

Exponent and Roots আমাদের দেশের গণিতজ্ঞদের নিকট খুব পরিচিত নাম হলেও ভারতীয় উপমহাদেশ তথা এশিয়ান গণিতবিদগণ একে Surds and Indices নামে অভিহিত করে থাকেন। যে নামেই ডাকা হোক না কেন এই অধ্যায়টি সরকারী-বেসরকারী ব্যাংক ও আর্থিক প্রতিষ্ঠানসমূহ এমনকি কেন্দ্রীয় ব্যাংকের বিভিন্ন পদের নিয়োগ পরীক্ষার জন্য একটি গুরুত্বপূর্ণ অধ্যায়। আর্টস ফ্যাকাল্টি থেকে AUST কিংবা বিআইবিএম থেকে ব্যাংকিং বিভাগ সবার প্রশ্নপত্রে Exponent and Roots তথা Surds and Indices অধ্যায়ের প্রশ্নপত্রের আধিক্য লক্ষ্যনীয়। অধ্যায়টি নবম-দশম শ্রেণীতে বিশদ পঠিত বিধায় এই অধ্যায়ের কাঠিন্য শিক্ষার্থীদের স্পর্শ করেন। পরীক্ষার প্রশ্নপত্রের সাথে সংগতি রেখে ও ক্লাসে পাঠদানের সুবিধা মাথায় রেখে টপিকস/টাইপ অনুসারে (প্রয়োজনীয় ক্ষেত্রে সাব-টাইপসে তথা কেস অনুসারে) নিয়ম ও সংশ্লিষ্ট সমস্যাগুলো দেওয়া হলো।

Discussed Types :

- ✎ Formula Related Simplification (Easy Mode)
- ✎ Formula with base constraint simplification (Difficult Mode)
- ✎ Solution of Roots and Exponent

✎ Topic – 01 : Formula Related Simplification (Easy Mode)

01. $(0.04)^{-1.5} = ?$

- (a) 25 (b) 125 (c) 250 (d) 625 (e) None

02. If $x^{-5/3} = 1/243$ then the value of x is

- (a) 9 (b) 27 (c) 81 (d) 243 (e) None

03. $3^{30} + 3^{31} + 3^{32} = ?$

- (a) $3^{33} - 1$ (b) $3^{33} + 1$ (c) $(13)^{330}$ (d) 3^{34} (e) None

✎ Topic – 02 : Formula with base constraint simplification (Difficult Mode)**Case-1 : Different Base approach**

04. If $a^x = b$; $b^y = c$ and $c^z = a$, then the value of xyz is :

- (a) 0 (b) 1 (c) $\frac{1}{abc}$ (d) abc (e) None

Case-2 : Same Base approach

05. $(a^{(x-y)})^{(x^2 - xy + y^2)} (a^{(y-z)})^{(y^2 - yz + z^2)} (a^{(z-x)})^{(z^2 - zx + y^2)}$

- (a) 0 (b) 1 (c) x^{a+b+c} (d) 11 (e) None

Topic - 03 : Solution of Roots and Exponent
Case - 01 : Basic Solutions

06. If $2^{(x-y)} = 8$ and $2^{(x+y)} = 32$, then $x = ?$

- (a) 0 (b) 2 (c) 4 (d) 6 (e) None

07. If $m^n = 121$ then $(m - 1)^{n+1} = ?$

- (a) 1 (b) 10 (c) 121 (d) 1000 (e) None

08. The value of $\sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}}}$ is:

- (A) 4 (B) 6 (C) 8 (D) 10 (E) None of these

Case - 02 : Basic Solutions

09. If $3^{2x-1} = 243$, then $x = ?$

- (a) 2 (b) 3 (c) 1 (d) $\frac{2}{3}$ (e) None

10. $2^{x-1} + 2^{x+1} = 640$ then $x = ?$

- (a) 6 (b) 8 (c) 5 (d) 7 (e) None

11. If $\sqrt{x} = \frac{6}{25} - x$? Then $x = ?$

- (a) $\frac{1}{5}$ (b) $-\frac{1}{5}$ (c) $\frac{1}{25}$ (d) $-\frac{1}{25}$ (e) $\frac{35}{25}$

একটা সময় ছিল “লগারিদম” কখনোই ব্যাংকার্স রিজুটোমেন্ট এক্সামে আসত না। তবে ২০১৮ ও ২০১৯ সালে এই ট্যাবুটি সরে গেছে। আর্টস ফ্যাকাল্টি ও AUST তাদের এমসিকিউ পরীক্ষায় নিয়মিতভাবে লগারিদম থেকে প্রশ্ন করে এসেছে। এই অধ্যায়ের শুরুতেই তাই লগারিদমের বেসিক কনসেপ্ট আলোচনা করে সমস্যা সমাধানের জন্য শিক্ষক ও শিক্ষার্থী উভয়কেই অনুরোধ করা হলো। সূচকের মত এই অধ্যায়টি নবম-দশম শ্রেণীতে বিশদ পঠিত বিধায় এই অধ্যায়ের কাঠিন্য শিক্ষার্থীদের স্পর্শ করেনা। পরীক্ষার প্রশ্নপত্রের সাথে সংগতি রেখে ও ক্লাসে পাঠদানের সুবিধা মাথায় রেখে টপিকস/টাইপ অনুসারে (প্রয়োজনীয় ক্ষেত্রে সাব-টাইপসে তথা কেস অনুসারে) নিয়ম ও সংশ্লিষ্ট সমস্যাগুলো দেওয়া হলো।

Discussed Types :

- ✘ Logarithmic Simplification
- ✘ Logarithmic Equations

✘ Topic – 01 : Logarithmic Simplification12. $\log_3 27 =$ কত?

- (a) 1 (b) 2 (c) 3 (d) 4

✘ Topic – 02 : Logarithmic Equation13. If $\log_x \frac{1}{64} = -6$, the $x = ?$

- (a) $\frac{-1}{2}$ (b) $\frac{1}{2}$ (c) 2 (d) 3 (e) None

14. If $\log_x^3 \frac{9}{16} = -\frac{1}{3}$ the value of $x^{-1/2}$ is-

- (a) 16/9 (b) 9/16 (c) 3/4 (d) 4/3 (e) None

Inequality তথা অসমতা বাংলাদেশ ব্যাংক/রাষ্ট্রীয় ব্যাংক/কমার্শিয়াল ব্যাংক ও আর্থিক প্রতিষ্ঠানসমূহের রিক্রুটমেন্টের জন্য মহা গুরুত্বপূর্ণ একটি অধ্যায়। এমসিকিউ মানেই Inequality তথা অসমতা। এই অধ্যায়টির কাঠিন্য সুবিদিত। পরীক্ষার প্রশ্নপত্রের সাথে সংগতি রেখে ও ক্লাসে পাঠদানের সুবিধা মাথায় রেখে টপিকস/টাইপ অনুসারে (প্রয়োজনীয় ক্ষেত্রে সাব-টাইপসে তথা কেস অনুসারে এবং কাঠিন্যের ক্রমানুসারে) নিয়ম ও সংশ্লিষ্ট সমস্যাগুলো দেওয়া হলো।

Discussed Types:

- ✎ Basic Inequality
- ✎ Inequality Solution (Number Line Concept)
- ✎ Maximum and Minimum

✎ Topic – 01 : Basic Inequality**Case-I : Easy Level**

15. If $(x + y) > 5$ and $(x - y) > 3$, then which of the following gives all and only possible values of x ?
- a. $x < 3$ b. $x > 3$ c. $x > 4$ d. $x < 5$

Case-II : Medium Level

16. If $a > b > 1$, then which of the following is true?
- a. $(a - b) < 0$ b. $a^2 < ab$ c. $a^2 > ab$ d. $b^2 > ab$

Case-III : Hard Level

17. In a graph there are two curves, $y_1 = 2x - 5$ and $y_2 = -x + 10$. y_2 will be greater than y_1 when-
- a. $x > 5$ b. $x > 4$ c. $x < 5$ d. $x < 4$

✎ Topic – 02 : Inequality Solution

18. If $3 - 2x \leq 7$, then -
- a) $x \leq -2$ b) $x \geq -2$ c) $x \leq -1$ d) $x \geq -1$
19. If $-3 < 2x + 1 < 7$, which of following is correct?
- (a) $-1 < x < 2$ (b) $0 < x < 2$ (c) $-1 < x < 0$ (d) $-1 < x < 1$ (e) None
20. Which of the following expression is equivalent to $|2x - 3| < 5$
- (a) $-1 < x < 3$ (b) $-1 < x < 5$ (c) $-1 < x < 4$ (d) $1 < x < 6$ (e) None

✎ Topic – 03 : Maximum and Minimum

21. If x is an integer and $y = -2x - 8$, what is the least value of x for which y is less than 9?
- a. -9 b. -8 c. -7 d. -6
22. If for integer x , $2 < x < 7$ and $y = x + 5$, what is the greatest possible value of $x + y$?
- a. 32 b. 22 c. 23 d. 17

