

DEPARTMENT OF MATHEMATICS
COLLEGE OF SCIENCE
KING SAUD UNIVERSITY
M - 203 (DIFFERENTIAL AND INTEGRAL CALCULUS)
II MID-TERM EXAMINATION (II SEMESTER 1447/1448, 2025/2026)
Time: 90 Minutes Max. Marks: 25

Note: All questions carry equal marks. Use of calculator is not allowed.

Q#1) Evaluate the double integral

$$\int_0^6 \int_{\frac{\pi}{3}}^2 x\sqrt{1+y^3} dy dx$$

Q#2) Find the surface area of the part of the cone $z = \sqrt{x^2 + y^2}$ that is inside the cylinder $x^2 + y^2 = 4x$.

Q#3) Evaluate

$$\iint_R xy dA,$$

where R is the region in the first quadrant bounded by the circles $x^2 + y^2 = 1$, $x^2 + y^2 = 4$ and x and y axes.

Q#4) A homogeneous solid of density δ is bounded by the paraboloid $z = 9 - x^2 - y^2$, the interior of the cylinder $x^2 + y^2 = 4$ and the xy -plane.

Find (a) the mass and (b) the center of the mass.

Q#5) Evaluate the triple integral by changing to spherical coordinates:

$$\int_0^{\sqrt{2}} \int_y^{\sqrt{4-y^2}} \int_0^{\sqrt{4-x^2-y^2}} (x^2 + y^2 + z^2) dz dx dy$$