Q.1 f(c) is a maximum value of f(x) if -
(A) $f'(c) = 0, f''(c) > 0$
(B) $f'(c) = 0, f''(c) < 0$
(C) $f'(c) \neq 0, f''(c) = 0$
(D) $f'(c) < 0, f''(c) > 0$

Q.2 f(c) is a minimum value of f(x) if -
(A) $f'(c) = 0, f''(c) > 0$
(B) $f'(c) = 0, f''(c) < 0$
(C) $f'(c) \neq 0, f''(c) = 0$
(D) $f'(c) < 0, f''(c) > 0$

Q.3 f(c) is a maximum value of f(x) when at x = c-
(A) $f'(x)$ changes sign +ve to –ve
(B) $f'(x)$ changes sign from –ve to +ve
(C) $f'(x)$ does not change sign
(D) $f'(x)$ is zero

Q.4 f(c) is a minimum value of f(x) when at x = c-
(A) $f'(x)$ changes sign +ve to –ve
(B) $f'(x)$ changes sign from –ve to +ve
(C) $f'(x)$ does not change sign
(D) $f'(x)$ is zero

Q.5 The correct statement is -
(A) f(c) is an extreme value of f(x) if $f'(c) = 0$
(B) If f(c) is an extreme value of f(x) then $f'(c) = 0$
(C) If $f'(c) = 0$ then f(c) is an extreme value of f(x)
(D) All the above statements are incorrect

Q.6 If for a function f(x), $f'(a) = 0 = f''(a) = f^{n-1}(a)$ but $f^n(a) \neq 0$ then at x = a, f(x) is minimum if -
(A) n is even and $f^n(a) > 0$
(B) n is odd and $f^n(a) > 0$
(C) n is even and $f^n(a) < 0$
(D) n is odd and $f^n(a) < 0$

Q.7 The point of maxima of sec x is -
(A) x = 0 (B) $x = \pi/2$
(C) $x = \pi$ (D) $x = 3\pi/2$

Q.8 $x^3 - 3x + 4$ is minimum at -
(A) x = 1 (B) x = –1
(C) x = 0 (D) No where

Q.9 The maximum value of $2x^3 - 9x^2 + 100$ is -
(A) 0 (B) 100
(C) 3 (D) 30

Q.10 If $f(x) = x^3 - kx + 7$ is maximum at x = –1, then the value of k is -

(A) 3 (B) 6 (C) –3 (D) –6

Q.11 Which of the following function has no extreme point-
(A) 2^x (B) [x]
(C) $\log_{10}x$ (D) All these functions

Q.12 If for a function f(x), $f'(a) = 0 = f''(a) = f^{n-1}(a)$ but $f^n(a) \neq 0$ then at x = a, f(x) is maximum if -
(A) n is even and $f^n(a) > 0$
(B) n is odd and $f^n(a) > 0$
(C) n is even and $f^n(a) < 0$
(D) n is odd and $f^n(a) < 0$

Q.13 The maximum value of
$5 \cos \theta + 3 \cos \left(\theta + \frac{\pi}{3} \right) + 3$ is -
(A) 5 (B) 10 (C) 11 (D) –1

Q.14 The function $f(x) = \sum_{K=1}^{5} (x - K)^2$ assumes minimum value for x given by
(A) 5 (B) 3 (C) 5/2 (D) 2

Q.15 If $f(x) = x^3 - 3x^2 + 3x + 7$, then -
(A) f(x) has a maximum at x = 1
(B) f(x) has a minimum at x = 1
(C) f(x) has a point of inflexion at x = 1
(D) None of these

Q.16 In [0, 2] the point of maxima of
$3x^4 - 2x^3 - 6x^2 + 6x + 1$ is –
(A) x = 0 (B) x = 1
(C) x = 1/2 (D) Does not exist

Q.17 If $f'(c)$ changes sign from negative to positive as x passes through c, then -
(A) f(c) is neither a maximum nor a minimum value of f(x)
(B) f(c) is a maximum value of f(x)
(C) f(c) is a minimum value of f(x)
(D) f(c) is either a maximum or a minimum value of f(x)

Q.18 If $f'(c)$ changes sign from positive to negative as x passes through c, then,
(A) f(c) is neither a maximum nor a minimum value of f(x)
(B) f(c) is a maximum value of f(x)
(C) f(c) is a minimum value of f(x)
(D) f(c) is either a maximum or minimum value of f(x)

Q.19 If $f'(c) < 0$ and $f''(c) > 0$, then at x = c, f(x) is -
(A) maximum
(B) minimum
(C) neither maximum nor minimum
(D) either maximum or minimum

Q.20 If for a function f(x), $f'(b)=0, f''(b) = 0, f'''(b) > 0$, then x = b is -
(A) a maximum point (B) a minimum point
(C) an extreme point (D) not an extreme point

Q.21 The maximum height of the curve $y = 6\cos x - 8\sin x$ above x axis is-
(A) 5 (B) 10
(C) 15 (D) None of these

Q.22 The minimum value of $a\sec x + b\,\text{cosec}\,x$, $0 < a < b$, $0 < x < \pi/2$ is =
(A) $a + b$ (B) $a^{2/3} + b^{2/3}$
(C) $(a^{2/3} + b^{2/3})^{3/2}$ (D) None of these

