

(b) Find inverse Laplace transformation of $(se^{-s/2} + \pi e^{-s}) / (s^2 + \pi^2)$.

7. (a) Using Convolution theorem, find Inverse Laplace

$$\text{transformation of } \frac{s}{(s^2 + a^2)^2}$$

(b) Solve

$$\frac{d^2x}{dt^2} + \frac{dx}{dt} + 5x = e^{-t} \sin t, \quad x(0) = 1, \quad x'(0) = -1,$$

using Laplace transform.

Unit-IV

8. (a) Solve the following differential equation

$$(y + z)p - (z + x)q = (x - y)$$

(b) Solve the equation by Charpit's method

$$(p^2 + q^2)y = qz$$

9. (a) Find the differential equation of all planes which are at a constant distance 'a' from the origin.

(b) Using method of separation of variables,

$$\text{solve } \frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u, \text{ where } u(x, 0) = 6e^{-3x}.$$

B.Tech. 2nd Semester F-Scheme Examination,

May-2018

MATHEMATICS-II

Paper-MATH-102-F

(Common for All Branches)

Time allowed : 3 hours] [Maximum marks : 100

Note: Question No. 1 is compulsory. Attempt total five questions with selecting one question from each unit. All questions carry equal marks.

1. (a) If $\vec{F} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$. Find Div \vec{F} and curl \vec{F}

(b) Show that, if $R = \sin \omega t + B \cos \omega t$, where A, B, ω are constants, then

$$\frac{d^2R}{dt^2} = -\omega^2 R \text{ and } R \times \frac{dR}{dt} = -\omega \times R$$

(c) Solve $pq = p + q$.

(d) Find Laplace transformation of $\frac{e^{-t} \sin t}{t}$

(e) Solve $\frac{\partial^2 z}{\partial y \partial x} = xy$

(f) Solve $\frac{d^2y}{dx^2} + \frac{dy}{dx} = e^{-2x}$