CHAPTER 6

APPLICATION OF DERIVATIVES

MULTIPLE CHOICE TYPE QUESTIONS

1	A function $y = f(x)$ is said to have a local maximum value if A) $\frac{dy}{dx} = 0$ & $\frac{d^2y}{dx^2} = 0$ B) $\frac{dy}{dx} = 0$ & $\frac{d^2y}{dx^2} > 0$ C) $\frac{dy}{dx} = 0$ & $\frac{d^2y}{dx^2} < 0$ D) $\frac{dy}{dx} = 0$ & $\frac{d^2y}{dx^2} \leq 0$
2	The sign of $f'(x)$ changes from positive to negative as x increases through x = a then A) $x = a$ is a point of local minimum B) $x = a$ is a point of local maximum C) $x = a$ is a point of inflection D) None of these
3	The sign of $f'(x)$ changes from negative to positive as x increases through x = a then A) $x = a$ is a point of local minimum B) $x = a$ is a point of local maximum C) $x = a$ is a point of inflection D) None of these
4	Maximum value of sin x. cos x is A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\sqrt{2}$ D) $2\sqrt{2}$
5	Maximum slope of the curve y = $-x^3+3x^2+9x-27$ is A) 0 B) 12 C) 16 D) 32
6	The function $f(x) = 2x^3-3x^2-12x+4$, has A) two points of local maximum B) two points of local minimum C) one maxima and one minimum D) neither maximum nor minimum
7	At x = $\frac{5\pi}{6}$, f(x) = 2 sin 3x + 3 cos 3x has a A) maxima B) minima C) zero D) neither a maximum nor a minimum

8	f(x) = x^x has a stationery point at x = A) e B) $\frac{1}{e}$ C) 1 D) $\sqrt{e}$
9	For all real values of x, the minimum value of $\frac{1-x+x^2}{1+x+x^2}$ A) 0 B) 1 C) 3 D) $\frac{1}{3}$
10	The maximum value of $\left(\frac{1}{x}\right)^x$ is A) e B) e^e C) $e^{\frac{1}{e}}$ D) $\left(\frac{1}{e}\right)^e$
11	The maximum and minimum values of $f(x) = x + \sin 2x$ in the interval [0, 2π] are A) 2π , 0 B) $0, 2\pi$ C) $0, 0$ D) None of these
12	Let f(x) be a function such that $f'(a) \neq 0$. Then at x = a, f(x) A) cannot have a maximum B) cannot have a minimum C) have neither a maximum nor a minimum D) None of these
13	Two numbers whose sum is 24 and whose product is as large as possible. Then the two numbers are A) 16, 8 B) 12 , 12 C) $10, 14$ D) $11, 13$
14	The critical point(s) of f(x) = x^2e^{-x} is/are A) 0 B) 2 C) both A & B D) None of these
15	The function f(x) = x^2e^{-x} has A) local minimum at x = 0 only B) local maximum at x = 2 only C) both A and B D) None of these
16	The function $f(x)$ is said to be strictly decreasing if (A) $f'(x) > 0$ (B) $f'(x) \geq 0$ (C) $f'(x) < 0$ (D) $f'(x) \leq 0$
17	The function given by f (x) = 3x + 17 is (A) strictly increasing on R. (B)strictly decreasing on R. (C)Neither increasing nor decreasing on R.

	(D)decreasing on R.
18	The function given by f (x) = e^{2x} is (A) strictly increasing on R. (B)strictly decreasing on R. (C)Neither increasing nor decreasing on R. (D)decreasing on R.
19	The intervals in which the function f given by f(x) = $2x^2 - 3x$ is strictly increasing is (A)$\left(\frac{3}{4}, \infty\right)$ (B)$\left[\frac{3}{4}, \infty\right)$ (C)$\left(-\infty, \frac{3}{4}\right)$ (D)$\left(-\infty, \frac{3}{4}\right]$
20	The logarithmic function f(x) = log x is (A) strictly decreasing on (0, ∞). (B) strictly increasing on (0, ∞). (C) increasing on (0, ∞). (D) Neither increasing nor decreasing on (0, ∞).
21	Which of the following functions is strictly decreasing on $\left(0, \frac{\pi}{2}\right)$? (A) cos x (B) cos 2x (C) cos 3x (D) tan x
22	The interval in which y = $x^2 e^{-x}$ is increasing is (A) (– ∞, ∞) (B) (– 2, 0) (C) (2, ∞) (D) (0, 2)
23	The function f given by f(x) = log sin x is strictly increasing on$\left(0, \frac{\pi}{2}\right)$ (A)is increasing on$\left(0, \frac{\pi}{2}\right)$ (B)is decreasing on$\left(0, \frac{\pi}{2}\right)$ (C)is strictly decreasing on$\left(0, \frac{\pi}{2}\right)$