Assignment

01. $2^{11} + 2^{12} + 2^{13} + 2^{14} = ?$
 (a) $2^{15} - 1$ (b) $2^{10} + 1$ (c) $(30)2^{10}$ (d) 2^{17} (e) None
02. $(0.04)^{-1.5} = ?$
 (a) 25 (b) 125 (c) 250 (d) 625 (e) None
03. $\frac{1}{1+x^{(b-a)} + x^{(c-a)}} + \frac{1}{1+x^{(a-b)} + x^{(c-b)}} + \frac{1}{1+x^{(b-c)} + x^{(a-c)}} = ?$
 (a) 0 (b) 1 (c) x^{a+b+c} (d) 11 (e) None
04. If $x^{-\frac{7}{2}} = \frac{1}{128}$ then the value of x is
 (a) 8 (b) -4 (c) 4 (d) 2 (e) None
05. If $3^{(x-y)} = 27$ and $3^{(x+y)} = 243$, then $x = ?$
 (a) 0 (b) 2 (c) 4 (d) 6 (e) None
06. If $\sqrt{3-2x} = 1$, then $(3-2x) + (3-2x)^2 = ?$
 (a) 0 (b) 1 (c) 2 (d) 3 (e) 4
07. If $4^{2x+1} = 64$, then $x = ?$
 (a) 2 (b) 3 (c) 1 (d) $2/3$ (e) None
08. $2^{x-1} + 2^{x+1} = 320$ then $x = ?$
 (a) 6 (b) 8 (c) 5 (d) 7 (e) None
09. If $\log_x \frac{1}{4} = -2$, the $x = ?$
 (a) $\frac{-1}{2}$ (b) $\frac{1}{2}$ (c) 2 (d) 3 (e) None
10. If $\log_x^2 \frac{9}{16} = -\frac{1}{2}$ the value of the base is-
 (a) $16/9$ (b) $9/16$ (c) $256/81$ (d) $81/256$ (e) None
11. If $1 - 3x \leq 4$, then -
 a) $x \leq -2$ (b) $x \geq -2$ (c) $x \leq -1$ (d) $x \geq -1$
12. If $-1 < 2x + 1 < 5$, which of following is correct?
 (a) $-1 < x < 2$ (b) $0 < x < 2$ (c) $-1 < x < 0$ (d) $-1 < x < 1$ (e) None
13. Find the range of real value of x. Satisfying the inequalities $3x - 2 > 7$ and $4x - 13 > 15$.
 (a) $x > 3$ (b) $x > 7$ (c) $x < 7$ (d) $x < 3$ (e) None
14. If $(3x \leq x + 6)$ and $(2x + 4 \leq 3x + 6)$, what value of x will satisfy both the inequalities;
 (a) $[2, 3]$ (b) $[-2, 3]$ (c) $[0, 3]$ (d) $2 \leq x \leq 3$ (e) None
15. If $x^2 - 11x + 30 \leq 0$, what value of x will satisfy both the inequalities;
 (a) $2 \leq x \leq 3$ (b) $-2 \leq x \leq 3$ (c) $4 \leq x \leq 5$ (d) $-4 \leq x \leq 5$ (e) None

16. If $x^2 - 11x + 30 > 0$, what value of x will satisfy both the inequalities;
(a) $4 > x > 5$ (b) $x > 4$ or $x > 5$ (c) $4 < x < 5$ (d) $-4 < x < 5$ (e) None
16. Which of the following expression is equivalent to $|2x - 5| < 7$.
(a) $-6 < x < 1$ (b) $-1 < x < 6$ (c) $1 < x < 6$ (d) $1 < x < 6$ (e) None
17. Which of the following expression is equivalent to $|2x - 5| > 7$.
(a) $x < 6$ or $x < -1$ (b) $x < -1$ or $x > 6$ (c) $x > -1$ or $x > 6$ (d) $x > -1$ or $x < 6$ (e) None
18. Which of the following expression is equivalent to $\frac{1}{|2x - 5|} > \frac{1}{7}$
(a) $(-6) - \{\frac{5}{2}\}$ (b) $(-1, 6)$ (c) $(-1, 6) - \{\frac{5}{2}\}$ (d) $(1, 6) - \{\frac{5}{2}\}$ (e) None
19. The solution of the inequality $|7 - 3x| < 2$ is -
(a) $(-3, 5)$ (b) $(-\infty, \frac{5}{3}) \cup (3, \infty)$ (c) $(-3, \frac{5}{2})$ (d) $(-3, -\frac{5}{3})$ (e) None
20. If for integer x , $5 < x < 10$ and $y = x + 5$, what is the greatest possible value of $x + y$?
a. 32 b. 22 c. 23 d. 27

Students' work

Try Yourself

01. Simplify $\frac{\frac{1}{2} - \frac{1}{2}}{1-a} + \frac{\frac{-1}{2}}{1+\sqrt{a}}$
- a. $\frac{2}{1-b}$ b. $\frac{2}{1-a}$ c. $\frac{1}{1-a}$ d. $\frac{2}{2-a}$ e. None
02. If $4^n + 4^{n-1} = 20$, then the value of n^n is
- a. 3 b. 2 c. 4 d. 5 e. None
03. $\sqrt{(248 + \sqrt{(51) + \sqrt{169}})}$.
- a. 16 b. 18 c. 21 d. 24 e. None
04. The value of $-\frac{3\sqrt{2}}{\sqrt{3} + \sqrt{6}} - \frac{4\sqrt{3}}{\sqrt{6} + \sqrt{2}} + \frac{\sqrt{6}}{\sqrt{2} + \sqrt{3}}$
- a. 2 b. 0 c. 3 d. 4 e. None of these
05. The simplified value of $\sqrt{900} - \sqrt{0.000009}$ is
- a. 29.697 b. 29.197 c. 29.597 d. 29.797 e. None of these
06. $\sqrt{\frac{0.009 \times 0.036 \times 0.016 \times 0.08}{0.002 \times 0.0008 \times 0.0002}}$ is equal to
- a. 26 b. 18 c. 36 d. 42 e. None of these
07. $\frac{\sqrt{3+x} + \sqrt{3-x}}{\sqrt{3+x} - \sqrt{3-x}} = 2$ then x is equal to
- a. $\frac{13}{2}$ b. $\frac{2}{13}$ c. $\frac{5}{12}$ d. $\frac{12}{5}$ e. None of these
08. Simplified form of $\left[\left(\sqrt[5]{x^{-\frac{3}{5}}} \right)^{-\frac{5}{3}} \right]^5$ is
- a. x b. (x+1) c. (x-1) d. x^3 e. None of these
09. $\left(\frac{1.5}{2.5} \right)^2$ is equal to
- a. 0.45 b. 0.36 c. 0.49 d. 0.16 e. None of these
10. Find $3+0.3 + 0.03 + .003$
- a. 3.5 b. 3.666 c. 3.33333 d. 3.333 e. None of these
11. Find P in the expression, if $\frac{P}{1 + \frac{1}{1 + \frac{P}{1-P}}} = 1$
- a. 2 b. 1 c. 3 d. 4 e. None of these
12. Find the value of $\frac{5 + 5 \times 19 - 15 - 7}{13 \times 13 - 156}$
- a. 2 b. 1 c. 3 d. 4 e. None of these
13. Simplify $1 \div [1 + 1 \div \{1 + 1 \div (1 \div 1)\}]$
- a. $\frac{1}{4}$ b. $\frac{2}{3}$ c. $\frac{1}{3}$ d. $\frac{2}{5}$ e. None of these

