1. What is the value of $\log_2(\log_3 81)$?
   (a) 2 (b) 3
   (c) 4 (d) 9

2. If $\log_3[\log_3(\log_3 x)] = \log_3 3$, then what is the value of x?
   (a) 3 (b) 27
   (c) 3^9 (d) 3^{27}

3. If $\log_e\left(\frac{a+b}{2}\right) = \frac{1}{2}(\log_e a + \log_e b)$, then
   (a) a = b (b) $a = \frac{b}{2}$
   (c) 2a = b (d) $a = \frac{b}{3}$

4. If $2\log(x+1) - \log(x^2-1) = \log 2$, then x equals to
   (a) 1 (b) 0
   (c) 2 (d) 3

5. If a, b and c are the pth, qth and rth terms, respectively of a GP, then $(q-r)\log a + (r-p)\log b + (p-q)\log c$ is equal to
   (a) 0 (b) 1
   (c) -1 (d) abc

6. If $(\log_x x)(\log_3 2x)(\log_{2x} y) = \log_x x^2$, then what is the value of y?
   (a) $\frac{9}{2}$ (b) 9
   (c) 18 (d) 27

7. The number of solutions of $\log_2(x-1) = 2\log_2(x-3)$ is
   (a) 2 (b) 1
   (c) 6 (d) 7

8. If $\log_{10}(x+1) + \log_{10} 5 = 3$, then what is the value of x ?
   (a) 199 (b) 200
   (c) 299 (d) 300

9. Solution of the equation $x^{\log_x 2} = \log_3(x+y)$ and $x^2 + y^2 = 65$ is
   (a) x = 8, y = 1 (b) x = 1, y = 8
   (c) (x = 8, y = 1) ; (x = 1, y = 8) (d) None of these

10. The identity $\log_a n \log_b n + \log_b n \log_c n + \log_c n \log_a n$ is
    (a) $\frac{\log_a n \log_b n \log_c n}{\log_{abc} n}$ (b) $\frac{\log_{abc} n}{\log_a n}$
    (c) $\frac{\log_b n}{\log_{abc} n}$ (d) None of these

11. If $\log_4 7 = x$, then $\log_7 16$ is equal to
    (a) 2/x (b) x^2
    (c) x (d) 2x

12. The value of $e^{(\log_{10}\tan 1° + \log_{10}\tan 2° + \ldots + \log_{10}\tan 89°)} = ?$
    (a) 0 (b) 1
    (c) e (d) $\frac{1}{e}$

13. What is $\log(a+\sqrt{a^2+1}) + \log\left(\frac{1}{a+\sqrt{a^2+1}}\right)$ equals to?
    (a) 1 (b) 0
    (c) 2 (d) $\frac{1}{2}$

14. The least value of n in order that the sum of first n terms of the infinite series $1 + \frac{3}{4} + \left(\frac{3}{4}\right)^2 + \left(\frac{3}{3}\right)^3 + \ldots\ldots$, should differ from the sum of the series by less than 10^{-6} is
    (Given, $\log_{10} 2 = 0.30103$, $\log_{10} 3 = 0.47712$)
    (a) 14 (b) 27
    (c) 53 (d) 57

15. The number of solution (s) of the equation
    $\log_2(x^2-1) = \log_{1/2}(x-1) = a$ real number, is
    (a) 0 (b) 1
    (c) 2 (d) 3

16. If the logarithm of a number of the base $\sqrt{8}$ is 6, then the number is
    (a) $\sqrt{48}$ (b) $\frac{\sqrt{8}}{6}$
    (c) $6\sqrt{8}$ (d) 512

17. Find the value of $\log_{5\sqrt{5}} 5$.
    (a) $\frac{2}{3}$ (b) $\frac{1}{3}$
    (c) $\frac{1}{2}$ (d) 2

18. If $\log_r 6 = m$ and $\log_r 3 = n$ then $\log_r\left(\frac{r}{2}\right)$ is equal to
    (a) $\frac{\log_2 r}{2}$ (b) $1 - \log_r 2$
    (c) 1 - m - n (d) 1 - m + n

19. If $\log_8 m + \log_8 \frac{1}{6} = \frac{2}{3}$, then m is equal to
    (a) 24 (b) 18
    (c) 12 (d) 4

20. If $a^x = b^y = c^z$ and $\log_b a = \log_c b$, then which one of the following will hold true?
    (a) $y^2 = xz$ (b) $x^2 = yz$
    (c) $z^2 = xy$ (d) $y = xz$

21. What is the value of $\frac{\log_{\sqrt{\alpha\beta}}(H)}{\log_{\sqrt{\alpha\beta\gamma}}(H)}$?

(a) $\log_{\alpha\beta}(\alpha)$ (b) $\log_{\alpha\beta\gamma}(\alpha\beta)$

(c) $\log_{\alpha\beta}(\alpha\beta\gamma)$ (d) $\log_{\alpha\beta}(\beta)$

22. The positive solurion of the equation
$\log_{x+3}(x^2+6x+9)+\log_{5x+2}(6x^2-6x)=\log_{2x-1}(8x^3-12x^2+6x-1)$ is
(a) 9 (b) 6
(c) 5 (d) 2

23. What is the least integral value of $2\log_{10} x - \log_x (0.01)$?
(a) 0 (b) 2
(c) 4 (d) 3

24. If $\frac{\log x}{\log 5}=\frac{\log 36}{\log 6}=\frac{\log 64}{\log y}$, what are the values of x and y, respectively?
(a) Only 2 (b) Only -2
(c) 2 or -2 (d) 1 or - 1

25. What is the number of digits in the numeral form of 8^{17}?
(a) 51 (b) 16
(c) 15 (d) 14

26.. If $(\log_3 x)^2 + (\log_3 x) < 2$, then which one of the following is correct?

(a) $0<x<\frac{1}{9}$ (b) $\frac{1}{9}<x<3$

(c) $3<x<\infty$ (d) $\frac{1}{9}\le x\le 3$

27. If $\log_{10} 2, \log_{10}(2^x-1), \log_{10}(2^x+3)$ are three consecutive terms of an AP, then which one of the following is correct?
(a) $x=0$ (b) $x=1$
(c) $x=\log_2 5$ (d) $x=\log_5 2$

28. How many number of digits are there in 2^{98}?
(Given that $\log_{10} 2 = 0.30103$)
(a) 98 (b) 99
(c) 30 (d) 29

Directions (Q. Nos. 29 - 30) : Let us consider $\log 2 = 0.3010$, $\log 3 = 0.4771$

29. The value of $7\log\frac{16}{15}+5\log\frac{25}{24}+3\log\frac{81}{80}$ is
(a) 0.3010 (b) 0.3512
(c) 0.412 (d) None of these

30. The value of $\log\frac{70}{33}+\log\frac{22}{135}-\log\frac{7}{18}$ is
(a) - 0.512 (b) 0.4213
(c) 0.3010 (d) None of these