Q.1 Evaluate the line integrals

(i) \[ \int_C \sqrt{y}dx - \sqrt{x}dy, \] where \( C \) is the portion of the graph of \( xy = 1 \) from \((1, 1)\) to \((2, \frac{1}{2})\).

(ii) \[ \int_C e^x dy + ydx, \] where \( C \) is the portion of the parabola \( y = 1 + x^2 \) from the point \((0, 1)\) to \((1, 2)\).

Answers: (i) \( \sqrt{2} \), (ii) \( \frac{10}{3} \).

Q.2 If \( \mathbf{F} = -yi + xj \), find the work done by the force \( \mathbf{F} \) along the parabola \( y = 2x^2 \) from the point \((-1, 2)\) to \((1, 2)\).

Answer: \( \frac{4}{3} \).

Q.3 Find the work done by the force \( \mathbf{F} = zi + yj + zk \) along the curve \( x = t, y = t^2, z = t^3 \) from the point \((1, 1, 1)\) to \((2, 4, 8)\).

Answer: \( 15 \).

Q.4 Check whether the following integrals are independent of path.

(i) \[ \int_C \frac{1}{2y} (dx - 2dy), \] (ii) \[ \int_C (2x - y)dx - 2xdy, \] (iii) \[ \int_C x\cos ydy - y\sin xdx. \]

Answers: (i) Yes, (ii) Yes, (iii) No.

Q.5 Evaluate the following integrals.

(i) \[ \int_C y \cos(xy)dx + x \cos(xy)dy, \] (ii) \[ \int_0^{2,1} e^{\frac{y}{y^2}}(\frac{1}{y}dx - \frac{1}{y^2}dy). \]

Answers: (i) 1, (ii) \( e^2 - 1 \).

Q.6 Use Green’s theorem to find the area of the region bounded by the graphs of the equations \( y = x^2 \) and \( y^2 = 8x \).

Answer: \( \frac{8}{3} \).