14. Simplify $\frac{1}{4\frac{2}{5}} + \frac{1}{2\frac{4}{9}}$
- a. $\frac{7}{11}$ b. $\frac{7}{13}$ c. $\frac{7}{15}$ d. $\frac{7}{15}$ e. None of these
15. If $x \# y = x + y$, then find the value of $(3 \# 4) \# 3$
- a. 20 b. 10 c. 30 d. 40 e. None of these
16. If x is positive and $6 - x^2 = \frac{15}{16}$, then $\sqrt{x} = ?$
- a. $\frac{3}{4}$ b. $\frac{3}{2}$ c. $\frac{1}{3}$ d. $\frac{2}{5}$ e. None of these
17. Find the value of $\frac{1}{\sqrt{5}} \left[\left(\frac{1+\sqrt{5}}{2} \right) - \left(\frac{1-\sqrt{5}}{2} \right) \right]$
- a. 2 b. 1 c. 3 d. 4 e. None of these
18. Simplify $[1 - 2(3 - 4) - 1] - 1$
- a. 4 b. 3 c. 1 d. 2 e. None of these
19. Simplify $\left[\frac{1}{2} + \frac{1}{2} \left\{ \frac{3}{4} - \frac{1}{2} \left(\frac{7}{8} - \frac{3}{4} \right) \right\} \right]$
- a. $\frac{27}{32}$ b. $\frac{25}{33}$ c. $\frac{27}{33}$ d. $\frac{25}{32}$ e. None of these
20. Simplify $0.00175 \div 0.025 \div 0.07$
- a. 2 b. 1 c. 3 d. 4 e. None of these
21. If $y < x$ and $xm < ym$, Which of the following must be true.
- (a) $m < x$ (b) $m < y$ (c) $x < 0$ (d) $m < 0$ (e) $m > 0$
22. If $d > 0$ and $0 < 1 - \frac{c}{d} < 1$. Which of the following must be true.
- I. $c > 0$ II. $\frac{c}{d} < 0$ III. $c^2 + d^2 > 0$
- (a) I only (b) II only (c) III only (d) II and III only (e) I, II and III
23. If $x^2 > x^3 > x$, Which of the following is not a possible value of x ?
- (a) $-\frac{1}{8}$ (b) $-\frac{1}{3}$ (c) $-\frac{2}{7}$ (d) $-\frac{7}{6}$ (e) None
24. If x, y and z are consecutive integer so that $(x > y > z)$ and $x + 2y + 3z = 5y + 4$; what is z ?
- (a) 5 (b) 6 (c) 3 (d) 4 (e) 2
25. If $z = x + y$ and $x < y$, which of the following is equal to $(z - 2x)$
- (a) $z - x - y$ (b) $z + x - y$ (c) $2y - z$ (d) $2z - x + y$ (e) None
26. For which values of x is the value $(x^2 - 6x + 8)$ negative?
- (a) $2 < x < 4$ (b) $x < 4$ (c) $-8 > x > 6$ (d) $x > 8$ (e) None
27. If $2x > 5x - 18$ the solution set of x be?
- (a) $x > 6$ (b) $x < 6$ (c) $x > -6$ (d) $x > \frac{18}{7}$ (e) None
28. If $(2 + \sqrt{x}) > 2\sqrt{x}$. Which of the following must be true?
- (a) $x < 1$ (b) $x < 2$ (c) $x < 3$ (d) $x < 4$ (e) None

29. What is the largest value of x if $(x^2 + 7x + 3) < (x^2 + 5x + 13)$
 (a) 4 (b) 5 (c) 6 (d) 7 (e) None
30. For which values of x is the value $(x^2 - 6x + 8)$ positive?
 (a) $x > 4$ or $x > 2$ (b) $x > 4$ or $x < 2$ (c) $x < 4$ and $x < 2$ (d) x (e) None
31. If $-2 \leq x \leq 3$ and $-1 \leq y \leq 5$ then find the maximum value of $(xy) = ?$
 (a) 2 (b) -10 (c) -3 (d) 15 (e) None
32. If x and y are integer and $x + y < 10$ and $x > 5$, find the maximum value of y .
 (a) 1 (b) 2 (c) 3 (d) 4 (e) None
33. If x, y and z are choose x from three numbers $\frac{1}{2}, 2$ and -3 , what is the largest possible value of the expression $(\frac{x}{y})z^2$?
 (a) 16 (b) 32 (c) 36 (d) 39 (e) None
34. Distance between home to university is 10 km. From university Kanta across 2km, to her friends house and 3km. to shopping mall. From shopping mall, she returned back her home. What is the maximum distance between home and shopping mall?
 (a) 5km. (b) 9km. (c) 10km. (d) 15km. (e) None
35. If x and y are integers. If $x + y < 12$ and $x > 8$, which of the following can be a value of y ?
 (a) 1 (b) 4 (c) 6 (d) 8 (e) None
36. x and y are integers, $5 < x < 10$ and $y = x + 5$. What is the maximum possible value of $x + y$?
 (a) 32 (b) 22 (c) 23 (d) 27 (e) 30
37. x and y are integers, $2 < x < 10$ and $y = x + 3$. What is the maximum possible value of $x + y$?
 (a) 21 (b) 22 (c) 23 (d) 27 (e) 30
38. If $x = 3 + 2\sqrt{2}$, then the value of $(\sqrt{x} - \frac{1}{\sqrt{x}})$ is :
 (a) 1 (b) 2 (c) $2\sqrt{2}$ (d) 4 (e) None
39. $(17)^{3.5} \times (17)^x = 17^8$
 (a) 2.29 (b) 2.75 (c) 4.25 (d) 4.5 (e) None
40. If $(\frac{a}{b})^{x-1} = (\frac{b}{a})^{x-3}$ then $x = ?$
 (a) $\frac{1}{2}$ (b) 1 (c) 2 (d) $\frac{3}{2}$ (e) None
41. $(0.04)^{-1.5} = ?$
 (a) 25 (b) 125 (c) 250 (d) 625 (e) None
42. How many two digits numbers satisfies this property. The last digit (unit digit) of the square of the two digits number is 8?
 (a) 1 (b) 2 (c) 3 (d) 4 (e) None
43. $\frac{1}{1+a^{(n-m)}} + \frac{1}{1+a^{(m-n)}} = ?$
 (a) 0 (b) $\frac{1}{2}$ (c) 1 (d) a^{m+n} (e) None

44. $\left(\frac{x^b}{x^c}\right)^{(b+c-a)} \cdot \left(\frac{x^c}{x^a}\right)^{(c+a-b)} \cdot \left(\frac{x^a}{x^b}\right)^{(a+b-c)} = ?$
 (a) x^{abc} (b) 1 (c) $x^{ab+bc+ca}$ (d) x^{a+b+c} (e) None
45. If both 13^2 and 3^3 are factors of the number $4^3 \times 6^2 \times z \times 8^{11}$ then the smallest possible value of z is?
 (a) 507 (b) 369 (c) 1521 (d) 4563 (e) None
46. If $x = 1 + \sqrt{2}$ and $y = 1 - \sqrt{2}$, find $x^2 + y^2 = ?$
 (a) 6 (b) 8 (c) 10 (d) 12 (e) None
47. If $x + y = 7$ and $x^2 + y^2 = 25$, then $x^3 + y^3 = ?$
 (a) 7 (b) 25 (c) 35 (d) 65 (e) 91
48. If m is an integer such that $(-2)^{2m} = 2^{9-m}$ then $m = ?$
 (a) 1 (b) 2 (c) 3 (d) 4 (e) 6
49. If $mn = 3$ and $\frac{1}{m} + \frac{1}{n} = \frac{4}{3}$ then, $0.1 + 0.1^{\frac{1}{m}} + 0.1^{\frac{1}{n}} = ?$
 (a) $0.2 + 0.1^{\frac{1}{3}}$ (b) $0.1 + 0.1^{\frac{2}{3}}$ (c) $0.2 + 0.1^{\frac{2}{3}}$ (d) All (e) None
50. If $5^a = 3125$ then $5^{a-3} = ?$
 (a) 25 (b) 125 (c) 625 (d) 1625 (e) None
51. If $\sqrt{\frac{x}{y}} = \frac{1}{2}$ then which following must be true?
 i. $\frac{x}{y} > \frac{y}{x}$ ii. $\frac{x}{y} < \frac{y}{x}$ iii. $\frac{x}{y} = \frac{y}{x}$
 (a) i only (b) ii only (c) iii only (d) i and ii only (e) i and iii only
52. If $\frac{x}{\sqrt{128}} = \frac{\sqrt{162}}{x}$ than find x ?
 (a) 12 (b) 14 (c) 144 (d) 196 (e) None
53. If $a = 0.1039$ than $\sqrt{4a^2 - 4a + 1} + 31 = ?$
 (a) 0.013 (b) 0.103 (c) 1.103 (d) 1 (e) None
54. If $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$, then $x^2 + y^2 = ?$
 (a) 10 (b) 13 (c) 14 (d) 15 (e) None
55. A group of students decided to collect as many paise from each member of group as is the number of members. If the total collection amounts to Tk. 59.29, the number of the member is the group is:
 (a) 57 (b) 67 (c) 77 (d) 87 (e) 98
56. $\frac{\sqrt{625}}{11} \times \frac{14}{\sqrt{25}} \times \frac{11}{\sqrt{196}} = ?$
 (a) 5 (b) 6 (c) 8 (d) 11 (e) None

57. $\left(\sqrt{3} - \frac{1}{\sqrt{3}}\right)^2 = ?$

- (a) $\frac{3}{4}$ (b) $\frac{4}{\sqrt{3}}$ (c) $\frac{4}{3}$ (d) All (e) None

58. If $6x - 14 < 8x + 2$, which of the following must be true?

- (A) $x < 2$ (B) $x > 8$ (C) $x < 8$ (D) $x > -8$ (E) None of these

$6x - 14 < 8x + 2 \Rightarrow -14 - 2 < 8x - 6x \Rightarrow 2x > -16 \Rightarrow x > -8$ Ans. D

59. If $\sqrt{\frac{1}{\frac{x}{1}} = \frac{1}{2}}$, then which one of the following statements must be true?

- I. $\frac{x}{y} > \frac{y}{x}$ II. $\frac{x}{y} < \frac{y}{x}$ III. $\frac{x}{y} = \frac{y}{x}$

- (A) I only (B) II only (C) I and II only (D) I and III only (E) II and III only

$\Rightarrow \left(\sqrt{\frac{y}{x}}\right)^2 = \left(\frac{1}{2}\right)^2 \Rightarrow \frac{y}{x} = \frac{1}{4} \therefore \frac{x}{y} = \frac{4}{1}$

So, $\frac{x}{y} > \frac{y}{x} = \frac{4}{1} > \frac{1}{4}$ Ans. I Only.