	(D) is strictly increasing on $\left(0, \frac{\pi}{2}\right)$
24	The least value of a such that the function f given by $f(x) = x^2 + ax + 1$ is strictly increasing on (1, 2) is (A) 2 (B) -2 (C) 4 (D) -4
25	The slope of the tangent to the curve $y = x^3 - x$ at x = 2. (A) $\frac{1}{11}$ (B) $-\frac{1}{11}$ (C) -11 (D) 11
26	The slope of the tangent to the curve given by $x = a \sin^3 t$, $y = b \cos^3 t$ at a point where $t = \frac{\pi}{2}$ is (A) ∞ (B) 0 (C) 1 (D) -1
27	The slope of the normal to the curve $y = 2x^2 + 3 \sin x$ at x = 0 is (A) 3 (B) 1/3 (C) –3 (D) – 1/3
28	The equation of the normal to the curve y = sin x at (0, 0) is (A) y = 0 (B) x = 0 (C) x + y = 0 (D) x – y = 0
29	If the tangent to a curve is parallel to the x-axis then its slope is (A) 0 (B) undefined (C) -1 (D) 1

30	If the tangent is parallel to the y-axis then (A)$\frac{dy}{dx}$ is 0 (B)$\frac{dx}{dy}$ is 0 (C)$\frac{dy}{dx}$ is -1 (D)$\frac{dx}{dy}$ is undefined
31	The point where the tangent to the curve $y = x^2 - 4x + 5$ is parallel to x – axis is (2,1) (b) (1,2) (c) (2,4) (d) (-4,5)
32	The interval in which the function $f(x) = 2x^2 + 4x - 5$ is increasing is $(-\infty, -1]$ (b) $[-1, \infty)$ (c) [2,4] (d) None of these
33	Which of the following is strictly decreasing on $\left(0, \frac{\pi}{2}\right)$ $cosx$ (b) $cos2x$ (c) $cos3x$ (d) a & b both
34	The slope of normal to the curve $y = x^2 + 3$ at x=1 is 2 (b) $\frac{-1}{3}$ (c) $\frac{-1}{2}$ (d) none of these
35	For what value of x, the slope of tangent to the curve $y = x^3 + x + 1$ is 10 3 (b) – 3 (c) $\sqrt{3}$ (d) None of these
36	In which of the following intervals the function $f(x) = x^2e^{-x}$ is increasing in $(-\infty, \infty)$ (b) $(-2,0)$ (c) $(2, \infty)$ (d) [0,2]
37	In which of the following intervals the function $f(x) = x^2e^x$ is decreasing $(-\infty - 2) \cup (0, \infty)$ (b) [-2,0] (c) $-\infty, \infty)$ (d) None of these
38	The interval in which the function $f(x) = x^2 - 6x + 3$ is increasing is $(1, \infty)$ (b)$(3, \infty)$ (c) (1,2) (d) None of these
39	The slope of tangent of the curve $y = 2x^2 + 3sinx$ at $x = 0$ is 3 (b) – 3 (c) 4 (d) None of these
40	The points on the curves $\frac{x^2}{9} + \frac{y^2}{16} = 1$ at which the tangent is parallel to x – axis is $(-1, \pm 4)$ (b) $(0, \pm 4)$ (c) $(-1, \pm 8)$ (d) $(\pm 3,0)$
41	The point on the curve $y = x^3 - 11x + 5$ at which the tangent is $y = x - 11$ is $(-2,0)$ (b) (3,7) (c) (0,2) (d) (2,-9)
42	The slope of tangent to the curve $x = a(t - sint), y = a(1 - cost)$ at $t = \frac{\pi}{2}$ is 1 (b) – 1 (c) 2 (d) – 2
43	Function $f(x) = x^3 - 27x + 5$ is monotonically increasing, when $x < -3$ (b) $\|x\| > 3$ (c) $x \leq -3$ (d) $\|x\| \geq 3$
44	Function $f(x) = logx$ is increasing on R, if 0<x<1 (b) x>1 (c)x<1 (d) x>0
45	Function $f(x) = a^x$ is increasing on R, if a > 0 (b) a < 0 (c) 0 < a < 1 (d) a > 1
46	Function $f(x) = 2x^3 - 9x^2 + 12x + 29$ is monotonically decreasing when x < 2 (b) x > 2 (c) x > 3 (d)1 < x < 2
47	The function $f(x) = x^x$ $decreases$ on the interval $(0, e)$ (b) (0,1) (c) $(0, \frac{1}{e})$ (d) None of these
48	The function $f(x) = \frac{logx}{x}$ is increasing in the interval

