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# EX-273

## B.Tech. IIIrd Semester (New Scheme) Inform. Tech. Examination, 2022-23

### Mathematics - II

### Paper - IT-301

**Time : 3 Hours]** **[Maximum Marks : 60**

**Note :-** Attempt any two parts from each questions. All questions carry equal marks.

**1.** (a) Solve the Bernoulli's equation

$$x \frac{dy}{dx} + y - y^2 \log x.$$

(b) Solve : $\frac{d^5y}{dx^5} - \frac{d^3y}{dx^3} = 0$

(c) Solve : $(D^2 + 1)\, y = x^2 . \text{Sin } 2x$

$$\left[ D \equiv \frac{d}{dx} \right]$$

2. (a) Solve : $x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = 0$

given that $x + \frac{1}{x}$ is one integral.

(b) Solve : by using normal form

$$\frac{d^2y}{dx^2} - (2\tan x)\frac{dy}{dx} + 5y = e^x (\sec x).$$

(c) Solve by using method of variation of parameters : -

$$\frac{d^2y}{dx^2} + n^2 y = \text{Sec } n\, x$$

3. (a) Obtain a partical differential equation by eliminating a and b from $z = (a + x)(b + y)$

(b) Solve using Lagrange's method -



I)

$xz(z^2 + xy)p - zy(z^2 + xy)q = x^4$

(c) Solve : $(D_x^2 + D_y^2)z = x^2y^2$

4. (a) If $\vec{v} = x^2z\hat{i} - 2y^3z^2\hat{J} + xy^2z\hat{k}$,

Find curl $\vec{v}$ at (1, –1, 1).

(b) Explain in brief surface and valume integral.

(c) Find the unit normal vector of the cone of revolution

$z^2 = 4(x^2 + y^2)$ at the point (1, 0, 2)

5. (a) Is $f(z) = |z|^2$ an analytic function ? Is it differentiable ?

(b) Evaluate : $\oint_c \frac{z^2+1}{z^2-1} dz$,

$C : |z-1| = 1$

(c) Show that the function $f(z) = \sqrt{xy}$ is not analytic at the origin even though cauchy - Remann equations are satisfied here.

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