   D @ G
                    II.   F # H
                   III.   E \$ H
                   IV.   D ©H
(A) Only II follows
(B) Only III follows
(C) Only III and IV follow
(D) Either I or IV follows

10.09. Statements: N © P; S $ P; T @ S; R#T

Conclusions: I. N $ S
                 II. N@ S
                 III. P # T
                 IV. S $ R
(A) Only III follows
(B) Only I and III follow
(C) Only II and III follow
(D) Only III and either I or II follow

10.10. Statements: A @ T; K + L; T $ B; K © A

Conclusions: I. T # L
                 II. A $ L
                 III. A @ L
                 IV. A # L
(A) Only I follow
(B) Only I and either II or III follow
(C) Only I and either II or IV follow
(D) Only I and either III or IV follow

Solutions for questions 10.06 to 10.10:

A @ B means A > B
A # B means A < B
A $ B means A = B
A © B means A ≥ B
A + B means A ≤ B

10.06. K @ L means K > L
L @ M means L > M
M @ N means M > N
N @ P means N > P
Combining the above statements, we get
K > L > M > N > P
I. M # K means M < K, follows.
II. N # K means N < K, follows.
III. N # L, means N < L, follows.
IV. P # K, means P < K follows.
∴ All follow.   Choice (D)

10.07. P@Q means P > Q.
Q @ R means Q > R.
R $ S means R = S
S # T means S = T
Combining the above statements, we get
P > Q > R = S < T
I. P@ R means P > R, follows.

II. Q $ S means Q = S does not follow.
III. R # T means R < T, follows.
IV Q @ T means Q > T, does not follow.
∴ Only I and III follow.   Choice (B)

10.08. E # D means E < D
G © F means G ≥ F
F $ E means   F = E
M @ G means H > G.
Combining the above statements, we get
D > E = F ≤ G < H
I. D @ G means D > G does not follow.
II. F # H means F < H follows.
III. E $ H means E = H does not follow.
IV. D © H means D ≥ H, does not follow.
∴ Only II follows.   Choice (A)

10.09. N © P means N ≥ P
S $ P means S = P
T @ S means T > S
R # T means   R < T
Combining the above statements, we get
N ≥ P = S < T > R
I. N$ S means N = S; does not follow.
II. N @ S means N > S does not follow.
III. P # T means P < T, follows.
IV. S $ R means S = R, does not follow.
Here I and II form a contradictory pair. From the given statements we know that N ≥ S.
Hence, either N > S or N = S. Which means when I follows, II does not follow and vice versa.
∴ Either I or II follows.
∴Only III and either I or II follow.   Choice (D)

10.10. A @ T means A > T
K + L means   K ≤ L
T $ B means T = B
K © A means K ≥ A
Combining the above statements, we get
B = T < A ≤ K ≤ L
I. T # L means T < L follows.
II. A $ L means A = L does not follow.
III. A @ L means A > L, does not follow.
IV. A # L means A < L, does not follow.
Here II and IV are form a contradictory pair.
∴Only I and either II or IV follow.   Choice (C)

Exercise – 10

Directions for questions 1 to 5: In a certain code language '+' means '–', '–' means '×', '×' means '÷', '÷' means '×'. Answer the following questions using the data.

1. 14 × 2 – 6 + 10 + 4 × 2
(A) 30   (B) 40   (C) 1   (D) 16

2. 15 ÷ 5 + 15 ÷ 10 × 2
(A) 54   (B) 20   (C) 0   (D) 225

3. 11 ÷ 15 × 3 + 6 – 5
(A) 55   (B) 35   (C) 165   (D) 25

4. 13 + 3 – 5 – 20 + 25
(A) –314   (B) 313   (C) –312   (D) 6

5. 196 × 14 ÷ 25 × 5 + 225 x 15
(A) 70   (B) 85   (C) 196   (D) 55

Directions for questions 6 to 15: Select the correct alternative from the given choices.

