



BK BIRLA CENTRE FOR EDUCATION
SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL



PREMID TERM EXAMINATION (2024-25)

APPLIED MATHEMATICS (241)

Class: XII Commerce
Date: 03/08/24
Admission Number: _____

Duration: 1 Hour
Max. Marks: 25
Roll number: _____

General Instructions:

Question 1 to 5 carries ONE mark each. Questions 6 to 9 carries TWO marks each. Questions 10 to 13 carries THREE marks each.

- The derivative of x^{2x} w.r.t x is:
(A) x^{2x-1} (B) $2x^{2x}\log x$ (C) $2x^{2x}(1+\log x)$ (D) $2x^{2x}(1-\log x)$
- If $x = at^2$, $y = 2at$ then $\frac{dy}{dx}$ is
(A) $\frac{1}{t}$ (B) t (C) $-\frac{1}{t^2}$ (D) t^2
- If the rate of change of area of a circle is equal to the rate of change of its diameter, then its radius is equal to:
(A) π units (B) $\frac{1}{\pi}$ (C) $\frac{\pi}{2}$ (D) 2π
- If $f'(x) = 3x^3 - x^2$, then $f(x)$ is increasing in the interval
(A) $(\frac{1}{3}, \infty)$ (B) $(-\infty, \frac{1}{3})$ (C) $(0, \frac{1}{3})$ (D) *none of these*

Assertion and Reasoning questions: In the following two questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.
- Assertion (A): The function $f(x) = e^{2x}$ is strictly increasing on R.
Reason (R): $f'(x) > 0$ for all real values.
- Differentiate $(x)^{\log x}$ with respect to x .
- Find $\frac{dy}{dx}$ when $\log xy = x^2 + y^2$
- A small stone thrown in to a still pond produces a circular disturbance on the surface of water

whose radius is increasing at the rate of 3.5cm/sec. find the rate at which disturbed area is increasing, when its radius is 7.5cm.

- 9 The total cost $C(x)$, associated with producing and marketing x units of an item is given by: $C(x) = 0.005x^3 - 0.02x^2 + 30x + 5000$. Find the average cost function, the marginal cost function.
- 10 Find the derivative of $(2x+3)^{x-5}$ with respect to x .
- 11 If $e^{y(x+1)} = 1$, show that $\frac{dy}{dx} = -e^y$.
- 12 Total cost for x units of output is given by $C = \frac{x^2}{90} + 2x + 1000$. Find the value of output at which the average cost is minimum. Also, find the minimum value of average cost
- 13 The total cost C producing x units of an item is given by $C = 50 + \frac{3x}{2} + \frac{x^2}{4}$ (in rupees) and the total revenue R received from the sale is given by $R = 300x - \frac{x^2}{2}$ (in rupees). Find the production rate which will maximise profit and the amount of maximum profit.
