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RAJARATA UNIVERSITY OF SRI LANKA

FACULTY OF APPLIED SCIENCES, MIHINTALE

B.Sc. (General Degree) Examination

Second Year – Semester II Examination, March/April 2014

MAP 2203 - DIFFERENTIAL EQUATIONS II

Answer **ALL** questions. Time allowed: **02 hours**

1.

a) Discuss the Frobenius method for solving a second order linear differential equation given , with the usual notations, as

$$a_2(x)\,y'' + a_1(x)\,y' + a_0(x)\,y = 0$$

b) Show that the differential equation $x^2\,y'' - 2\,(x + x^2)\,y' + (x^2 + 2x + 2)\,y = 0$ has a regular singular point at the origin.

c) Find the first three terms of the Frobenius solution around x=0 for

$$x^2\,y'' + e^x y = 0$$

2.

i. Consider the initial value problem of the form, $\frac{dy}{dx} = F(x, y)$; $y(x_0) = y_0$. Discuss the Picard's iteration method for n^{th} approximation $y_n(x)$.

ii. Using Picards method to approximate y when x=0.2, givan that y(0)=1 and

$$\frac{dy}{dx} = x - y$$

iii. Find the approximated sequence(y_n), for the IVP

$y' = 2x(1 + y)$, $y(0) = 0$