60. The value of $\sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}}$ is:

- (A) 4 (B) 6 (C) 8 (D) 10 (E) None of these

61. If $(5 - 2x)^x = 1$ and $x \neq 0$, then $x = ?$

- (A) -3 (B) -2 (C) 2 (D) $\frac{5}{2}$ (E) 2

62. If $a > b$ and $c < 0$, which of the following is correct?

- (A) $ac > bc$ (B) $\frac{a}{c} = \frac{b}{c}$ (C) $ac < bc$ (D) $bc < ac$ (E) None of these

63. If $0 < a < 1 < b$, which of the following is true about the reciprocals of a and b ?

- (A) $1 < \frac{1}{a} < \frac{1}{b}$ (B) $\frac{1}{a} < 1 < \frac{1}{b}$ (C) $\frac{1}{a} < \frac{1}{b} < 1$ (D) $\frac{1}{b} < 1 < \frac{1}{a}$ (E) $\frac{1}{b} < \frac{1}{a} < 1$

64. Solve the inequality: $3^{3x-2} > 1$

- (A) $x > 1$ (B) $x > 3$ (C) $x > \frac{2}{3}$ (D) $x > \frac{1}{3}$ (E) None of these

65. Solve for real 'x' if $\sqrt{(9x - x^2)} > 0$

- (A) $x > 9$ (B) $0 < x < 9$ (C) $x < 0$ (D) $x < 1$ (E) None of these

66. Find the range of real values of x satisfying the inequalities $3x - 2 > 7$ and $4x - 13 > 15$.

- (A) $x > 3$ (B) $x > 7$ (C) $x < 7$ (D) $x < 3$ (E) None of these

$$1. \frac{\frac{1}{a^2} + a^{-\frac{1}{2}}}{1-a} + \frac{\left(1-a^{-\frac{1}{2}}\right)}{1+\sqrt{a}} = \frac{\frac{1}{a} + a^{-\frac{1}{2}}}{\left(1+a^{\frac{1}{2}}\right)\left(1-a^{\frac{1}{2}}\right)} + \frac{\left(1-a^{-\frac{1}{2}}\right)}{1+a^{\frac{1}{2}}} = \left[\geq 1-a = 1^2 - \left(a^{\frac{1}{2}}\right)^2 \right] = \left[\left(1+a^{\frac{1}{2}}\right)\left(1-a^{\frac{1}{2}}\right) \right]$$

$$= \frac{\left(\frac{1}{a} + a^{\frac{1}{2}}\right) + \left(1-a^{-\frac{1}{2}}\right)\left(1+a^{\frac{1}{2}}\right)}{\left(1+a^{\frac{1}{2}}\right)\left(1-a^{\frac{1}{2}}\right)} = \frac{\frac{1}{a} + a^{\frac{1}{2}} + 1 - a^{-\frac{1}{2}} - a^{\frac{1}{2}} + 1}{1-a} = \frac{2}{1-a}$$

Ans. B

$$2. 4^n + 4^{n-1} = 20 \Rightarrow 4^x = 4^2 \Rightarrow n = 2 \Rightarrow n^n = 2^2 = 4$$

Ans. C

$$3. \text{ Given expression} = \sqrt{\sqrt{248} + \sqrt{51} + \sqrt{13}} = \sqrt{\sqrt{248} + \sqrt{64}} = \sqrt{(248 + 8)}$$

$$= \sqrt{(256)} = 16.$$

Ans. A

$$4. \frac{3\sqrt{2}}{\sqrt{3} + \sqrt{6}} - \frac{4\sqrt{3}}{\sqrt{6} + \sqrt{2}} + \frac{\sqrt{6}}{\sqrt{2} + \sqrt{3}} = \frac{3\sqrt{2}}{\sqrt{3} + \sqrt{6}} \times \frac{\sqrt{3} - \sqrt{6}}{\sqrt{3} - \sqrt{6}} - \frac{4\sqrt{3}}{\sqrt{6} + \sqrt{2}} \times \frac{\sqrt{6} - \sqrt{2}}{\sqrt{6} - \sqrt{2}} + \frac{\sqrt{6}}{\sqrt{2} + \sqrt{3}} \times \frac{\sqrt{2} - \sqrt{3}}{\sqrt{2} - \sqrt{3}}$$

$$= \frac{3\sqrt{6} - 3\sqrt{12}}{-3} - \frac{4\sqrt{18} - 4\sqrt{6}}{-4} + \frac{\sqrt{12} - \sqrt{18}}{-1} = \frac{3\sqrt{6} - 3\sqrt{4 \times 3}}{-3} - \frac{4\sqrt{9 \times 2} - 4\sqrt{6}}{4} + \frac{\sqrt{12} - \sqrt{18}}{-1}$$

$$= \frac{3\sqrt{6} - 6\sqrt{3}}{-3} - \frac{12\sqrt{2} - 4\sqrt{6}}{4} + \frac{2\sqrt{3} - 3\sqrt{2}}{-1} = -(\sqrt{6} - 2\sqrt{3}) - (\sqrt{2} - 2\sqrt{6}) + (2\sqrt{3} - 3\sqrt{2})$$

$$= -\sqrt{6} + 2\sqrt{3} - 3\sqrt{2} + \sqrt{6} - 2\sqrt{3} + 3\sqrt{2} = 0$$

Ans. B

$$5. \sqrt{900} - \sqrt{0.000009} = 30 - .003 = 29.697$$

Ans. A

$$6. \sqrt{\frac{0.009 \times 0.036 \times 0.016 \times 0.08}{0.002 \times 0.0008 \times 0.0002}} = \sqrt{\frac{9 \times 1000 \times 36 \times 1000 \times 16 \times 8 \times 10000}{1000 \times 2 \times 8 \times 1000 \times 100 \times 2}} = \sqrt{9 \times 36 \times 4} = 36$$

Ans. C

$$7. \frac{\sqrt{3+x} + \sqrt{3-x}}{\sqrt{3+x} - \sqrt{3-x}} = 2$$

$$\Rightarrow \frac{\sqrt{3+x} + \sqrt{3-x} + \sqrt{3+x} - \sqrt{3-x}}{\sqrt{3+x} + \sqrt{3-x} - \sqrt{3+x} + \sqrt{3-x}} = \frac{2+1}{2-1} \Rightarrow \frac{2\sqrt{3+x}}{2\sqrt{3-x}} = \frac{3}{1} \Rightarrow \left(\frac{\sqrt{3+x}}{\sqrt{3-x}}\right)^2 = (3)^3$$

$$\Rightarrow \frac{3+x}{3-x} = 9 \Rightarrow \frac{3+x+3-x}{3+x-3+x} = \frac{9+1}{9-1} \Rightarrow \frac{6}{2x} = \frac{10}{8} \Rightarrow 20x = 48 \Rightarrow x = \frac{48}{20} \therefore x = \frac{12}{5}$$

Ans. D

$$8. \left[\left(\sqrt[5]{\frac{3}{x}} \right)^{\frac{5}{3}} \right]^5 = \left[\left(x^{\frac{3}{5} \times \frac{1}{5}} \right)^{\frac{5}{3}} \right]^5 = \left[\left(x^{\frac{3}{25} \times \frac{-5}{3}} \right)^5 \right] = \left(x^{\frac{1}{5}} \right)^5 = x^1 = x$$

Ans. A

$$9. \text{ Here, } \left(\frac{1.5}{2.5}\right)^2 = \left(\frac{3}{5}\right)^2 = \frac{9}{25} = .36$$

Ans. B

$$10. 3 + 0.3 + 0.03 + .003 = 3.333$$

Ans. D

$$11. \frac{P}{1 + \frac{1}{1 + \frac{P}{1-P}}} = 1 \Rightarrow \frac{P}{1 + \frac{1}{1 + \frac{P}{1-P}}} = 1 \Rightarrow \frac{P}{1 + \frac{1-P+P}{1-P}} = 1 \Rightarrow \frac{P}{1 + \frac{1-P}{1}} = 1$$

$$\Rightarrow \frac{P}{2-P} = 1 \Rightarrow P = 2 - P \Rightarrow 2P = 2 \Rightarrow P = \frac{2}{2} \therefore P = 1$$

Ans. B

$$12. \frac{5 + 5 \times 19 - 15 - 7}{13 \times 13 - 156} = \frac{5 + 95 - 15 - 7}{169 - 156} = \frac{78}{13} = 6$$

Ans. E

$$13. [1 + 1 \div \{1 + 1 \div (1 \div 1)\}] = 1 \div [1 + 1 \div \{1 + 1 \div 1\}] = 1 \div [1 + 1 \div 2] = 1 \div [1 + \frac{1}{2}] = 1 \div \frac{3}{2} = \frac{2}{3}$$

