

$$\frac{dy}{dx} - y = 5 \sin x. \tag{1.5}$$

- What is the general form of the Bessel's differential (1.5)equation?
- Find the integrating factor of the following differential equation: (1.5)

$$(x^3 + xy^4) dx + 2y^3 dy = 0.$$

- $(x^3 + xy^4) dx + 2y^3 dy = 0.$ e Green's Thorem. (h) State Green's Thorem.
- (1) Evaluate the integral $\int_{0}^{1} \int_{0}^{2} x(x+y) \, dy \, dx.$ (1.5)
- Find the general solution of the following differential equation:

equation:

$$y = y = (x-a)p - p^{2}, \text{ where } p = \frac{dy}{dx}.$$

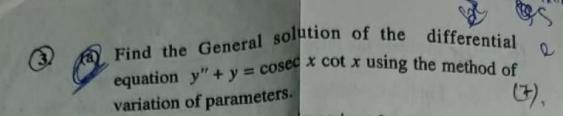
(1.5)

PART-B

$$y = (x-a)p - p^{2}, \text{ where } p = \frac{dy}{dx}.$$

- 2. Evaluate the integral $\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dy dx$ by changing the order of integration.
 - Evaluate the integral $\iint \vec{F} \cdot \vec{n} + ds = y\vec{z} \vec{l} + zx\vec{j} + xy\vec{k}$ and S is part of the surface $x^2 + y^2 + z^2 = 1$, which lies in the first octant. (8)

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Find the series solution in series of power of x of the following differential equation:

$$4x\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0. {(8)}$$

4. (a) Solve the following differential equation:

$$p^2 + 2xp - 3x^2 = 0$$
where $p = \frac{dy}{dx}$.

- Sp.dn (7)

(b) Solve the differential equation:

$$(2x - y)dy + (2y + x) dx.$$
 (8)

Show that the function $u(x, y) = 2x + y^3 - 3x^2y$ is harmonic. Find its conjugate harmonic function v(x, y) and the corresponding analytic function f(z).

(7)

(b) Find the image of the closed half disk

$$|z| \leq 1$$
, Im $z \geq 0$

under the bilinear transformation

$$w = \frac{z}{z+1}.$$

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