6. If A   B = A + AB + B – 6, then 7   8 =
(A) 55   (B) 70   (C) 65   (D) 49

7. If p ⊙ q = $p^2 + q^2 + pq + q$, then 10 ⊙ 5 =
(A) 180   (B) 50   (C) 500   (D) 250

8. If C Δ D = $C^2 + CD + D^2 – (C + D)$ then 7 Δ 8 =
(A) 169   (B) 154   (C) 133   (D) 172

9. If x $ y = $\sqrt{x} + \sqrt{y} + \sqrt{xy}$, then 49 $ 16 =
(A) 16   (B) 49   (C) 27   (D) 39

10. a o b = $2a^b$, then 5 o 2 =
(A) 40   (B) 30   (C) 60   (D) 50

11. If 5 @ 6 = 61 and 8 @ 10 = 164, then 7 @ 9 =
(A) 125   (B) 63   (C) 130   (D) 32

12. If 3 ≠ 5 = 16 and 7 ≠ 5 = −24, then 10 ≠ 11 =
(A) 21   (B) −25   (C) 20   (D) 110

13. If 12 ≠ 13 = 182 and 17 ≠ 8 = 162, then 15 ≠ 16 =
(A) 186   (B) 240   (C) 272   (D) 145

14. If 3 > 2 = 31, and 4 > 3 = 283, then 1 > 2 =
(A) 16   (B) 36   (C) 14   (D) 5

15. If 17 * 18 = 306 and 14 * 23 = 330, then 10 * 12 =
(A) 121   (B) 306   (C) 345   (D) 129

Directions for questions 16 to 20: Study the following sequence carefully and answer the questions given below it.

S T U ς ? J ↑ P Q 8 L 1 @ C 3 S ≠ A $ 6 2 B R £ 7 9 ☉

16. Fill the blank based on the above sequence.

☉, 7, 2, 3, ↑, £ _____.
(A) 1   (B) @   (C) L   (D) 8

17. What would come in the place of the blank based on the given sequence?
TςJ, ↑QL, 1C5, _____, B£9
(A) 5 ≠ $ (B) ≠ $ 2   (C) $ B 9   (D) $ 2 B

18. How many such symbols are there in the above sequence of elements which are immediately preceded by a letter and immediately followed by a digit?
(A) One   (B) Zero   (C) Two   (D) Three

19. Which of the following is the seventh to the right of the eleventh letter / digit / symbol from the right?
(A) 7   (B) 9   (C) £   (D) $

20. If the first ten elements from the left are reversed in the above sequence which letter digit/symbol is the tenth to the left of the fifteenth letter / digit / symbol from the right?
(A) J   (B) Q   (C) ↑   (D) P

Directions for questions 21 to 25: In the following questions, the symbols +, −, ×, ÷ and = are used as follows.

a = b means a is not equal to b.
a − b means a is neither greater than nor equal to b.
a + b means a is either equal to or greater than b.
a ÷ b means a is neither equal to nor smaller than b.
a × b means a is neither smaller nor greater than b.
Give your answer as

(A) if only conclusion I follows.
(B) if only conclusion II follows.
(C) if neither I nor II follows.
(D) if either I or II follows

21. Statement :   P + Q, Q ÷ R, R − S

Conclusions :   I.   R × S
                          II. P ÷ R

22. Statement :   L × M, L + N, N − T

Conclusions :   I.   M − T
                          II. L × N

23. Statement :   A + B, A × C, A = D

Conclusions :   I.   B − C
                          II. B × C

24. Statement :   K + R, R ÷ P, P × Q

Conclusions :   I.   Q − K
                          II. P ÷ K

25. Statement :   G × H, G − J, H ÷ K

Conclusions :   I.   K − J
                          II. G − K

Directions for questions 26 to 30: In the questions given below, certain symbols are used with the following meanings.

A @ B means A is not greater than B.
A + B means A is not lesser than B.
A © B means A is equal to B.
A $ B means A is neither greater than nor equal to B.
A * B means A is neither lesser than nor equal to B.