	$(1,2e)$ (b) $(0,e)$ (c) $(2,2e)$ (d) $\frac{1}{e},2e)$
49	For the function $f(x)=x\cos\frac{1}{x}, x\geq 1, f(x)$ is (a) Strictly increasing in $(1,\infty)$ (b) Strictly decreasing in $(1,\infty)$ (c) Neither increasing nor decreasing in $(1,\infty)$ None of these
50	The point on the curve $y=12x-x^2$ where the slope of the tangent is zero is (0,0) (b) (2,16) (c) (3,9) (d) None of these
51	The points on the curve $9y^2=x^3$ where normal to the curve makes equal intercepts with the axis are (a) $\left(4,\frac{8}{3}\right)$ or $\left(4,\frac{-8}{3}\right)$ (b) $\left(-4,\frac{8}{3}\right)$ (c) $\left(-4,\frac{-8}{3}\right)$ None of these
52	The equation of the normal to the curve $y=x(2-x)$ at point (2,0) is (a) $x-2y=2$ (b) $x-2y+2=0$ (c) $2x+y=4$ $x+2y=4$
53	If $x+y=k$ is normal to curve $y^2=12x$ then value of k is -3 (b) 3 (c) 9 (d) -9
54	The value of the function $f(x)=(x-1)(x-2)^2$ at its maxima is $\frac{5}{27}$ (b) $\frac{4}{27}$ (c) 2 (d) 1
55	The Maximum and Minimum values of the function $\lvert\sin 4x+3\rvert$ are 1, 2 (b) 4, 2 (c) 2, 4 (d) 1, 1
56	Local Maximum and Local Minimum values of the function $(x-1)(x+2)^2$ are 4, 0 (b) 0, 4 (c) -4, 0 (d) None of these
57	The function $x^5-5x^4+5x^3-10$ has a maximum, when x = ? 3 (b) 2 (c) 1 (d) 0
58	The maximum value of function $x^3-12x^2+36x+17$ in the interval [1, 10] is 177 (b) 17 (c) 77 (d) None of these
59	The maximum value of the function x^3+x^2+x-4 is 127 (b) 4 (c) Does not have a maximum value (d) None of these
60	The function $x^2\log x$ in the interval $(1,e)$ has (a) A point of maximum (b) A point of minimum (c) Points of maximum as well as minimum (d) Neither a point of maximum nor minimum
61	The minimum value of $\lvert x\rvert+\left\lvert x+\frac{1}{2}\right\rvert+\lvert x-3\rvert+\left\lvert x-\frac{5}{2}\right\rvert$ is 0 (b) 2 (c) 4 (d) 6
62	Local maximum value of the function $\frac{\log x}{x}$ is 33e (b) 1 (c) $\frac{1}{e}$ (d) 2e
63	If two sides of a triangle be given then the area of triangle will be maximum if the angle between the given sides be $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{2}$
64	The minimum value of the function $2\cos 2x-\cos 4x$ in $0\leq x\leq\pi$ is 0 (b) 1 (c) $\frac{3}{2}$ (d) -3