Q.23 The minimum value of $\frac{x}{\log x}$ $(x > 0)$ is -
(A) e (B) 1/e
(C) 0 (D) Does not exist

Q.24 For what value of x, $x^2 \log (1/x)$ is maximum-
(A) $e^{-1/2}$ (B) $e^{1/2}$ (C) e (D) e^{-1}

Q.25 For what value of k, the function:
$f(x)=kx^2+\frac{2k^2-81}{2}x-12$, is maximum at $x = 9/4$
(A) 9/2 (B) –9
(C) –9/2 (D) 9

Q.26 The greatest value of the function
$f(x) = \cos [xe^{[x]} + 2x^2 - x]$, $-1 < x < \infty$ is-
(A) –1 (B) 1
(C) 0 (D) None of these

Q.27 For $f(x) = \sqrt{3}\sin x + 3\cos x$, the point
$x = \pi/6$ is -
(A) a local maximum
(B) a local minimum
(C) None of these
(D) a point of inflexion

Q.28 Which of the following functions has maximum or minimum value -
(A) sinh x (B) cosh x
(C) tanh x (D) None of these

Q.29 The maximum value of $5\sin\theta + 3\sin(\theta + \pi/3) + 3$ is -
(A) 11 (B) 12 (C) 10 (D) 9

Q.30 The maximum value of $(x - 2)(x - 3)^2$ is-
(A) 2/27 (B) 1/27
(C) 4/27 (D) 5/27

Q.31 A maximum point of cosecx is-
(A) $x = 0$ (B) $x = \pi/2$
(C) $x = \pi$ (D) $x = 3\pi/2$

Q.32 The function $f(x) = a\sin x + \frac{1}{3}\sin 3x$ has a maximum at $x = \pi/3$, then a equals-
(A) –2 (B) 2 (C) –1 (D) 1

Q.33 If $f(x) = x^3 + ax^2 + bx + c$ is minimum at $x = 3$ and maximum at $x = -1$, then-
(A) $a = -3, b = -9, c = 0$
(B) $a = 3, b = 9, c = 0$
(C) $a = -3, b = -9, c \in R$
(D) None of these

Q.34 If $a > 1, x > 1$, then minimum value of $\log_a x + \log_x a$ is -
(A) 2 (B) –2 (C) 2a (D) None

Q.35 If x be real, then the minimum value of $f(x) = 3^{x+1} + 3^{-(x+1)}$ is -
(A) 2 (B) 6 (C) 2/3 (D) 7/9

Q.36 If $\alpha<\beta, \alpha,\beta \in (0, \pi/2)$ then correct statement is -
(A) $\alpha - \sin\alpha > \beta - \sin\beta$
(B) $\alpha - \sin\alpha < \beta - \sin\beta$
(C) $\sin\alpha - \alpha < -\sin\beta + \beta$
(D) None of these

Q.37 Function $f(x) = e^x + e^{-x}$ has -
(A) one minimum point
(B) one maximum point
(C) many extreme points
(D) no extreme point

Q.38 Which of the following functions has infinite extreme points -
(A) tan x (B) cot x (C) sec x (D) cosh x

Q.39 The maximum value of the function $(x - 2)^6 (x - 3)^5$ is -
(A) 0 (B) 1
(C) –1 (D) does not exist

Q.40 If $f'(x) = (x - a)^{2n}(x - b)^{2p+1}$; $n, p \in N$, then-
(A) x = a is a minimum point
(B) x = a is a maximum point
(C) x = a is neither maximum nor minimum
(D) None of these

Q.41 At $x = 5\pi/6$, function $2 \sin 3x + 3 \cos 3x$ is-
(A) maximum (B) minimum
(C) zero (D) None of these

Q.42 The minimum value of $y = x(\log x)^2$ is -
(A) 0 (B) 1 (C) 2 (D) None

Q.43 The local maximum value of $x(1 - x)^2, 0 \le x \le 2$ is
(A) 2 (B) 4/27 (C) 5 (D) 0

Q.44 In the interval (–2, 2), the minimum value of $x^3 - 3x + 4$ is -
(A) 0 (B) 1 (C) 2 (D) 3

Q.45 The least value of $f(x) = x^3 - 12x^2 + 45x$ in $[0, 7]$ is -

(A) 0 (B) 50 (C) 45 (D) 54

Q.46 The minimum value of $y = 7\cos\theta + 24\sin\theta$ $(0 \le \theta \le 2\pi)$ is -

(A) 25 (B) –25 (C) 50 (D) None

Q.47 If $0 \le x \le \pi$, then maximum value of $y = (1 + \sin x)\cos x$ is -

(A) $3\sqrt{3}$ (B) $3\sqrt{3}/2$

(C) $3\sqrt{3}/4$ (D) –1

Q.48 The highest point on the curve $y = xe^{-x}$ is-

(A) (1, 1/e) (B) (e, 1)

(C) (1/e, 1) (D) (1, e)

Q.49 The function $3x^4 - 2x^3 - 6x^2 + 6x + 1$ has a maximum in [0, 2] at -

(A) x = 1/2 (B) x = 1

(C) x = 0 (D) does not exist

Q.50 The function $f(x) = x^2 \log x$ in the interval [1, e] has -

(A) a point of maximum and minimum

(B) a point of maximum only

(C) a point of minimum only

(D) no point of maximum and minimum is [1, e]