B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

MID-APRIL TEST 2026-27
APPLIED MATHEMATICS (241)

Class: XII **Time: 1hr**
Date: 18/04/26 **Max Marks: 25**
Admission no: **Roll no:**

General Instructions:
Question 1 to 7 carries ONE mark each. Questions 8 to 10 carries TWO marks each. Questions 11 to 14 carries THREE marks each.

---

1. 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) $2x^{2x}(1-\log x)$
2. If $x= at^2$, $y= 2at$ then dy/dx is :
   a) 1/t b) t c) $-1/t^2$ d) t^2
3. 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) $\pi unit$ b) $1/\pi$ units c) $\pi/2$units d) 2πunits
4. If the radius of a circle is increasing at the rate of 1.4cm/sec , then the rate of increasing in its circumference is:
   a) 2.8cm/sec b) 4.4cm/sec c) 8.8cm/sec d) 1.4cm/sec
5. Radius of a sphere is increasing at the rate of 2cm/sec. The rate of change of its volume , when its radius is 6cm is:
   a) $288\pi cm^3$/sec b)$8\pi cm^3$/sec c) $12\pi cm^3$/sec d) None of these

In the following 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 but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

6. **Assertion**: The function $f(x) =e^{2x}$ is strictly increasing on R.
   Reason: $f'(x) = > 0$ for all real values of x.
7. **Assertion**: The function $f(x) = (x+2)\, e^{-x}$ is increasing in the interval $(-1,\infty)$.
   Reason: A function f(x) is increasing, if $f'(x) > 0$.
8. Find dy/dx, if $(x^2+y^2)^2 = xy$
9. If $e^y(x+y) =1$, Show that $dy/dx = -e^y$
10. The radius of an air bubble is increasing at the rate of ½ cm per sec. At what rate is the volume of the bubble increasing when the radius is 1cm?
11. Find dy/dx , if $x^y = y^x$.
12. Differentiate $\frac{\sqrt{x}\,(x+4)^{3/2}}{(4x-3)^{4/3}}$.
13. Differentiate: x^x w.r.t xlogx.
14. A ladder 5m long is leaning against a wall. The bottom of the ladder is pulled along the ground , away from the wall at the rate of 2cm/sec. How fast is its height on the wall decreasing when the foot of the ladder is 4m away from the wall?