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|  | <p><b>Parul University</b></p> <p>Faculty of Engineering &amp; Technology</p> <p>Department of Applied Sciences and Humanities</p> <p>1<sup>st</sup>Year B.Tech Programme (All Branches)</p> <p>Mathematics-II (303191151)</p> |
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### Tutorial - 3 Multivariable Calculus

Q:1 Evaluate the following integrals:

(i)  $\int_0^1 \int_0^x e^x dy dx$

(ii)  $\int_{-a}^a \int_0^x dy dx$

(iii)  $\int_0^1 \int_{x^2}^{\sqrt{x}} \int_0^3 dz dy dx$

(iv)  $\int_0^{\frac{\pi}{2}} \int_0^{\infty} e^{-r^2} r dr d\theta$

(v)  $\int_0^{\pi} \int_0^{a(1+\cos\theta)} r dr d\theta$

Q:2 Evaluate  $\iint_R f(x, y) dx dy$ , where  $f(x, y) = 1 - 6x^2y$  and  $R: 0 \leq x \leq 2, -1 \leq y \leq 1$ .

Q:3 Evaluate  $\iint_R xy dy dx$ , where  $R$  is the positive quadrant of the circle  $x^2 + y^2 = a^2$ .

Q:4 Change the order of integration in the integral  $\int_0^{\infty} \int_x^{\infty} \frac{e^{-y}}{y} dy dx$  and evaluate it.

Q:5 By changing into polar co-ordinates, evaluate the integral  $\int_0^{2a} \int_0^{\sqrt{2ax-x^2}} (x^2 + y^2) dy dx$ .

Q:6 By changing into polar co-ordinates, evaluate the integral  $\int_0^1 \int_0^{\sqrt{1-y^2}} \sin(x^2 + y^2) dx dy$ .

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