65	If from a wire of length 36 metre a rectangle of greatest area is made, then its two adjacent sides in metre are 6, 12 (b) 9, 9 (c) 10, 8 (d) 13, 5
66	The sum of two non-zero numbers is 4. The minimum value of the sum of their reciprocals is $\frac{3}{4}$ (b) $\frac{6}{5}$ (c) 1 (d) None of these
67	The minimum value of $x^2 + \frac{250}{x}$ is 75 (b) 50 (c) 25 (d) 55
68	If $x + y = 10$, then the maximum value of xy is 5 (b) 20 (c) 25 (d) None of these
69	Area of the greatest rectangle that can be inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is $\sqrt{ab}$ (b) $\frac{a}{b}$ (c) $2ab$ (d) ab
70	If PQ and PR are the two sides of a triangle, then the angle between them which gives maximum area of the triangle is π (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{2}$
71	The equation of the normal to the curve $y = sinx$ at (0,0) is a)$x = 0$b)$y = 0$ c)$x + y = 0$ d)$x - y = 0$
72	The tangent to the curve $y = e^{2x}$ at the point (0,1) meets x-axis at a)$(0,2)$b)$(2,0)$ c)$(-\frac{1}{2}, 0)$d)None of these
73	The area of the triangle formed by any tangent to the curve $2xy = a^2$ and the co-ordinate axes is a)$2a^2$ b)a^2 c)$3a^2$ d) None of these
74	The slope of the tangent to the curve $x = t^2 + 3t - 8,\ y = 2t^2 - 2t - 5$ at t = -1 is a)22/7 b)6/7 c)-6 d)1/7
75	The equation of tangent to the curve $y = 1 - e^{\frac{x}{2}}$ at the point of intersection with y-axis is a)$x + 2y = 0$ b)$2x + y = 0$ c)$x - y = 2$ d)$x + y = 0$
76	If the equation of tangent to the curve $y^2 = ax^3 + b$ at the point (2,3) is $y = 4x - 5$,then a) a=2, b =7 b) a=7, b=2 c) a=2, b=-7 d) a=-2, b=7
77	A straight line is parallel to the line $2x - y + 5 = 0$ and is tangent to the curve $y^2 = 4x + 5$. The point of contact of the tangent and the curve is a) (2,1) b) (3,4) c) (1,3) d) (-1,1)
78	The point on the curve $y^2 = x$ where the tangent makes an angle $\frac{\pi}{4}$ with x-axis is a) $(\frac{1}{2}, \frac{1}{4})$ b) $(\frac{1}{4}, \frac{1}{2})$ c) (4,2) d) (2,4)
79	The intervals in which $f(x) = x(x-3)^2$ is decreasing strictly for a)1 < x < 3 b) x < 0 c) x > 0 d) 0 < x< 3/2
80	The function $f(x) = 1 - x^3 - x^5$ is decreasing for a)$1 \le x \le 5$ b) $x \le 1$ c)$x \ge 1$ d) all real values of x.
81	The function $f(x) = -2x^3 + 3x^2 + 12x + 6$ is a) strictly increasing in the interval$(-\infty, 1) \cup (2, \infty)$ b)strictly decreasing in the interval$(-\infty, -1) \cup (2, \infty)$ c) strictly decreasing in the interval$(1,2)$ d) strictly increasing in the interval$(-2,1)$
82	The function $f(x) = \frac{x}{1+x^2}$ increases in the interval a)$(-\infty, -1) \cup (1, \infty)$ b) $(-\infty, 0) \cup (1, \infty)$ c) $[0, \infty)$ d) $(-1,1)$
83	The angle of intersection of the curves $y = x^2$ and $x = y^2$ at (1,1) is

	a)$tan^{-1}(\frac{4}{3})$b)$\frac{\pi}{4}$ c) $\frac{\pi}{2}$ d) $tan^{-1}(\frac{3}{4})$
84	The function $f(x) = x^2 - x + 1$ in the interval (0,1) is a) strictly increasing b) strictly decreasing c) neither increasing nor decreasing d) decreasing
85	Which of the following function is decreasing in $(0, \frac{\pi}{2})$ a) cotx b) cos3x c) tanx d) sin2x
86	$Find\ the\ absolute\ maximum\ value\ of\ f(x) = sin\ sinx - cos\ cosx\ \ where\ x \in [0, \pi]$ a. 0 b. 1 c. -1 d. $\sqrt{2}$
87	Let f(a) be local maximum value of the function f(x) if a. $f''(a) < 0$ b. $f''(a) > 0$ c. $f'(a) < 0$ d. $f'(a) < 0$
88	The maximum value of $(\frac{1}{x})^x$is a. e b. e^e c. $e^{\frac{1}{e}}$ d. $(\frac{1}{e})^{\frac{1}{e}}$
89	The function $f(x) = 2x^3 - 3x^2 - 12x + 4$ has a. Two points of local minima b. Two points of local maxima c. One maximum and one minimum d. No maxima and no minima
90	If $f(x) = \frac{1}{4x^2+2x+1}$ then the maximum value is a. 0 b. 4/3 c. 5 d. Not exist.
91	The least value of the function $f = ax + \frac{b}{x}\ where\ a, b, x > 0$ is a. a/b b. $2\sqrt{ab}$ c. 0 d. a
92	If f be a function such that $f' \neq 0$. then the function must have a. No maxima b. No minima c. Neither maxima nor a minima d. May have maxima or minima
93	The maximum value of f= sinx. cosx is a. 1/4 b. 1/2

