

**King Saud University**  
**Department of Mathematics**  
**M-203**  
**(Differential and Integral Calculus)**  
**Second Mid-Term Examination**  
(II-Semester 1436/1437)

Max. Marks: 25

Time: 90 Minutes

**Note:** All questions carry equal marks

**Q. No: 1** Evaluate the integral:  $\int_0^2 \int_{y^2}^4 y \cos(2x^2 + 1) dx dy.$

**Q. No: 2** Use polar co-ordinate to evaluate the double integral

$$\int_0^2 \int_0^{\sqrt{2x-x^2}} \sqrt{x^2 + y^2} dy dx.$$

**Q. No: 3** A solid is bounded by the graphs of the equations

$$x^2 + y^2 = 1, \quad z = 0, \quad z = 4.$$

Find the **moment of Inertia about** z-axis, if the density at any point of the solid is directly proportional to its distance from the z-axis.

**Q. No: 4** Find the **volume** of the solid in the **first octant** bounded by the graphs of

$$z = x^2 + y^2 \text{ and } y = 4 - x^2.$$

**Q.No: 5** Use **spherical coordinates** to evaluate the integral

$$\int_{-1}^1 \int_0^{\sqrt{1-x^2}} \int_{\sqrt{x^2+y^2}}^1 \sqrt{x^2 + y^2 + z^2} dz dy dx.$$