Ans. B

$$14. \frac{1}{4\frac{2}{5}} + \frac{1}{2\frac{4}{9}} = \frac{5}{22} + \frac{9}{22} = \frac{14}{22} = \frac{7}{11}$$

Ans. A

$$15. \text{Here, } x \# y = x + y \therefore 3 \# 4 = 3 + 4 = 7$$

$$\text{So, } (3 \# 4) \# 3 = 7 \# 3 = 7 + 3 = 10$$

Ans. B

$$16. 6 - x^2 = \frac{15}{16}, \text{ then } \sqrt{x} \Rightarrow 96 - 16x^2 = 15 \Rightarrow 16x^2 = 15 - 96 \Rightarrow 16x^2 = 81$$

$$\Rightarrow x^2 = \frac{81}{16} \Rightarrow x = \frac{9}{4} \therefore \sqrt{x} = \sqrt{\frac{9}{4}} \therefore \sqrt{x} = \frac{3}{2}$$

Ans. B

$$17. \frac{1}{\sqrt{5}} \left[\left(\frac{1+\sqrt{5}}{2} \right) - \left(\frac{1-\sqrt{5}}{2} \right) \right] = \frac{1}{\sqrt{5}} \left[\frac{1+\sqrt{5}}{2} - \frac{1-\sqrt{5}}{2} \right] = \frac{1}{\sqrt{5}} \left[\frac{1+\sqrt{5}-1+\sqrt{5}}{2} \right] = \frac{2\sqrt{5}}{2\sqrt{5}} = 1$$

Ans. B

$$18. [1 - 2(3 - 4) - 1] - 1 = [1 - 2(-1) - 1] - 1$$

$$[1 + 2 - 1] - 1 = 2 - 1 = 1$$

Ans. C

$$19. \left[\frac{1}{2} + \frac{1}{2} \left\{ \frac{3}{4} - \frac{1}{2} \left(\frac{7}{8} - \frac{3}{4} \right) \right\} \right] = \left[\frac{1}{2} + \frac{1}{2} \left\{ \frac{3}{4} - \frac{1}{2} \times \frac{7-6}{8} \right\} \right]$$

$$= \left[\frac{1}{2} + \frac{1}{2} \left\{ \frac{3}{4} - \frac{1}{2} \times \frac{1}{8} \right\} \right] = \left[\frac{1}{2} + \frac{1}{2} \left\{ \frac{3}{4} - \frac{1}{16} \right\} \right] = \left[\frac{1}{2} + \frac{1}{2} \times \frac{12-1}{16} \right] = \left[\frac{1}{2} + \frac{11}{2 \times 16} \right] = \frac{16+11}{32} = \frac{27}{32}$$

Ans. A

$$20. 0.00175 \div 0.025 \div 0.07 = .07 \div .07 = 1$$

Ans. B

$$21. \text{Here, } y < x \text{ and } xm < ym; \text{ For } m = -1, \text{ it became } y < x \text{ So, } m < 0$$

Ans: D

$$22. 0 < 1 - \frac{c}{d} < 1 \Rightarrow 0 < \frac{c}{d} < 1.$$

If $d > 0$ so, $c > 0$ now,
 I. $c > 0$ its true.

II. $\frac{c}{d} < 0$ its not true because both c and d positive.

III. $c^2 + d^2 > 0$ its true.

Ans: D

$$23. \text{সকল ঋণাত্মক প্রকৃত ভগ্নাংশের জন্য } x^2 > x^3 > x \text{ সত্য হলেও সকল ঋণাত্মক অপ্রকৃত ভগ্নাংশের জন্য সত্য নয়।}$$

Ans: D

24. (i) $z = 5$
 So, $x = 7$ & $y = 6$ as $x > y > z$
 $\therefore 7 + 2 \times 6 + 3 \times 5 = 5 \times 6 + 4$
 $\Rightarrow 34 = 34$
 So, $z = 5$ is the correct option. Ans: A
25. $z = x + y \therefore x = z - y \therefore z - 2x = z - 2(z - y) = 2y - z.$ Ans: C
26. $x^2 - 6x + 8 < 0 \Rightarrow (x - 2)(x - 4) < 0 \Rightarrow (x - 2) > 0$ or $(x - 4) < 0$
 $\therefore x > 2$ or $x < 4 \therefore 2 < x < 4$ Ans: A
27. $2x > 5x - 18 \Rightarrow -3x > -18 \therefore x < 6.$ Ans: B
28. $2 + \sqrt{x} > 2\sqrt{x} \Rightarrow \sqrt{x} < 2 \therefore x < 4.$ Ans: B
29. $x^2 + 7x + 3 < x^2 + 5x + 13 \Rightarrow 2x < 10 \therefore x < 5 \therefore x = 4.$ Ans: A
30. $x^2 - 6x + 8 > 0 \Rightarrow (x - 2)(x - 4) > 0;$ so, $x < 2$ or, $x > 4.$ Ans: B
31. $-2 \leq x \leq 3$ and $-1 \leq y \leq 5 \therefore \text{Max}(xy) = 3 \times 5 = 15.$ Ans: D
32. To get Maximum value of y then x must be minimum If $x > 5$
 So, $\text{min } x = 6$
 Here, $x + y < 10 \therefore x + y = 9$ (maximum) $\Rightarrow 6 + y = 9 \therefore y = 3$ Ans: C
33. Largest $\left(\frac{x}{y}\right) z^2 = \frac{2}{\frac{1}{2}} \times (-3)^2 = 36$ Ans: C
34. Max distance = $10 - (2 + 3) = 5$ Ans: A
35. Minimum value of x is 1
 $x + y = 11 \therefore y = 2$
 $x + y = 10 \therefore y = 1$ Ans: A
36. Maximum value of x is 9.
 $\therefore y = x + 5 = 9 + 5 = 14 \therefore \text{Max}(x + y) = 9 + 14 = 23.$ Ans: C
37. Let, $x = 9$ and $y = 9 + 3 = 12$
 $\therefore \text{Max}(x + y) = 12 + 9 = 21.$ Ans: A
38. $x = 3 + 2\sqrt{2}$ and $\frac{1}{x} = 3 - 2\sqrt{2}.$
 $\therefore \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2 = x + \frac{1}{x} - 2 = 3 + 2\sqrt{2} + 3 - 2\sqrt{2} - 2 = 4$
 $\therefore \sqrt{x} - \frac{1}{\sqrt{x}} = 2$ Ans: B
39. $x + 3.5 = 8 \therefore x = 4.5$ Ans: D
40. $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3} \Rightarrow \left(\frac{a}{b}\right)^{x-1} = \left(\frac{a}{b}\right)^{-x+3} \Rightarrow x - 1 = -x + 3 \therefore x = 2.$ Ans: C

$$41. (0.04)^{-1.5} = \left(\frac{4}{100}\right)^{-\frac{3}{2}} = \left(\frac{4}{100}\right)^{-\frac{3}{2}} = \left(\frac{1}{25}\right)^{-\frac{3}{2}}$$

$$= 5^{-2 \times -\frac{3}{2}} = 5^3 = 125$$

Ans: B

42. There is no number which exist 8 on last digit.

Ans: E

$$43. \frac{1}{1+a^{(n-m)}} + \frac{1}{1+a^{(m-n)}} = \frac{1}{1+\frac{a^n}{a^m}} + \frac{1}{1+\frac{a^m}{a^n}} = \frac{a^m}{a^m+a^n} + \frac{a^n}{a^m+a^n} = 1.$$

Ans: C

$$44. \left(\frac{x^6}{x^c}\right)^{(b+c-a)} \times \left(\frac{x^c}{x^a}\right)^{(c+a-b)} \times \left(\frac{x^a}{x^b}\right)^{(a+b-c)}$$

$$= x^{(b-c)(b+c-a)} \times x^{(c-a)(c+a-b)} \times x^{(a-b)(a+b-c)} = x^{(b-c)(b+c-a) + (c-a)(c+a-b) + (a-b)(a+b-c)} = x^0 = 1$$

Ans: B

$$45. \text{Factor} = 13^2 \times 3 = 13 \times 13 \times 3 = 507$$

$$46. x^2 + y^2 = (1 + \sqrt{2})^2 + (1 - \sqrt{2})^2 = 1 + 2 + 2\sqrt{2} + 1 + 2 - 2\sqrt{2} = 6.$$

Ans: A

$$47. x^2 + y^2 = 25 \Rightarrow (x+y)^2 - 2xy = 25 \therefore xy = 12.$$

$$\therefore x^3 + y^3 = (x+y)^3 - xy(x+y) = 7^3 - 3 \times 12 \times 7 = 91.$$

Ans: E

$$48. (-2)^{2m} = 2^{9-m} \Rightarrow 2^{2m} = 2^{9-m} \Rightarrow 2m = 9 - m \Rightarrow 3m = 9 \therefore m = 3.$$