	c. $\sqrt{2}$	d. $2\sqrt{2}$	
94	If X+Y=8 the maximum value of XY is a. 8 / b. 16 c. 20 / d. 24		
95	The maximum and minimum value of f= x + sin2x in the interval [0, 2π] is a. Maximum value=2π Minimum value=0 / b. Maximum value=0 Minimum value=2π c. Maximum value=0 Minimum value=$-\pi$ / d. Maximum value=2π Minimum value=π		
96	Minimum values of $f(x) = x^2 + 4x + 8$ is: a. 1 / b. 2 c. 3 / d. 4		
97	Maximum and minimum values of $f(x) = sin2x + \pi$ a. $\pi - 1, \pi + 1$ / b. $1 - \pi, 1 + \pi$ c. . $\pi, -\pi$ / d. . $1, 0$		
98	Maximum and minimum values of $f(x) = x^3 + x^2 + x + 1$ a. 1, 0 / b. 4, 3 c. 15, 10 / d. Both do not exist		
99	Find the maximum of $f(x) = x^2 - 24x + 150\ in\ [12, 15]$ a. 12 / b. 13 c. 15 / d. 150		
100	Find two positive numbers whose sum is 16 and sum of whose cubes is minimum. a. 8, 8 / b. 6, 10 c. 9, 7 / d. 5, 11		
101	Find the interval in which f(x)= - x^2 - 2x +15 is increasing (a) $(-1, \infty)$ (b) $(-\infty, -1)$ (c) $(1, \infty)$ (d) $(-1, \infty)$		
102	Find the interval in which the function F(x) = 2 x^3 -9 x^2 +12x +15 is decreasing $(a)(-\infty, 1)$ (b) $(2, \infty)$ (c) $(-\infty, 1)\ U\ (2, \infty)$ (d) (1,2)		
103	Find the values of K for which f(x) = kx^3 -9kx^2 +9x +3 is increasing on R .		

	(a) $(-\infty, 0)$ (b) (0 , 1/3) (c) (1, ∞) (d) (- ∞ , 1)
104	The interval in which the function f given by $f(x) = x^2 e^{-x}$ is strictly increasing is (a) $(-\infty , \infty)$ (b) $(-\infty, 0)$ (b) (c) (2, ∞) (d) (0,2)
105	Which of the following function is decreasing on $(0 , \pi/2)$ (a) tan2x (b) cosx (c) cos 3x (d) none of these
106	The function $f(x) = \frac{2x^2-1}{x^4}$, x >0 , decreases in the interval (a) $(-\infty, 0)$ (b) [1 , ∞) (c) [-1 , 1] (d) None of these
107	The function $f(x) = 2 \log(x -2) – x^2 +4x +1$ increases in the interval (a) (1, 2) (b) (2,3) (c) (1,3) (d) (2, 4)
108	The equation of the normal to the curve y = x(2-x) at the point (2, 0) is (a) X – 2y = 2 (b) x- 2y +2 = 0 (c) 2x + y =4 (d) 2x + y – 4= 0
109	The point on the curve $y^2 = x$ where tangent makes an angle 45^0 with X axis is (a) (½ , ¼) (b) (¼ , ½) (c) (4,2) (d) (1, 1)
110	The slope of the tangent to the curve $x= 3 t^2 +1$, $y = t^3 -1$ at x=1 is (a) ½ (b) 0 (c) -2 (d) ∞
111	The line y= mx +1 is a tangent to the curve $y^2 = 4x$, if the value of m is (a) 1 (b) 2 (c) 3 (d) ½
112	The curve $y= 2e^x$ and $y= ae^{-x}$ intersect orthogonally , then the value of a= (a) ½ (b) -1/2 (c) 2 (d) $2e^2$
113	The equation of the normal to the curve $3x^2 –y^2 = 8$ which is parallel to x+ 3y =8 is

(a) X-3y = 8 (b) x- 3y +8 =0

. (c) x+ 3y $\pm$ 8 =0 (d) x+3y =0

114 The Value of 'a' for which y = x^2 +ax+25 touches the X axis are

(a) 0 (b) $\pm$ 10

(c) 4, -6 (d) $\pm$ 5

115 The slope of the normal to the curve 2 x^2 +3 sin x at x=0 is

(a) 3 , (b) 1/3

(c) -3 (d) -1/3

116 Find the intervals in which the functions f(x) = x^2 – 4x + 6 is strictly increasing

(a) $(-\infty, 2) \cup (2, \infty)$	(b) $(2, \infty)$
(c) $(-\infty, 2)$	(d) $(-\infty, 2] \cup [2, \infty)$

