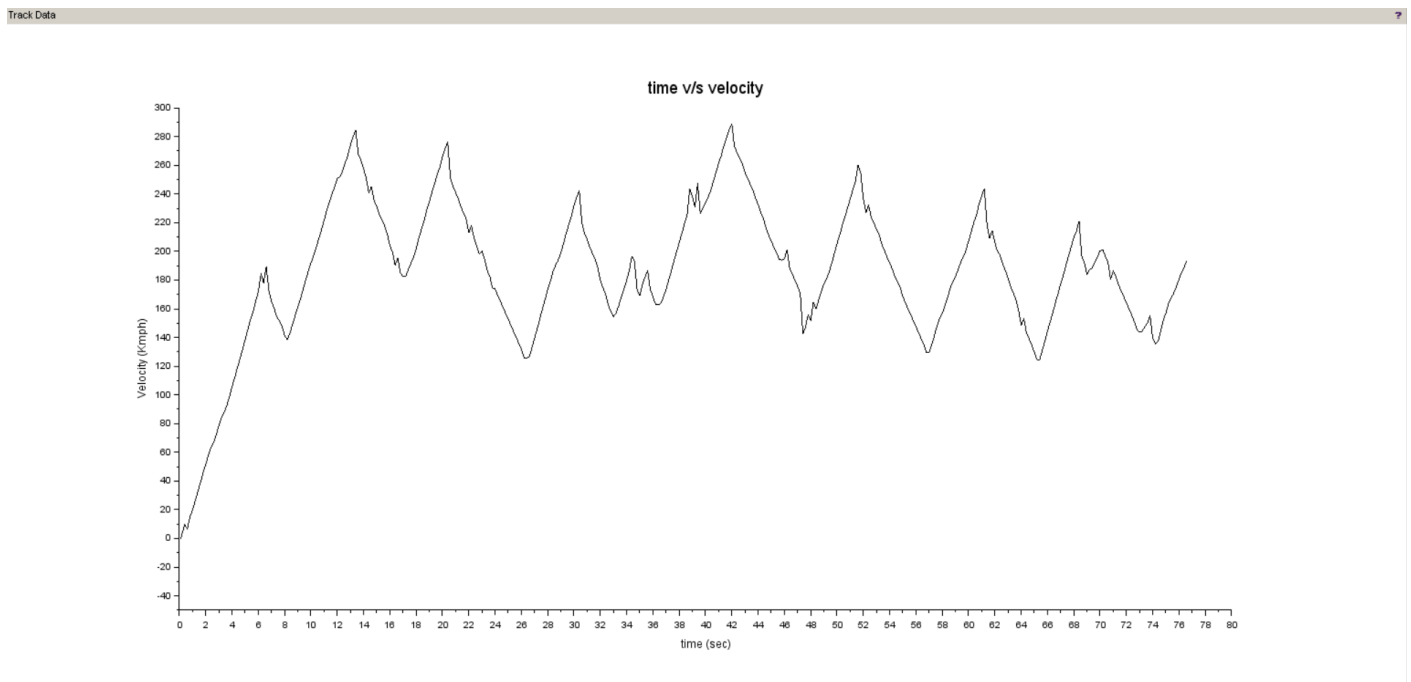| Course name	Numerical Modeling & Simulation in Scilab Xcos
Lesson name	**Numerical Modelling Formula 1 Vehicle Resistive Forces in Scilab-Xcos**
Lesson objective	**Practice blocks & acquaint to use GUI of Scilab-Xcos**
Created by	Nishchay N