Ans: C

$$49. mn = 3. \therefore \frac{1}{m} + \frac{1}{n} = \frac{4}{3} = 1 + \frac{1}{3}.$$

$$\therefore m = 3 \text{ and } n = 1 \therefore 0.1 + 0.1^{\frac{1}{m}} + 0.1^{\frac{1}{n}} = 0.1 + 0.1^{\frac{1}{3}} + 0.1 = 0.2 + 0.1^{\frac{1}{3}}$$

Ans: C

$$50. 5^a = 3125 = 5^5 \therefore a = 5$$

$$\therefore 5^{5-3} = 5^2 = 25.$$

Ans: B

$$51. \sqrt{\frac{1}{\frac{x}{1}}} = \frac{1}{2} \Rightarrow \sqrt{\frac{x}{y}} = 2 \therefore \frac{x}{y} = 4 \text{ So, } \frac{y}{x} = \frac{1}{4}$$

Ans: A

$$52. \frac{x}{\sqrt{128}} = \frac{\sqrt{162}}{x} \therefore x = 12$$

Ans: A

53. Ans: E (Options test করে দেখুন)

$$54. x = \frac{\sqrt{3+1}}{\sqrt{3-1}} = \frac{(\sqrt{3+1})(\sqrt{3+1})}{(\sqrt{3-1})(\sqrt{3+1})} = \frac{3+1+2\sqrt{3}}{2} = 2 + \sqrt{3}.$$

$$\text{Similarly } y = \frac{\sqrt{3-1}}{\sqrt{2+1}} = 2 - \sqrt{3} \therefore x^2 + y^2 = (2 + \sqrt{3})^2 + (2 - \sqrt{3})^2 = 4 + 3 + 4\sqrt{3} + 2 + 3 - 4\sqrt{3} = 14. \text{ Ans: C}$$

$$55. \text{Let, Number} = x \text{ So, } x \times x = 59.29 \times 100 \therefore x = 77.$$

Ans: C

$$56. \frac{\sqrt{625}}{11} \times \frac{14}{\sqrt{25}} \times \frac{11}{\sqrt{196}} = \frac{25}{11} \times \frac{14}{5} \times \frac{11}{14} = 5.$$

Ans: A

$$57. (\sqrt{3} - \frac{1}{\sqrt{3}})^2 = 3 + \frac{1}{3} - 2\sqrt{3} \cdot \frac{1}{\sqrt{3}} = 1 + \frac{1}{3} = \frac{4}{3}.$$

Ans: C

$$58. 6x - 14 < 8x + 2 \Rightarrow -14 - 2 < 8x - 6x \Rightarrow 2x > -16 \Rightarrow x > -8$$

Ans. D

$$59. \Rightarrow \left(\sqrt{\frac{y}{x}}\right)^2 = \left(\frac{1}{2}\right)^2 \Rightarrow \frac{y}{x} = \frac{1}{4} \therefore \frac{x}{y} = \frac{4}{1}$$

So, $\frac{x}{y} > \frac{y}{x} = \frac{4}{1} > \frac{1}{4}$

Ans. I Only.

$$60. \sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}}}$$

$$= \sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + 15}}}} = \sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{169}}}} = \sqrt{10 + \sqrt{25 + \sqrt{108 + 13}}}$$

$$= \sqrt{10 + \sqrt{25 + \sqrt{121}}} = \sqrt{10 + \sqrt{25 + 11}} = \sqrt{10 + \sqrt{36}} = \sqrt{10 + 6} = \sqrt{16} = 4$$

Ans. A

61. Lets test the options. Only for $x = 2$ L.H.S = R.H.S

Ans. C

62. Here, $A > B$ & $C < 0$. So, for $AC < BC$ its satisfied.

Ans. C

63. Just takes than as reciprocal $\frac{1}{a} > 1 > \frac{1}{b}$ বা, $\frac{1}{b} < 1 < \frac{1}{a}$

Ans. D

64. Here, $3^{3x-2} > 1$

$$\Rightarrow 3^{3x-2} > 3^0 \Rightarrow 3x - 2 > 0 \Rightarrow 3x > 2 \Rightarrow x > \frac{2}{3}$$

Ans. C

$$65. 9x - x^2 > 0 \Rightarrow x^2 - 9x < 0$$

$$\Rightarrow x(x - 9) < 0 \Rightarrow 0 < x < 9$$

Ans. B

$$66. 3x - 2 > 7 \Rightarrow 3x > 9 \Rightarrow x > 3$$

$$\text{এবং } 4x - 13 > 15 \Rightarrow 4x > 28 \Rightarrow x > 7, 7 \text{ is greater than } 3. \therefore x > 7.$$

Ans. B

বিগত বছরের প্রশ্ন ও সমাধান

২০১৯ সালের সরকারী-বেসরকারী ব্যাংকের প্রশ্নপত্র সমাধান

1. Find the range of real values of x satisfying the inequality $3x - 2 > 7$ and $4x - 13 > 15$?

[Sonali Bank Ltd. (Officer (cash), 22-02-2019)]

a. $7 > x > 3$

b. $-3 > x > 7$

c. $x > 7$

d. $x > 4$

Ans. C

Solution:

$$\text{Here, } 3x - 2 > 7 \Rightarrow 3x > 9 \Rightarrow x > 3; \quad \& \quad 4x - 13 > 15 \Rightarrow 4x > 28 \Rightarrow x > 7$$

$$\text{So, } S = \{x : x > 7\}$$

2. $\sqrt{\sqrt{17956} + \sqrt{24025}} = ?$

[Pubali Bank Ltd. TAJO(Cash) 15.02.2019]

a. 19

b. 155

c. 17

d. 256

Ans. C

Solution:

$$\sqrt{\sqrt{17956} + \sqrt{24025}} = \sqrt{\sqrt{(134)^2} + \sqrt{155^2}} = \sqrt{134 + 155} = \sqrt{289} = \sqrt{(17)^2} = 17$$

3. $9^3 \times (81)^2 \div (27)^3 = (3)^x$ [Sonali Bank Ltd. (Officer (cash), 22-02-2019)]
 a. 5 b. 4 c. 3 d. 6 **Ans. A**

Solution:

মনে করি, $9^3 \times (81)^2 \div (27)^3 = (3)^x$
 $\Rightarrow 3^6 \times 3^{4 \times 2} \div 3^{3 \times 3} = 3^x \Rightarrow 3^6 \times 3^8 \div 3^9 = 3^x \Rightarrow \frac{3^{14}}{3^9} = 3^x \Rightarrow 3^{14-9} = 3^x \Rightarrow 3^5 = 3^x$
 $\therefore x = 5$

4. Evaluate: $\sqrt{248 + \sqrt{52 + \sqrt{144}}}$ [Pubali Bank Ltd. JO- 01.03.2019]
 a. 20 b. 16 c. 24 d. 30 **Ans. B**

বিগত বছরের প্রশ্ন ও সমাধান

২০১৮ সালের সরকারী-বেসরকারী ব্যাংকের প্রশ্নপত্র সমাধান

5. If $a > b > 1$, then which of the following is true? BSC (3 Govt. Banks & Financial Institutes) (SO'18)
 a. $(a-b) < 0$ b. $a^2 < ab$ c. 16 d. 18

Hints:

since a and b is positive, so $a^2 > b^2$ is true.

6. If x is an integer and $y = -2x - 8$, what is the least value of x for which y is less than 9? BSC (5 Govt. Banks & Financial Institutes) (O'18)
 a. -9 b. -8 c. -7 d. -6

Hints:

এখানে, $y < 9 \Rightarrow -2x - 8 < 9 \Rightarrow -2x < 17 \Rightarrow -x < 17/2 \therefore x > -8.5$
 since x is integer, so the least value of x is -8.

7. The solution of the inequality $|7 - 3x| < 2$ is - BSC (5 Govt. Banks & Financial Institutes) (O'18)
 a. $-3 < x < \frac{5}{3}$ b. $3 > x > \frac{5}{3}$ c. $-3 < x < \frac{5}{2}$ d. $-3 < x < -\frac{5}{3}$

Hints:

$|7-3x| < 2$
 $= -2 < 7-3x < 2 \Rightarrow -2-7 < 7-3x-7 < 2-7 \Rightarrow \frac{-9}{3} < \frac{-3}{3} x < \frac{-5}{3} \Rightarrow -3 < -x < -5/3 \Rightarrow 3 > x > \frac{5}{3}$

8. In a graph there are two curves, $y_1 = 2x - 5$ and $y_2 = -x + 10$. y_2 will be greater than y_1 when- BSC (Sonali Bank Ltd. & Janata Bank Ltd.) (SO[It/ICT]18)
 a. $x > 5$ b. 129 c. 69 d. 15

Hints:

$y_1 = 2x - 5$ and $y_2 = -x + 10 \therefore Y_2 > Y_1 \Rightarrow -x + 10 > 2x - 5 \Rightarrow 15 > 3x \therefore x < 5$

9. If x is an integer and $y = -2x - 8$, what is the least value of x for which y is less than 9? Sonali Bank Ltd. (SO [MCQ]-18)
 a. -9 b. -8 c. -7 d. -6