117 The function $f(x) = 3 - 4x + 2x^2 - \frac{1}{3}x^3$ is

(a) Increasing on $\Re$	(b) Decreasing on $\Re$
(c) Neither increasing nor decreasing	(d) None of these

118 The tangent to the parabola x^2 = 2y at the point $(1, \frac{1}{2})$ makes with the x – axis an angle of

(a) 0°	(b) 45°
(c) 30°	(d) 60°

119 The curve $y = x^{\frac{1}{5}}$ has at (0, 0)

(a) A vertical tangent (parallel to y – axis)	(b) A horizontal tangent (parallel to x – axis)
(c) An oblique tangent	(d) No tangent

120 The slope of the normal to the curve $x = a(\theta - sin\theta), y = a(1 - cos\theta)$ at $\theta = \frac{\pi}{2}$ is

(a) 0	(b) undefined
(c) – 1	(d) 1

121 Tangents to the curve $x^2 + y^2 = 2$ at the points (1, 1) and (– 1, 1) are

(a) Parallel	(b) Perpendicular
© Intersecting but not at right angles	d) None of these

122

The point at which the normal to the curve $y = x + \frac{1}{x}, x > 0$ is perpendicular to the line 3x – 4y – 7 = 0 is:

(a) $\left(2, \frac{5}{2}\right)$	(b) $\left(\pm 2, \frac{5}{2}\right)$
(c) $\left(-\frac{1}{2}, \frac{5}{2}\right)$	(d) $\left(\frac{1}{2}, \frac{5}{2}\right)$

123

The tangent to the curve $y = e^{2x}$ at the point (0, 1) meets x – axis at

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

124

The function f(x) = tanx – x

(a) Always increases	(b) Always decreases
(c) Never increases	d) Sometimes increases and sometimes decreases

125

The function f(x) = x + sinx is

(a) Always increasing	(b) Always decreasing
(c) Increasing for certain range of x	(d) None of these

126

The function $f(x) = -x^3 + 3x^2 - 3x + 100, \forall x \in \mathcal{R}$ is

(a) Strictly increasing	(b) Strictly decreasing
(c) Neither increasing nor decreasing	(d) Decreasing

127

In which interval the function $f(x) = 3x^2 - 7x + 5$ is strictly increasing

(a) $\left(-\infty, \frac{7}{6}\right)$	(b) $(-\infty, \infty)$
(c) $\left(0, \frac{7}{6}\right)$	(d) $\left(\frac{7}{6}, \infty\right)$

128

The interval on which the function $f(x) = 2x^3 + 9x^2 + 12x - 1$ is decreasing is

(a) $[-1, \infty)$	(b) $[-2, -1]$
(c) $(-\infty, -2]$	(d) $[-1, 1]$

129

The function $f(x) = 1 - x^3 - x^5$ is decreasing for

(a) $1 \le x \le 5$	(b) $x \le 1$
(c) $x \ge 1$	(d) all values of x

130

The function $f(x) = x - \frac{1}{x}, x \in \Re, x \neq 0$ is

(a) Increasing for all $x \in \Re$	(b) Decreasing for all $x \in \Re$
(c) Increasing for all $x \in (0, \infty)$	(d) Neither increasing nor decreasing

131	The interval in which the function $f(x)=x^2-4x+6$ is strictly decreasing is (A) $(-\infty,-2)$ (B) (-2, 3) (C) (3, 2) (D) $(3,\infty)$
132	The interval in which $y=x^2e^{-x}$ is increasing is (A) $(-\infty,\infty)$ (B) (-2, 0) (C) $(2, \infty)$ (D) (0,2)
133	Which of the following functions are strictly decreasing on $(0,\pi/2)$ (A) tanx (B) cos2x (C) cos3x (D) none of these
134	The interval in which y=Logx is strictly increasing is (A) $(-\infty,\infty)$ (B) $(-\infty, 0)$ (C) $(0, \infty)$ (D) (0,2)
135	Find the interval in which function $f(x) = \sin x+\cos x$, $0 \le x \le 2\pi$ is decreasing. a) $(\pi/4, 5\pi/4)$ b) $(-\pi/4, 5\pi/4)$ c) $(\pi/4, -5\pi/4)$ d) $(-\pi/4, \pi/4)$
136	Nature of the function $f(x) = e^{2x}$ is _____ a) increasing b) decreasing c) constant d) increasing and decreasing
137	For all x in the given interval if derivative of f(x)>0 then f(x) is

