Roll No. 2202301078

Total No. of Questions : 5] [Total No. of Printed Pages : 3

# EX-207

## B.Tech. III[rd] Semester (New Scheme) CSE

## Examination, 2022-23

## Engineering Mathematics-II

## Paper - CS-301

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

**Note :-** Attempt all questions. All questions carry equal Marks. Attempt any two from each question.

1. (a) Solve : $y^{II} - (2 \tan x) y^{I} + 5y = (\text{Sec } x).\ e^{x}$ using normal form.

(b) Using method of variation of parameters

Solve $(D^2 + 4)\, y = 4 \tan 2x$.

(c) Solve : $x\frac{d^2y}{dx^2} - (2x-1)\frac{dy}{dx} + (x-1)y = 0$

2. (a) Solve : $\text{Cos}^2 x\left(\frac{dy}{dx}\right) + y = \tan x$

(b) Solve : $(1 + 2\, e^{x/y}) + 2\, e^{x/y}\left(1 - \frac{x}{y}\right)\frac{dy}{dx} = 0$

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

3. (a) Solve : $x^2p^2 + y^2 q^2 = z^2$

(b) Solve : $\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial^2 z}{\partial x \partial y} = \text{Sin } x . \text{Cos} zy$

(c) Solve : $yp = 2yx + \log q$

4. (a) Prove that the function $f(z) = z^2$ is analytic function.

(b) Write the following (without proof) : -

(i) Cauchy - Riemann equations



(ii) Cauchy - Goursat theorem

(iii) Cauchy - integral formula

(c) Evaluate $\int_0^{2+i} (\bar{z})^2\, dz$

along the real axis from $z = 0$ to $Z = 2$ and then along a line parallel to the y - axis from $Z = 2$ to $Z = 2 + i$.

5. (a) Evaluate $\iint_S \vec{F} . \hat{n}\, dS$ where $\vec{F} = yz\,\hat{i} + zx\,\hat{J} + xy\,\hat{k}$ and S is that part of the surface of the sphere $x^2 + y^2 + z^2 = 1$ Which lies in the first octant.

(b) If $\vec{F} = y\,\hat{i} - x\,\hat{J}$, evaluate $\int_C \vec{F} . \vec{dr}$ from (0,0) to (1,1) along the following paths : -

(i) The parabola $y = x^2$

(ii) The straight lines from (0,0) to (1,0) and then to (1,1).

(c) Explain the concept of curl of a vector function. Give its physical interpretation.

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