In each of the following questions four statements are given followed by four conclusions marked I, II, III and IV. Find which of the conclusions follow the given statements and choose the proper answer choice.

26. Statements:
F $ E; C * R; E © C; R @ K

Conclusions:
I.   E * R
II. C * F
III. E $ K
IV. F + K
(A) Only I and IV follow.
(B) Only I and III follow
(C) Only I, II and III follow.
(D) None of these

27. Statements:
Z © J; I + N; W @ I; W * J

Conclusions:
I.   I * Z
II. I © N
III. Z © I
IV. J * N
(A) Only I follows.
(B) Either I or II follow.
(C) Only I and IV follow.
(D) None of these

28. Statements:
H @ A; D @ B; T * D; N + A

Conclusions:
I.   H © D
II. T @ A
III. N + T
IV. A $ D
(A) Only I and III follow.
(B) Only II and IV follow.
(C) Only II and III follow.
(D) None of these

29. Statements:
A * Q; H © A; L + H; T $ L

Conclusions:
I.   Q $ H
II. A © L
III. H * T
IV. A $ L
(A) Only I follow.
(B) Only I and II follow.
(C) Only II and III follow.
(D) Only I either II or IV follow.

30. Statements:
S * T; M * A; M $ E; A + T

Conclusions:
I.   S + A
II. E * T
III. A $ E
IV. T * M
(A) Only III and IV follow.
(B) Only II and III follow.
(C) Only I, III and IV follow.
(D) All follow

Directions for questions 31 to 35: In each question, a relationship between different elements is shown in the statements. The statements are followed by conclusions. Study the conclusions based on the given statements and select the appropriate answer.

31. Statements:
M ≤ N ≤ K > F, K = J < Q < P

Conclusions:
I   K > P
II. Q > M
III. M < F
(A) Only I follows
(B) Only III follows
(C) Only II follows
(D) Either I or III follows

32. Statements:
Z = Y < X ≤ W, Y = T ≥ S ≥ K

Conclusions:
I.   Z > K
II. Z = K
III. Z < W
(A) Only III follows
(B) Only III and either I or II follow.
(C) Only I and II follow
(D) Only II follows

33. Statements:
A ≤ M ≤ G > I, M > Y ≥ K = Z

Conclusions:
I.   A ≥ Z
II. Y < A
III. M ≤ I
(A) Only I follows
(B) Only II follows
(C) Only II and III follow
(D) None follows

34. Statements:
E ≤ G < M > H = F > J ≥ L

Conclusions:
I.   M > J
II. M > E
III. M = E
(A) Only III follows
(B) Only I and III follow
(C) Either II or III follows
(D) Only I and II follow

35. Statements:
P > Q ≥ H = J < M ≤ F > S

Conclusions:
I.   Q ≥ J
II. F > J
III. H < F
(A) Only I and II follow
(B) Only II and III follow
(C) All follow
(D) None of these

Directions for questions 36 to 40: In the questions given below, the relationship between different elements is shown in the statements. These statements are followed by two conclusions:

36. Statements:
F ≥ M = O > A ≤ U = S; Z > E = O < R

Conclusions:
I.   F ≥ Z
II. S ≤ R
(A) Only II follows.
(B) Either I or II follows.
(C) Neither I nor II follows.
(D) Both I and II follow.

37. Statements:
H ≤ C ≤ R = I > U; N > J > I = V > C

Conclusions:
I.   N > H
II. C < U
(A) Either I or II follows.
(B) Both I and II follow.
(C) Only I follows.
(D) Only II follows.

38. Statements:
C > H ≥ P = O ≤ R ≤ A ; D ≤ S = O ≥ A

Conclusions:
I.   H > D
II. D = H
(A) Neither I nor II follows.
(B) Either I or II follows.
(C) Only II follows.
(D) Only I follows.