	(A) decreasing in the interval (B) increasing in the interval (C) constant in the interval (D) undefined in the function
138	The range of values of x for which the function $y=5-8x-2x^2$ is increasing is (A) $x<3$ (B) $x>2$ (C) $x<-2$ (D) $X>-2$
139	Find the tangent to the curve $y=3x^2+x+4$ at $x=3$. a) 19 b) 1.9 c) 18 d) 16
140	Find the slope of the tangent to the curve $x=4\cos^3 3\theta$ and $y=5\sin^3 3\theta$ at $\theta=\pi/4$. a) –3/4 b) –1/4 c) 5/4 d) –5/4
141	Find the equation of all the lines having slope 0 which are tangent to the curve $y=6x^2-7x$. a) 24/49 b) –24/49 c) 49/24 d) –49/24
142	The slope of the normal to the curve $y=2x^2+3\sin x$ at $x=0$ is (A) 3 (B) 1/3 (C) -3 (D) -1/3

143	The line y=x+1 is a tangent to the curve $y^2=4x$ at the point (A) (1,2) (B) (2, 1) (C) (1, -2) (D) (-1,2)
144	The curves $x= y^2$ and xy=k cut at right angles if (A) $8 k^2=0$ (B) $8 k^2=1$ (C) $k^2=1$ (D) $k^2=8$
145	The two curves $x^3-3xy^2+2=0$ and $3x^2y-y^3=2$ (A) touch each other (B) Cut at right angle (C) Cut at an angle π/3 (D) Cut at an angle π/4
146	The maximum value of $\sin x \cdot \cos x$ is (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\sqrt{2}$ (D) $2\sqrt{2}$
147	Maximum slope of the curve $y=-x^3+3x^2+9x-27$ is (A) 0 (B) 12 (C) 16 (D) 32
148	The smallest value of the polynomial x^3-18x^2+96x in $[0,9]$ is (A) (B) (C) (D)
149	The function $f(x)=2x^3-3x^2-12x+4$ has (A) Two points of local maximum (B) Two points of local minimum (C) One maxima and one minima (D) No maxima or minima
150	If *x* is real, the minimum value of $x^2-8x+17$ is (A) -1 (B) 0

	(C) 1 (D) 2
151	The maximum value of $\left(\frac{1}{x}\right)^x$ is (A) e (B) e^e (C) $e^{1/e}$ (D) $\left(\frac{1}{e}\right)^{1/e}$
152	If $x>0$ what is the minimum value of $x+\frac{4}{x}$ (A) 3 (B) 2 (C) 4 (D) 1
153	If $x<0$ what is the maximum value of $x+\frac{1}{x}$ (A) -2 (B) 0 (C) 2 (D) 4
154	Minimum value of $\sqrt{3}\sin x+\cos x$ is (A) 2 (B) 3 (C) $\sqrt{3}$ (D) -2
155	Maximum value of $\frac{1}{x^2+x+1},\ x\in R$ (A) $\frac{3}{4}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{4}{3}$
156	The minimum value of $\sin x\cdot\cos x$ is (A) $\frac{1}{2}$ (B) $-\frac{1}{2}$ (C) $\frac{3}{2}$ (D) $-\frac{3}{2}$
157	Maximum value of $a\sin x+b\cos x,\ x\in R$

	(A) a (B) $-\sqrt{a^2+b^2}$ (C) $\sqrt{a^2+b^2}$ (D) b
158	Maximum value of $f(x)=x-x^2$ is (A) $\frac{1}{4}$ (B) 4 (C) 3 (D) $\frac{3}{4}$
159	Minimum value of x^x, $x>0$ (A) $\frac{1}{e}$ (B) $e^{-1/e}$ (C) $\left(\frac{1}{e}\right)^{1/e}$ (D) e^e
160	For what value of x, does the function $f(x)=x^{2/3}$ have a local minimum value. (A) 1 (B) -1 (C) 0 (D) 2
161	The real number x when added to its inverse gives the minimum value of the sum at x equal to : (i) 1 (ii) -1 (iii) -2 2
162	Angle between the tangent to the curve $y = x^2 - 5x + 6$ at the points (2,0) and (3,0) is: (i) $\frac{\pi}{2}$ (ii) $\frac{\pi}{3}$ (iii) $\frac{\pi}{6}$ $\frac{\pi}{4}$
163	The normal to the curve $x = a(\cos\theta + \theta sin\theta), y = a(sin\theta - \theta cos\theta)$ at any point 'θ' is such that: (i) It makes angle $\frac{\pi}{2}+\theta$ with the x axis. (ii) It passes through the origin. (iii) It is a constant distance from the origin.

