# Birla Institute of Technology & Science, Pilani (Raj.)

**Second Semester 2016-2017, MATH F343 (Partial Differential Equations)**
**Mid Semester Examination (Closed Book)**

**Time: 90 Min.**        **Date: March 07, 2017 (Tuesday)**        **Max. Marks: 60**

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1. Write solution of each question on fresh page.

2. All questions are compulsory and carry equal marks.

3. Write **END** in the answer sheet just after the final attempted solution.

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Q. 1 Construct a partial differential equation of all planes which are at a constant distance from the origin.

Q. 2 Use the method of characteristics to solve the partial differential equation

$$\cos(x + y)z_x + \sin(x + y)z_y = z.$$

Q. 3 The complete solution of the partial differential equation

$$pxy + pq + qy = yz$$

is $z = f(x, y)$. Use Charpit's method to determine $f(x, y)$.

Q. 4 Find the general solution of the partial differential equation

$$(D^3 + D^2 D' - DD'^2 - D'^3)u = e^x \cos(2y).$$

Q. 5 Tranform the partial differential equation

$$yu_{xx} + 3yu_{xy} + 3u_x = 0, \ y \neq 0$$

to canonical form, and hence find its general solution.

Q. 6 Determine the solution of the initial boundary-value problem

$$u_{tt} = 16u_{xx}, \ 0 < x < \infty, \ t > 0$$

$$u(x, 0) = \sin x, \ 0 \leq x < \infty,$$
$$u_t(x, 0) = x^4 e^x, \ 0 \leq x < \infty,$$
$$u(0, t) = 0, \ 0 \leq t < \infty.$$

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