39. Statements:
P = A > R = M = I < T; D ≥ S = I < H

Conclusions:
I.   D ≥ P
II. S < T
(A) Only II follows.
(B) Both I and II follow.
(C) Neither I nor II follows.
(D) Only I follows.

40. Statements:
P < R ≤ E = M < A; S ≥ W = A ≥ N

Conclusions:
I.   P < S
II. S > M
(A) Only I follows.
(B) Only II follows.
(C) Neither I or II follows.
(D) Both I and II follow.

Directions for questions 41 to 45: In a certain instruction system, the different computation process are written as follows.

(a) A # B $ C means 'C' is subtracted from the product of 'A' and 'B'.
(b) A → B ←C means 'B is added to the product of 'A' and 'C'.
(c) A ↑ B ↓ C means sum of 'A' and 'B' is divided by 'C'.
(d) A * B @ C means product of 'B' and 'C' is subtracted from 'A'.

In each question you have to find out the number which will come in place of the question mark (?) following the above computation processes.

41. 5 # 7 $ 4 = x
x → 5 ← 3 = ?

(A) 98   (B) 158   (C) 90   (D) 88

42. 40 * 3 @ 3 = P
6 # 6 $ P = ?

(A) 31   (B) 5   (C) 35   (D) 10

43. 7 ↑ 2 ↓ 3 = a
3 → a ← 5 = ?

(A) 16   (B) 14   (C) 18   (D) 17

44. 4 → 4 ← 9 = b
b * 5 @ 8 = ?

(A) 0   (B) 1   (C) 5   (D) 7

45. 12 ↑ 24 ↓ 6 = y
7 # y $ 3 = ?

(A) 49   (B) 29   (C) 45   (D) 39

Directions for questions 46 to 48: Select the correct alternative from the given choices.

46. Which of the following symbols should replace the question marks, in that order in the given expression, in order to make the expression 'A > J' definitely true?
A? X? E? U? J? S
(A) =, ≥, =, =. >   (B) >, ≥, =, <, >
(C) =, >, =, >, ≥   (D) <, =, ≤, <, >

47. Which of the following elements should replace the question marks, in that order in the given expression, in order to make the expression 'L > P' definitely true?
? > ? =? >? =? <?
(A) L, O, N, M, Q, P   (B) L, M, N, O, P, Q
(C) P, O, N, Q, M, L   (D) L, M, O, N, Q, P

48. Which of the following expressions is true if the given expressions 'B > K' as well as 'T < D' are true?
(A) T < B ≤ G < D = K   (B) B < T = G ≤ D > K
(C) D < K > G = T ≥ B   (D) B > D = G ≥ K > T

Directions for questions 49: The symbols &, #, @, % and $ are used with the following meanings as illustrated below.

'A@B' means 'A is not greater than B'
'A%B' means 'A is not smaller than B'
'A#B' means 'A is neither greater than nor smaller than B'
'A$B' means 'A is neither greater than nor equal to B'
'A&B' means 'A is neither smaller than nor equal to B'

49. In which of the following expressions, will the expressions 'T % O' and 'Q $ K' definitely false?
(A) Y & T $ Q @ W # K @ O
(B) O % P & K # T $ H @ Q
(C) Q & T $ F & S $ O @ K
(D) O $ Q # B % N % K & T

Directions for question 50: Select the correct alternative from the given choices

50. Which of the following interchange of signs would make the equation correct?
64 = 8 + 8 ÷1 6
(A) + and =
(B) = and ÷
(C) + and ÷
(D) more than one of the above

Key

Exercise – 10

1. A	6. C	11. C	16. A	21. B	26. D	31. C	36. C	41. A	46. C
2. C	7. A	12. A	17. B	22. C	27. A	32. B	37. C	42. B	47. B
3. D	8. B	13. C	18. C	23. D	28. D	33. D	38. B	43. C	48. D
4. C	9. D	14. D	19. C	24. A	29. D	34. D	39. A	44. A	49. B
5. D	10. D	15. A	20. D	25. A	30. B	35. C	40. D	45. D	50. B