

22/5/18

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This question paper contains 5 printed pages.

Your Roll No. ....

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S. No. of Paper : 6631

Unique Paper Code : 32351202

Name of the Paper : Differential Equations

Name of the Course : B.Sc. (Hons.) Mathematics – I

Semester : II

Duration : 3 hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

All the Sections are compulsory.

Use of non-programmable scientific calculator is allowed.

Section I

1. Attempt any three parts of the following: (5+5+5)

a. Solve the differential equation:  $(2xe^y y^4 + 2xy^3 + y)dx + (x^2 e^y y^4 - x^2 y^2 - 3x)dy = 0.$

b. Find the general solution of the differential equation:  $yy'' + (y')^2 = yy'$ .

c. Solve the differential equation:  $\frac{dy}{dx} = \frac{x - y - 1}{x + y + 3}.$

d. Solve the initial value problem:  $\frac{dy}{dx} = 2xy^2 + 3x^2 y^2, y(1) = -1.$

2. Attempt any two parts of the following: (5+5)

a. A water tank has the shape obtained by revolving the parabola  $x^2 = by$  around the  $y$  axis. The water depth is 4 ft at 12 noon, when a circular plug in the bottom of the tank is removed. At 1 pm, the depth of the water is 1 ft. Find the