

DEPARTMENT OF MATHEMATICS
NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

B.TECH FIRST SEMESTER	MID TERM EXAMINATION	TIME ALLOWED: 1 hrs 30 minutes
MATHEMATICS	SEPT- 2017	MAX.MARKS: 30

NOTE: Attempt all questions, all questions carry equal marks.

Q.No. 1. Solve the following differential equations:

(a) $(D^5 + 4D)y = e^{2x} \cos x$

(b) $(1+x)^2 \frac{d^2 y}{dx^2} + (1+x) \frac{dy}{dx} + y = 2 \sin[\log(1+x)]$ (5,5)

Q.No. 2. (a) The currents x and y in a coupled circuit are given by

$$L \frac{dx}{dt} + Rx + R(x-y) = E, \quad L \frac{dy}{dt} + Ry - R(x-y) = 0. \text{ Find } x \text{ and } y \text{ in terms of } t, \text{ given that}$$

$$x = y = 0 \text{ at } t = 0.$$

(b) Solve $x^3 \frac{d^3 y}{dx^3} + 9x^2 \frac{d^2 y}{dx^2} + 18x \frac{dy}{dx} + 6y = \frac{1}{x}$ (5,5)

Q.No. 3. (a) $\frac{dx}{x+y-xy^2} = \frac{dy}{xy^2-x-y} = \frac{dz}{z(y^2-x^2)}$

(b) solve $p^3 - 4xyp + 8y^2 = 0$ (5,5)