Hints:

এখানে, $y < 9$
 $\therefore -2x - 8 < 9 \Rightarrow -2x < 9 + 8 \Rightarrow -x < \frac{17}{2} \therefore x > -8.5$ সুতরাং x এর সর্বনিম্ন মান -8।

10. If $\log_x^2 \frac{9}{16} = -\frac{1}{2}$ the value of the base is- BSC, 5 Govt. Banks & FI (Officer-18)

- a. 16/9 b. 9/16 c. 256/81 d. 81/256

Hints:

$$\log x^2 \frac{9}{16} = -\frac{1}{2} \Rightarrow \frac{9}{16} = (x^2)^{-\frac{1}{2}} \Rightarrow \frac{1}{x} = \frac{9}{16} \Rightarrow x = \frac{16}{9} \therefore x^2 = \frac{256}{81}$$

11. If $x^{-\frac{7}{2}} = \frac{1}{128}$ then the value of x is –

Sonali Bank Ltd. {Officer [MCQ]-2018}

- a. 8 b. -4 c. 4 d. 2

Hints:

$$x^{-\frac{7}{2}} = \frac{1}{128} \Rightarrow x^{-\frac{7}{2}} = \frac{1}{2^7} \Rightarrow (x^{\frac{1}{2}})^{-7} = 2^{-7} \Rightarrow (\sqrt{x})^{-7} = 2^{-7} \Rightarrow \sqrt{x} = 2 \Rightarrow (\sqrt{x})^2 = (2)^2 \text{ (Squaring both sides)}$$

$$\therefore x = 4$$

12. $(2x^{-1})^2 \div x^{-5}$ is equal to

Sonali Bank Ltd. {Officer [MCQ]-2018}

Hints:

$$(2x^{-1})^2 \div x^{-5} = 2^2 \cdot x^{-2} \div 1/x^5 = 4 \cdot x^{-2} \times x^5 = 4x^{5-2} = 4x^3$$

13. The roots of the equation $9x^2 - bx + 81 = C$ will be equal, if the value of b is – Rupali Bank Ltd. Officer(Cash-18)

- a. ± 9 b. ± 18 c. ± 27 d. ± 54

Hints:

$$9x^2 - bx + 81 = C$$

We know that, $ax^2 + bx + c = 0$ & $b^2 - 4ac = 0$ [It's the rules of being equal root)

$$\Rightarrow b^2 = \sqrt{4 \times 9 \times 81} \Rightarrow b = \pm 54$$

x এর মূল দুটি সমান হবে যদি b এর মান + 54 অথবা - 54 হয়

14. If $\log_x \frac{1}{4} = -2$, the x = ?

Rupali Bank Ltd. Officer(Cash-18)

- a. $\frac{-1}{2}$ b. $\frac{1}{2}$ c. 2 d. 3

Hints:

$$\log_x \frac{1}{4} = -2 \Rightarrow \frac{1}{4} = x^{-2} \Rightarrow \frac{1}{2^2} = x^{-2} \Rightarrow x^{-2} = 2^{-2} \Rightarrow x = 2$$

15. If $x = y^a$, $y = z^b$ and $z = x^c$ the value of abc is

Rupali Bank Ltd. Officer(Cash-18)

- a. 1 b. 0 c. 0.5 d. infinity

Hints:

$$x = y^a \Rightarrow x = (z^b)^a \Rightarrow x = (x^c)^{ab} \Rightarrow x^1 = x^{abc} \therefore abc = 1$$

16. If $(x + y) > 5$ and $(x - y) > 3$, then which of the following gives all and only possible values of x?

Probashi Kallyan Bank (SEO'18)

- a. $x < 3$ b. $x > 3$ c. $x > 4$ d. $x < 5$

Hints: $x + y > 5$

$$\frac{x - y > 3}{2x > 8}$$

$$\therefore x > 4$$

17. If $a^x = b$, $b^y = c$ and $c^z = a$, then the value of xyz is-

Probashi Kallyan Bank (SEO'18)

- a. 0 b. 1 c. 1/abc d. abc

Hints:

$$a^x = b, b^y = c \text{ এবং } c^z = a$$

$$\text{Here, } a^x = b \Rightarrow (c^z)^x = b \Rightarrow (b^y)^{zx} = b \Rightarrow b^{xyz} = b^1 \Rightarrow xyz = 1$$

18. For what value of x is $8^{2x-4} = 16^x$?

- a. 2 b. 3 c. 4 d. 6

$$\text{Hints: } 8^{2x-4} = 16^x \Rightarrow (2^3)^{2x-4} = (2^4)^x \Rightarrow 6x - 12 = 4x \Rightarrow x = \frac{12}{2} \therefore x = 6$$

Probashi Kallyan Bank (SEO'18)

19. If for integer x, $5 < x < 10$ and $y = x + 5$, what is the greatest possible value of $x + y$?

- a. 32 b. 22 c. 23 d. 27

Hints:

যেহেতু x একটি স্বাভাবিক সংখ্যা তাই 5 অপেক্ষা বড় এবং 10 অপেক্ষা ছোট স্বাভাবিক সংখ্যা হচ্ছে 9।

$$\text{তাহলে, } y = 9 + 5 = 14 \therefore x + y = 9 + 14 = 23$$

20. a, b, c, d চারটি ক্রমিক স্বাভাবিক সংখ্যা হলে নিচের কোনটি পূর্ণবর্গ সংখ্যা?

- a) abc b) ab + cd c) abcd + 1 d) abcd - 1

Jiban Bima Corporation (JO'18)

Hints:

ধরি, ক্রমিক সংখ্যাগুলো a = 1, b = 2, c = 3 ও d = 4

$$\therefore abcd = 1 \times 2 \times 3 \times 4 = 24 \text{ যা পূর্ণবর্গ নয়।}$$

$$ab + cd = 1 \times 2 + 3 \times 4 = 14 \text{ “ “ “}$$

$$abcd + 1 = 24 + 1 = 25 \text{ যা পূর্ণবর্গ সংখ্যা।}$$

$$abcd - 1 = 24 - 1 = 23 \text{ “ “ নয়। } \therefore (abcd + 1) \text{ পূর্ণবর্গ সংখ্যা}$$

21. $4^{x+1} + 32$ হলে x = ?

- a. 2/3 b. 4/5 c. 1/8 d. 3/2

Jiban Bima Corporation (JO'18)

Hints:

$$4^{x+1} = 32 \Rightarrow (2^2)^{x+1} = 2^5 \Rightarrow 2x + 2 = 5 \Rightarrow 2x = 5 - 2 \therefore x = \frac{3}{2}$$

22. $\log_3 27 =$ কত?

- a. 1 b. 2 c. 3 d. 4

Jiban Bima Corporation (JO'18)

Hints:

$$\log_3 27 = \log_3 3^3 = 3 \log_3 3 = 3 \times 1 = 3$$

23. If $4^{2x+1} = 32$, then x = ?

- a) 2 b) 3 c) $\frac{3}{4}$ d) $\frac{4}{3}$

BB, AD (General-18)

Hints:

$$4^{2x+1} = 32 \Rightarrow (2^2)^{2x+1} = 2^5 \Rightarrow 2^{4x+2} = 2^5 \Rightarrow 4x + 2 = 5 \Rightarrow 4x = 3 \therefore x = \frac{3}{4}$$

24. If $x = y^a$, $y = z^b$ and $z = x^c$ then abc is -

- a) 1 b) 0 c) $\frac{1}{2}$ d) Infinity

BB, AD (General-18)

$$\text{Hints : এখানে, } x = y^a \Rightarrow x = y^a [\because x = y^a] \Rightarrow x = z^{ab} [\because y = z^b] \Rightarrow x^1 = x^{abc} \therefore abc = 1$$

25. If $1 - 3x \leq 4$, then -

- a) $x \leq -2$ b) $x \geq -2$ c) $x \leq -1$ d) $x \geq -1$

BB, AD (General-18)

$$\text{Hints : } 1 - 3x \leq 4 \Rightarrow 1 - 3x - 1 \leq 4 - 1 \Rightarrow -3x \leq 3 = \frac{3x}{-3} \geq \frac{3}{-3} \text{ [-3 দ্বারা ভাগ করে]} \therefore x \geq -1$$

26. If $a > b > 1$, then which of the following is true?

BSC (3 Govt. Banks & Financial Institutes) (SO'18)

- a. $(a-b) < 0$ b. $a^2 < ab$ c. 16 d. 18

Hints:

Since a and b is positive, so $a^2 > b^2$ is true.

