National Institute of Technology Hamirpur(H.P.)

Mid Term Examination (May 2021)

[Class: B.Tech. (II Semester)]

Title of Course: Engineering Mathematics-II

Course Code: MA-121

Time: One and half hours **Maximum Marks: 30**

Note: All questions are compulsory.

Q1 Determine the orthogonal trajectories of the following system of the curves: (5 marks)

$$r^n = a^n cosn\theta$$

Q2 Solve: $(xy^2 - x^2)dx + (3x^2y^2 + x^2y - 2x^3 + y^2)dy = 0.$ (5 marks)

Q3 Solve: $x - yp = ap^2.$ (5 marks)

Q4 Solve:

$$x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + y = \frac{logx.sin(logx) + 1}{x}.$$

(5 marks)

Q5 Solve the following differential equation by the method of variation of parameters and also verify the solution:

$$\frac{d^2y}{dx^2} + y = tanx$$

(3+2 marks)

Q6 Solve the following simultaneous equations: (5 marks)

$$\frac{d^2y}{dt^2} = 2x - 3y$$

and

$$\frac{d^2y}{dt^2} + \frac{d^2x}{dt^2} = 3y - 5x$$

given that $x = 0, y = 0, \frac{dy}{dt} = 2, \frac{dx}{dt} = 3$ when $t = 0$.

****End of the paper****

*********Best of Luck, Be Honest*********