Problem statement: Model the Formula 1 Vehicle Resistive Force in Scilab-Xcos to plot the vehicle resistive force. (Track 2)
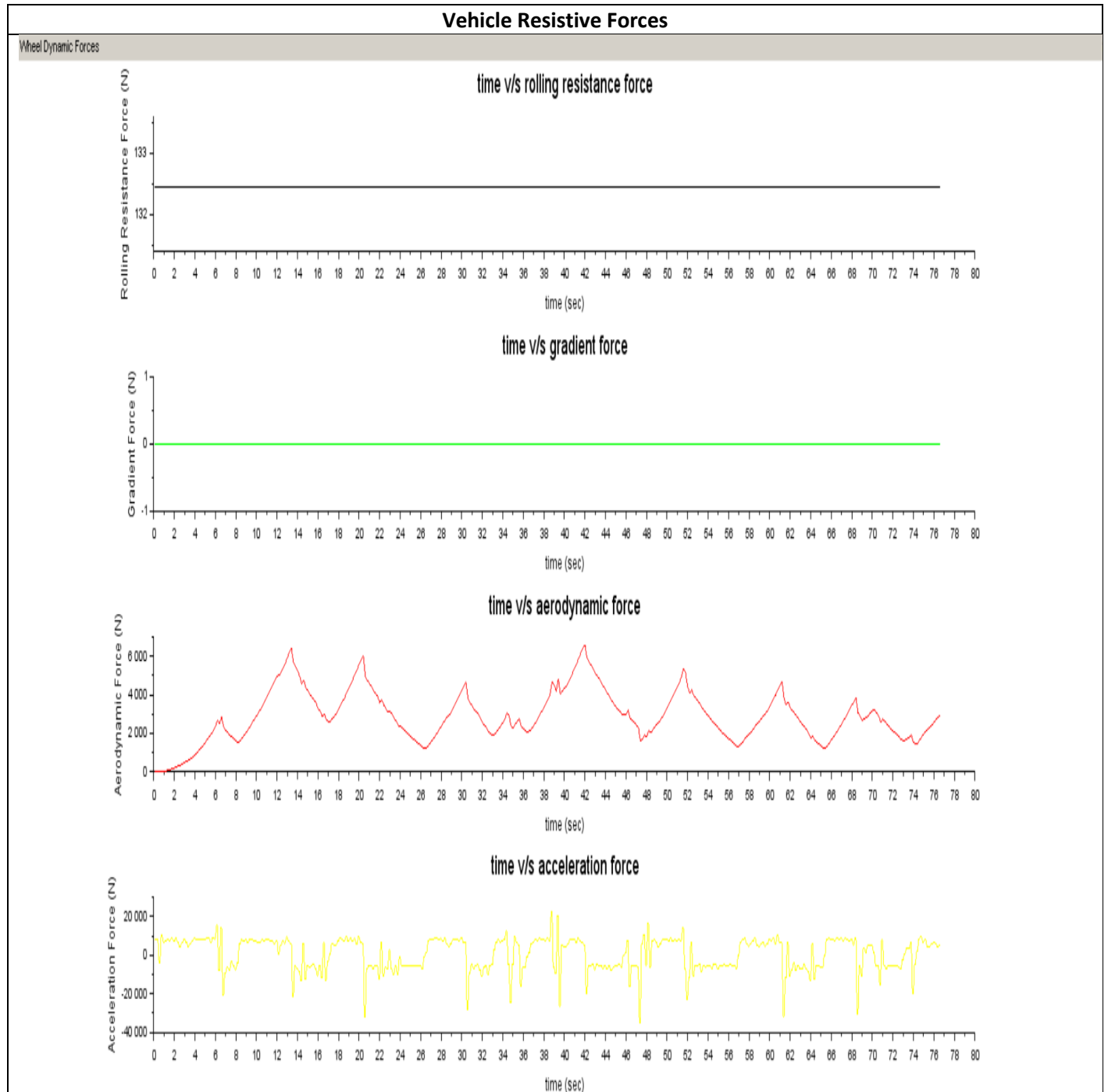
Track Drive Cycle Graph:

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Model Inputs:

