QB365 Question Bank Software Study Materials

Applications of Differential Calculus 50 Important 1Marks Questions With Answers (Book Back and Creative)

12th Standard

Maths

Total Marks : 50

50 x 1 = 50

1) The volume of a sphere is increasing in volume at the rate of 3 πcm^3 / sec. The rate of change of its radius when radius is $\frac{1}{2}$ cm

(a) 3 cm/s (b) 2 cm/s (c) 1 cm/s (d) $\frac{1}{2} cm/s$

2) A balloon rises straight up at 10 m/s. An observer is 40 m away from the spot where the balloon left the ground. The rate of change of the balloon's angle of elevation in radian per second when the balloon is 30 metres above the ground.

(a) $\frac{3}{25}$ radians /sec **(b)** $\frac{4}{25}$ radians /sec (c) $\frac{1}{5}$ radians /sec (d) $\frac{1}{3}$ radians /sec

3) The position of a particle moving along a horizontal line of any time t is given by s(t) = 3t^2 -2t- 8. The time at which the particle is at rest is

(a) t = 0 **(b)** $t = \frac{1}{3}$ (c) t =1 (d) t = 3

4) A stone is thrown up vertically. The height it reaches at time t seconds is given by x = 80t -16t^2. The stone reaches the maximum height in time t seconds is given by

(a) 2 **(b) 2.5** (c) 3 (d) 3.5

5) The point on the curve 6y = x^3 + 2 at which y-coordinate changes 8 times as fast as x-coordinate is

(a) (4, 11) (b) (4, -11) (c) (-4, 11) (d) (-4,-11)

6) The abscissa of the point on the curve $f(x) = \sqrt{8 - 2x}$ at which the slope of the tangent is -0.25 ?

(a) -8 **(b) -4** (c) -2 (d) 0

7) The slope of the line normal to the curve f(x) = 2cos 4x at $x = \frac{\pi}{12}$ is

(a) $-4\sqrt{3}$ (b) -4 **(c)** $\frac{\sqrt{3}}{12}$ (d) $4\sqrt{3}$

8) The tangent to the curve y^2 - xy + 9 = 0 is vertical when

(a) y = 0 (b) $y = \pm\sqrt{3}$ (c) $y = \frac{1}{2}$ **(d)** $y = \pm 3$

9) Angle between y^2 = x and x^2 = y at the origin is

(a) $tan^{-1}\frac{3}{4}$ (b) $tan^{-1}\left(\frac{4}{3}\right)$ **(c)** $\frac{\pi}{2}$ (d) $\frac{\pi}{4}$

10) What is the value of the limit $\lim_{x\to 0}\left(\cot x - \frac{1}{x}\right)$ is

(a) 0 (b) 1 (c) 2 (d) ∞

11) The function sin^4 x + cos^4 x is increasing in the interval

(a) $\left[\frac{5\pi}{8}, \frac{3\pi}{4}\right]$ (b) $\left[\frac{\pi}{2}, \frac{5\pi}{8}\right]$ **(c)** $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$ (d) $\left[0, \frac{\pi}{4}\right]$

12) The number given by the Rolle's theorem for the functlon x^3 - 3x^2, x ∈ [0, 3] is

(a) 1 (b) $\sqrt{2}$ (c) $\frac{3}{2}$ **(d) 2**

13) The number given by the Mean value theorem for the function $\frac{1}{x}$, x ∈ [1, 9] is

(a) 2 (b) 2.5 **(c) 3** (d) 3.5

14) The minimum value of the function |3 - x| + 9 is

(a) 0 (b) 3 (c) 6 **(d) 9**

15) The maximum slope of the tangent to the curve $y = e^x \sin x$, x ∈ [0, 2π] is at

(a) $x = \frac{\pi}{4}$ **(b)** $x = \frac{\pi}{2}$ (c) $x = \pi$ (d) $x = \frac{3\pi}{2}$

16) The maximum value of the function $x^2 e^{-2x}, x > 0$ is

(a) $\frac{1}{e}$ (b) $\frac{1}{2e}$ **(c)** $\frac{1}{e^2}$ (d) $\frac{4}{e^4}$

17) One of the closest points on the curve $x^2 - y^2 = 4$ to the point (6, 0) is

(a) (2,0) (b) $(\sqrt{5}, 1)$ **(c)** $(3, \sqrt{5})$ (d) $(\sqrt{13}, -\sqrt{3})$

18) The maximum product of two positive numbers, when their sum of the squares is 200, is

(a) 100 (b) $25\sqrt{7}$ (c) 28 (d) $24\sqrt{14}$

19) The curve $y = ax^4 + bx^2$ with ab > 0

(a) has, no horizontal tangent (b) is concave up (c) is concave down **(d) has no points of inflection**

20) The point of inflection of the curve $y = (x - 1)^3$ is

(a) (0, 0) (b) (0, 1) **(c) (1, 0)** (d) (1, 1)

21) If a particle moves in a straight line according to $s = t^3-6t^2-15t$, the time interval during which the velocity is negative and acceleration is positive is _____

(a) 2 < t < 5 (b) 2 ≤ t ≤ 5 (c) t ≥ 2 (d) t ≤ 2

22) The law of linear motion of a particle is given $s = \frac{1}{3} t^3-16t$, the acceleration at the time when the velocity vanishes is _____

(a) 4 (b) 6 (c) 2 **(d) 8**

23) The point on the curve $y = x^2$ is the tangent parallel to X-axis is _____

(a) (1, 1) (b) (2, 2) (c) (4, 4) **(d) (0, 0)**

24) The equation of the tangent to the curve $y = x^2-4x+2$ at (4, 2) is _____

(a) x + 4y + 12 = 0 (b) 4x + y + 12 = 0 **(c) 4x - y - 14 = 0** (d) x + 4y - 12 = 0

25) The least value of a when f f(x) = x^2 + ax + 1 is increasing on (1, 2) is _____

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

26) The critical points of the function f(x) = $(x-2)^{\frac{2}{3}}(2x+1)$ are _____

(a) -1, 2 (b) 1, $\frac{1}{2}$ **(c) 1, 2** (d) none

27) The function -3x+12 is _____ function on R.