	It passes through $\left(\frac{a\pi}{2}, -a\right)$
164	The curve $y = x^{\frac{1}{5}}$ has at (0,0) (i) A vertical tangent (parallel to y-axis). (ii) A horizontal tangent (parallel to x-axis) (iii) An oblique tangent No tangent
165	The equation of the tangent to the curve $y = x + \frac{4}{x^2}$ that is parallel to the x-axis, is (i) Y=0 (ii) Y=1 (iii) Y=2 Y=3
166	If the curve $ay + x^2 = 7 and x^3 = y$ cut orthogonally at (1,1), then the value of a is : (i) 1 (ii) 0 (iii) -6 6
167	The points at which the normal to the curve $y = x + sinxcosx$ at x = Π/2 is (i) 2x = Π (ii) X = 2Π (iii) X = Π/4 X = 2
168	The equation of tangent to the curve $y(1 + x^2) = 2 - x$, where it crosses x-axis is : (i) X + 5y =2 (ii) X-5y = 2 (iii) 5x – y = 2 (iv) 5x + y = 2
169	In case of strictly increasing function, slope of the tangent and hence derivative is : (i) Zero (ii) Either positive or zero

	(iii) Negative Positive
170	The value of k in order that f(x) = sinx – cosx – kx + b decreases for all real values is given by: (i) $k < \sqrt{2}$ (ii) $k \geq \sqrt{2}$ (iii) $k < 1$ $k \geq 1$
171	The interval on which the function $f(x) = 2x^3 + 9x^2 + 12x - 1$ is decreasing is : (i) [-1 , ∞) (ii) [-2, -1] (iii) (-∞, -2] [-1,1]
172	Let the $f : R \to R$ be defined by $f(x) = 2x + cosx$, then f : (i) has a minimum at x = Π (ii) has a maximum at x=0 (iii) is a decreasing function is a increasing function
173	Every invertible function is (i) monotonic function (ii) constant function (iii) identity function not necessarily monotonic function
174	If the function $f(x) = x^2 - kx + 5$ is increasing on [2, 4], then (i) $k\epsilon\ (2, \infty)$ (ii) $k\epsilon\ (-\infty, 2)$ (iii) $k\epsilon\ (4, \infty)$ $k \in (-\infty, 4)$
175	The function $f(x) = x^x$ decreases on the interval **(i)** (0, e) **(ii)** (0 , 1) **(iii)** (0, 1/e) **(iv)** (1/e, e)

ANSWERS

1	C	16	C	31	A	46	D	61	D	76	C	91	B	106	(b)
2	B	17	A	32	B	47	C	62	C	77	D	92	D	107	(b)
3	A	18	A	33	D	48	B	63	D	78	B	93	B	108	(a)
4	A	19	A	34	C	49	B	64	D	79	A	94	B	109	(b)
5	B	20	B	35	C	50	B	65	B	80	D	95	A	110	(b)
6	C	21	A	36	D	51	A	66	C	81	B	96	D	111	(a)
7	A	22	D	37	B	52	A	67	A	82	A	97	A	112	(a)
8	B	23	D	38	B	53	C	68	C	83	D	98	D	113	c
9	D	24	B	39	A	54	B	69	D	84	C	99	C	114	b
10	C	25	D	40	A	55	B	70	D	85	C	100	A	115	d
11	A	26	B	41	D	56	B	71	C	86	D	101	(a)	116	b
12	D	27	D	42	A	57	C	72	C	87	A	102	(d)	117	b
13	B	28	C	43	D	58	A	73	B	88	C	103	(b)	118	b
14	C	29	A	44	B	59	C	74	C	89	C	104	(d)	119	a
15	C	30	B	45	B	60	D	75	A	90	B	105	(b)	120	c

121	b	136	(A)	146	B	161	i
122	a	137	(B)	147	B	162	i
123	b	138	(C)	148	B	163	i
124	a	139	(A)	149	C	164	i
125	a	140	(C)	150	C	165	iv
126	b	141	(D)	151	C	166	iv
127	a	142	(D)	152	C	167	i
128	a	143	(A)	153	A	168	i
129	d	144	(B)	154	D	169	ii
130	a	145	(B)	155	D	170	ii
131	(B)			156	B	171	ii
132	(D)			157	C	172	iv
133	(B)			158	A	173	i
134	(D)			159	B	174	ii
135	(A)			160	C	175	iii

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