

**J C Bose University of Science and Technology, YMCA**  
**Department of Mathematics**  
**Second Sessional Test – April 2024 (Semester: Second)**  
**Subject: Mathematics II (BSC-106RAI)**  
**B. Tech. (Robotics and Artificial Engineering)**

**Attempt all questions:**

1. Evaluate  $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy dx$  by changing the order of integration. [3][CO1]

2. Evaluate by Green's theorem  $\int_C e^{-x}( \sin y \, dx + \cos x \, dy)$ ,  $C$  being the rectangle with vertices  $(0,0), (\pi,0), (\pi,\pi/2)$  and  $(0,\pi/2)$ . [3][CO1]

3. Solve the equation  $xp^2 - 2yp + x = 0$ , where  $p = \frac{dy}{dx}$ . [5] [CO2]

4. Solve the differential equation  $\frac{d^2y}{dx^2} + a^2y = \sec ax$ , by using the method of variation of parameter. [4] [CO2]