(a) decreasing **(b) strictly decreasing** (c) increasing (d) strictly increasing

28) If x + y = 8, then the maximum value of xy is _____

(a) 8 **(b) 16** (c) 20 (d) 24

29) The statement "If f has a local extremum at c and if f'(c) exists then f'(c) = 0" is _____

(a) the extreme value theorem **(b) Fermat's theorem** (c) Law of mean (d) Rolle's theorem

30) If the rate of change of volume of sphere is equal to the rate of change of its radius, then its radius is equal to _____

(a) 1 unit (b) $\sqrt{2\pi}$ units (c) $\frac{1}{\sqrt{2\pi}}$ units **(d)** $\frac{1}{2\sqrt{\pi}}$ units

31) For what values of x is the rate of increase of $x^3 - 5x^2 + 5x + 8$ is twice the rate of increase of x?

(a) $-3, \frac{-1}{3}$ (b) $-3, \frac{1}{3}$ (c) $3, \frac{-1}{3}$ **(d)** $3, \frac{1}{3}$

32) In a sphere, the rate of change of volume is _____

(a) π times the rate of change of radius (b) Surface area times the rate of change of diameter

(c) Surface area times the rate of change of radius (d) None of these

33) The angle of intersection of the curves $xy = a^2$ and $x^2 - y^2 = 2a^2$ is _____

(a) 0° (b) 45° **(c) 90°** (d) 30°

34) If $f(x) = e^x \sin x$ in $[0, \pi]$ then c in Rolles theorem is _____

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{3\pi}{4}$

35) $\lim_{x\to\infty} \frac{x^2}{e^x} =$ _____

(a) 2 **(b) 0** (c) ∞ (d) 1

36) $\lim_{x\to 0^x} \frac{a^x - b^x}{c^x - d^x}$ is _____

(a) ∞ (b) 0 (c) $\log \frac{ab}{cd}$ **(d)** $\frac{\log\left(\frac{a}{b}\right)}{\log\left(\frac{c}{d}\right)}$

37) The interval of increasing of the function $f(x) = x - c^x + \tan\frac{2\pi}{7}$ is

(a) $(0, \infty)$ **(b)** $(-\infty, 0)$ (c) $(1, \infty)$ (d) $(-\infty, 1)$

38) The function $f(x) = \frac{x}{1+|x|}$ is _____

(a) increasing **(b) decreasing** (c) Neither increasing nor decreasing (d) None of these

39) In the interval (- 3, 3), the function $f(x) = \frac{x}{3} + \frac{3}{x}, x \neq 0$ is _____

(a) Decreasing (b) Increasing (c) Neither increasing nor decreasing (d) None of these

40) The maximum value of $\frac{\log x}{x}$ is _____

(a) 1 (b) $\frac{2}{e}$ (c) 2 **(d)** $\frac{1}{e}$

41) The point on the curve $x^2 = 2y$ which is nearest to the point (0, 5) is _____

(a) $(2\sqrt{2}, 4)$ (b) $(2\sqrt{2}, 0)$ (c) (0,0) (d) (2,2)

42) Identify the true statements in the following

(i) If the curve is symmetrical about the origin, then it is symmetrical about both the axes.

(ii) If the curve is symmetrical abour both the axes, then it is symmetrical about the origin.

(iii) A curve (x, y) = 0 is symmetrical about the line y = x if (x, y) = f(y, x)

(iv) For the curve (x, y) = 0 if (x, y) = (- y, - x), then it is symmetrical about the origin

(a) (i),(iii) (b) (i),(iv) (c) (i),(ii) (d) (ii),(iv)

43) An asymptote to the curve $y^2 (a + 2x) = x^2 (3a - x)$ is _____

(a) x = 3a **(b)** $x = -\frac{a}{2}$ (c) $x = \frac{a}{2}$ (d) x = 0

44) The curve $ay^2 = x^2 (3a - x)$ cuts the y-axis at _____

(a) x = -3a, x = 0 (b) x = 0, x = 3a (c) x = 0, x = a **(d) x = 0**

45) The curve $9y^2 = x^2 (4 - x^2)$ is symmetrical about _____

(a) y-axis (b) x-axis (c) y = x **(d) both the axes**

46) The least possible perimeter (in meter) of a rectangle of area 100 m^2 is _____

(a) 50 **(b) 10** (c) 20 (d) 40

47) If x + y = k is a normal to the parabola $y^2 = 16x$, then the value of k is _____

(a) 3 (b) 6 **(c) 12** (d) 15

48) The slope of the curve $y^3 - xy^2 = 4$ at the point where y = 2 is _____

(a) -2 (b) $-\frac{1}{2}$ **(c)** $\frac{1}{4}$ (d) $\frac{1}{2}$

49) If $y = \log_a x$ then $\frac{dy}{dx}$ is equal to _____

(a) $\frac{1}{a}$ (b) $\frac{1}{x}$ **(c)** $\frac{1}{xloga}$ (d) $\frac{1}{xlogx}$

50) The position of a particle moving along a horizontal line at any time t is given by $s(t) = 5t^2-2t-8$.The time at which the particle at rest is

(a) t = 0 **(b) t = 1/6** (c) t = 1 (d) t = 3