27. The value of p for equation $2x^2 - 4x + p = 0$ to have real roots is- BSC (5 Govt. Banks & Financial Institutes) (O'18)

- a. $p \leq -2$ b. $p \geq 2$ c. $p \leq 2$ d. $p \geq -2$

Hints:

এখানে, $2x^2 - 4x + p = 0$

আমরা জানি, বাস্তবমূলের ক্ষেত্রে, $b^2 - 4ac \geq 0 \Rightarrow (-4)^2 - 4 \times p \geq 0 \Rightarrow 16 - 8p \leq 0 \Rightarrow 8p \leq 16 \therefore p \leq 2$

28. If x is an integer and $y = -2x - 8$, what is the least value of x for which y is less than 9?

BSC (5 Govt. Banks & Financial Institutes) (O'18)

- a. -9 b. -8 c. -7 d. -6

Hints:

এখানে, $y < 9$

$\therefore -2x - 8 < 9 \Rightarrow -2x < 17 \Rightarrow -x < 17/2 \therefore x > -8.5$

since x is integer, so the least value of x is- 8.

29. The solution of the inequality $|7 - 3x| < 2$ is -

BSC (5 Govt. Banks & Financial Institutes) (O'18)

- a. $-3 < x < \frac{5}{3}$ b. $3 > x > \frac{5}{3}$ c. $-3 < x < \frac{5}{2}$ d. $-3 < x < -\frac{5}{3}$

Hints: $|7-3x| < 2$

$\Rightarrow -2 < 7 - 3x < 2 \Rightarrow -2 - 7 < 7 - 3x - 7 < 2 - 7 \Rightarrow \frac{-9}{3} < \frac{-3}{3} x < \frac{-5}{3} \Rightarrow -3 < -x < -5/3 \Rightarrow 3 > x > \frac{5}{3}$

30. In a graph there are two curves, $y_1 = 2x_1 - 5$ and $y_2 = -x_2 + 10$. y_2 will be greater than y_1 when-

BSC (Sonal Bank Ltd. & Janata Bank Ltd.) (SO[It/ICT]18)

- a. $x > 5$ b. 129 c. 69 d. 15

Hints:

$y_1 = 2x - 5$ and $y_2 = -x + 10$

$\therefore Y_2 > Y_1 \Rightarrow -x + 10 > 2x - 5 \Rightarrow 15 > 3x \therefore x < 5$

31. If x is an integer and $y = -2x - 8$, what is the least value of x for which y is less than 9?

Sonal Bank Ltd. (SO [MCQ]-18)

- a. -9 b. -8 c. -7 d. -6

Hints: এখানে, $y < 9$

$\therefore -2x - 8 < 9 \Rightarrow -2x < 9 + 8 \Rightarrow -x < \frac{17}{2} \therefore x > -8.5$ সুতরাং x এর সর্বনিম্ন মান -8।

32. If $\log_x^2 \frac{9}{16} = -\frac{1}{2}$ the value of the base is-

BSC, 5 Govt. Banks & FI (Officer-18)

- a. 16/9 b. 9/16 c. 256/81 d. 81/256

Hints:

$\log_x^2 \frac{9}{16} = -\frac{1}{2} \Rightarrow \frac{9}{16} = (x^2)^{-\frac{1}{2}} \Rightarrow \frac{1}{x} = \frac{9}{16} \Rightarrow x = \frac{16}{9} \therefore x^2 = \frac{256}{81}$

33. If $x^{-\frac{7}{2}} = \frac{1}{128}$ then the value of x is

Sonal Bank Ltd. {Officer [MCQ]-2018}

- a. 8 b. -4 c. 4 d. 2

Hints: $x^{-\frac{7}{2}} = \frac{1}{128} \Rightarrow x^{-\frac{7}{2}} = \frac{1}{2^7} \Rightarrow (x^{\frac{1}{2}})^{-7} = 2^{-7} \Rightarrow (\sqrt{x})^{-7} = 2^{-7} \Rightarrow \sqrt{x} = 2 \Rightarrow (\sqrt{x})^2 = (2)^2$ (Squaring both sides)
 $\therefore x = 4$

34. $(2x^{-1})^2 \div x^{-5}$ is equal to –

Sonali Bank Ltd. {Officer [MCQ]-2018}

Hints:

$$(2x^{-1})^2 \div x^{-5} = 2^2 \cdot x^{-2} \div 1/x^5 = 4 \cdot x^{-2} \times x^5 = 4x^{5-2} = 4x^3$$

35. The roots of the equation $9x^2 - bx + 81 = C$ will be equal, if the value of b is – Rupali Bank Ltd. Officer(Cash-18)

- a. ± 9 b. ± 18 c. ± 27 d. ± 54

Hints:

$$9x^2 - bx + 81 = C$$

We know that, $ax^2 + bx + c = 0$ & $b^2 - 4ac = 0$ [It's the rules of being equal root]

$$\Rightarrow b^2 = \sqrt{4 \times 9 \times 81} \Rightarrow b = \pm 54; \quad x \text{ এর মূল দুটি সমান হবে যদি } b \text{ এর মান } + 54 \text{ অথবা } - 54 \text{ হয়}$$

36. If $\log_x \frac{1}{4} = -2$, the x = ?

Rupali Bank Ltd. Officer(Cash-18)

- a. $\frac{-1}{2}$ b. $\frac{1}{2}$ c. 2 d. 3

Hints:

$$\log_x \frac{1}{4} = -2 \Rightarrow \frac{1}{4} = x^{-2} \Rightarrow \frac{1}{2^2} = x^{-2} \Rightarrow x^{-2} = 2^{-2} \Rightarrow x = 2$$

37. If $x = y^a$, $y = z^b$ and $z = x^c$ the value of abc is

Rupali Bank Ltd. Officer(Cash-18)

- a. 1 b. 0 c. 0.5 d. infinity

Hints:

$$x = y^a \Rightarrow x = (z^b)^a \Rightarrow x = (x^c)^{ab} \Rightarrow x^1 = x^{abc} \therefore abc = 1$$

38. If $(x + y) > 5$ and $(x - y) > 3$, then which of the following gives all and only possible values of x?

Probashi Kallyan Bank (SEO'18)

- a. $x < 3$ b. $x > 3$ c. $x > 4$ d. $x < 5$

Hints:

$$\begin{array}{l} x + y > 5 \\ \underline{x - y > 3} \\ 2x > 8 \\ \therefore x > 4 \end{array}$$

39. If $a^x = b$, $b^y = c$ and $c^z = a$, then the value of xyz is –

Probashi Kallyan Bank (SEO'18)

- a. 0 b. 1 c. $1/abc$ d. abc

Hints:

$$a^x = b, b^y = c \text{ এবং } c^z = a$$

$$\text{Here, } a^x = b \Rightarrow (c^z)^x = b \Rightarrow (b^y)^{zx} = b \Rightarrow b^{xyz} = b^1 \Rightarrow xyz = 1$$

40. For what value of x is $8^{2x-4} = 16^x$?

Probashi Kallyan Bank (SEO'18)

- a. 2 b. 3 c. 4 d. 6

Hints:

$$8^{2x-4} = 16^x \Rightarrow (2^3)^{2x-4} = (2^4)^x \Rightarrow 6x - 12 = 4x \Rightarrow x = \frac{12}{2} \therefore x = 6$$

41. $4^{x+1} + 32$ হলে $x = ?$

- a. $2/3$ b. $4/5$ c. $1/8$ d. $3/2$

Jiban Bima Corporation (JO'18)

Hints:

$$4^{x+1} = 32 \Rightarrow (2^2)^{x+1} = 2^5 \Rightarrow 2x + 2 = 5 \Rightarrow 2x = 5 - 2 \therefore x = \frac{3}{2}$$

42. $\log_3 27 =$ কত?

- a. 1 b. 2 c. 3 d. 4

Jiban Bima Corporation (JO'18)

Hints:

$$\log_3 27 = \log_3 3^3 = 3 \log_3 3 = 3 \times 1 = 3$$

বিগত বছরের প্রশ্ন ও সমাধান

Bangladesh Bank

43. If $4^{2x+1} = 32$, then $x = ?$

- a) 2 b) 3 c) $\frac{3}{4}$ d) $\frac{4}{3}$

BB, AD (General-18)

Hints :

$$4^{2x+1} = 32 \Rightarrow (2^2)^{2x+1} = 2^5 \Rightarrow 2^{4x+2} = 2^5 \Rightarrow 4x + 2 = 5 \Rightarrow 4x = 3 \therefore x = \frac{3}{4}$$

44. If $x = y^a$, $y = z^b$ and $z = x^c$ then abc is –

- a) 1 b) 0 c) $\frac{1}{2}$ d) Infinity

BB, AD (General-18)

Hints :

$$\text{এখানে, } x = y^a \Rightarrow x = y^a [\because x = y^a] \Rightarrow x = z^{ab} [\because y = z^b] \Rightarrow x^1 = x^{abc} \therefore abc = 1$$

45. If $1 - 3x \leq 4$, then –

- a) $x \leq -2$ b) $x \geq -2$ c) $x \leq -1$ d) $x \geq -1$

BB, AD (General-18)

Hints :

$$1 - 3x \leq 4 \Rightarrow 1 - 3x - 1 \leq 4 - 1 \Rightarrow -3x \leq 3 = \frac{3x}{-3} \geq \frac{3}{-3} \text{ [-3 দ্বারা ভাগ করে]}$$

$$\therefore x \geq -1$$