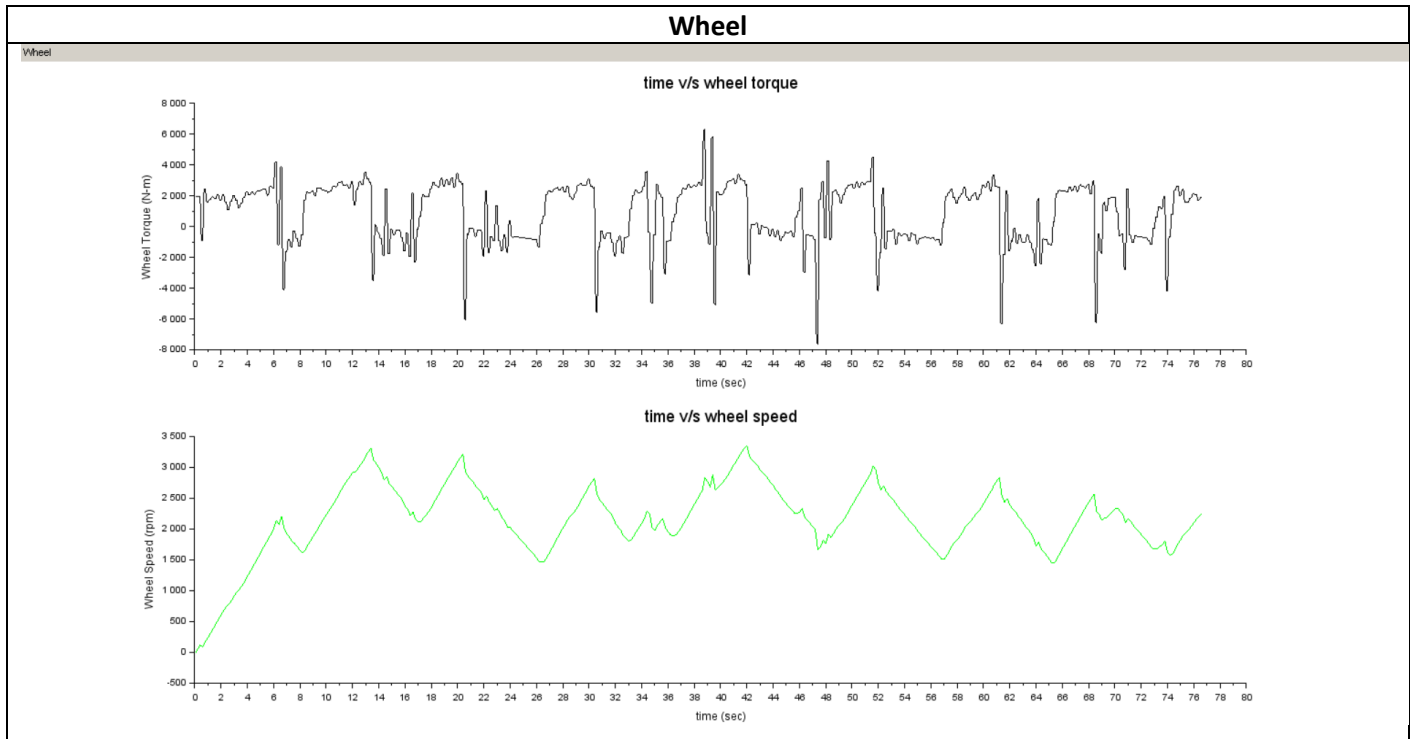| Sl No	Parameter		Value	Units
1.	**Chassis**			
2.	I.	Coefficient of rolling resistance	0.015	
3.	II.	Gross Vehicle Mass	900	Kg
4.	III.	Gravity constant	9.81	m/s
5.	IV.	Grade Angle	0	degree
6.	V.	Area	1.8585	m^2
7.	VI.	Air Density	1.225	Kg/m^3
8.	VII.	Drag Coefficient	0.9	
9.	VIII.	Radius of wheel	0.2286	m

Program:

A. To Import Track Data:	B. To define all input parameters:

// Reading Imports for Track 2
 	
// Form track 2
data = csvRead("Track_1.csv");
Drive.time = data(2:384,1);
Drive.values = data(2:384,2);
	// Data required for Calculation of model
	
	Crf = 0.015 // coeff of rolling resistance
	GVM = 900 // Gross Vehicle Weight in Kg
	g = 9.81 // m/s
	A = 1.8585 // frontal area in m^2
	rho = 1.225 // density of air in kg/m^3
	Cd = 0.9 // Coefficient of Drag
	Rw = 0.2286 // radius of wheel in m

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Results:

Vehicle Resistive Forces

Wheel Dynamic Forces

time v/s rolling resistance force

time v/s gradient force

time v/s aerodynamic force

time v/s acceleration force

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Wheel

Wheel

time v/s wheel torque

time v/s wheel speed

Conclusion:

Sl No	Parameters	Values	Units
1.	**Chassis**		
2.	• Rolling Force	132.435	N
3.	• Gradeability Force	0	N
4.	• Maximum Aerodynamic Force	6596	N
5.	• Maximum Acceleration Force	22900	N
6.	• Maximum Wheel Speed	3351	Rpm
7.	• Maximum Wheel Torque	6337	Nm