SECTION - A

$10 \times 2 = 20$

VERY SHORT ANSWER TYPE QUESTIONS

Attempt **ALL** questions. Each question carries **2** marks.

1. If the circle $x^2 + y^2 + ax + by - 12 = 0$ has the centre at (2, 3), then find a, b and the radius of the circle.
2. Find the equation of the sphere that passes through the point (4, 3, – 1) and having its centre at (3, 8, 1).
3. Find the coordinates of the points on the parabola $y^2 = 2x$ whose focal distance is $\frac{5}{2}$.
4. Find the equation of the tangent to the hyperbola $3x^2 - 4y^2 = 12$ which is parallel to the line $y = x - 7$.
5. Find the nth derivative of $f(x) = \log (8x^3 + 36x^2 + 54x + 27)$ for all $x > -\frac{3}{2}$.
6. Find $\int sec^2 x \, cosec^2 x \, dx$.
7. Find $\int e^x \frac{(1+x)}{(2+x)^2} dx$.
8. Find $\int_{-\pi/2}^{\pi/2} \sin^2 x \cos^4 x \, dx$.
9. Find the area under the curve $f(x) = \sin x$ in $[0, 2\pi]$.
10. Form the differential equation corresponding to $y = cx - 2c^2$, where c is a parameter.

SECTION - B

$5 \times 4 = 20$

SHORT ANSWER TYPE QUESTIONS

Attempt **any 5** questions. Each question carries **4** marks.

11. Show that $x + y + 1 = 0$ touches the circle $x^2 + y^2 - 3x + 7y + 14 = 0$ and find its point of contact.