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Department	Power Engineering
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Thesis Title	Modeling and Simulation of Photovoltaic Module using Matlab Simulink
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Abstract	Global warming, exhaustion, Depletion and high cost of fossil fuels dictates the exploitation of alternative sources of energy such as Wind and Solar energies. In addition knowledge of the characteristic of photovoltaic PV module is a prerequisite for designing and dimensioning a PV power supply. This is the reason for the development of PV module models useful for electrical applications. This approach allows the development of a high-performance conversion systems balancing system-components and permitting the evaluation of the behaviour of the entire system in various scenarios. Seven variables studying model was proposed in this thesis as a simple method of modelling and simulation of photovoltaic module using MATLAB software package. The method is used to determine the characteristic of PV module and to study the influence of different values of solar radiation at different temperatures concerning performance of PV cells. Taking the effect of Irradiance and temperature and wind speed into consideration as environment effects and 4 inside construction variables Saturation Current , Ideality Factor , Series and Shunt resistances, the output current and power characteristic of photovoltaic module are simulated using the proposed model. The proposed model was found to be better and accurate for any irradiance and temperature variation after comparing the simulation results with the Laboratory measurements results. For the purpose of confirming the accuracy of the results obtained from the Simulink model were compared with laboratory measurements. The results of the comparison show that when change irradiation at constant temperature, the rate differences slight and can be neglected for V_oc but for I_sc variation rate difference showed a percentage of 17% and 31% for P_max this is because that I_sc influenced proportion directly to solar radiation due to the solar meter device efficiency. When studying the effect of temperature variation and compare the results showed that; the laboratory measurements difference between the cell temperature is higher than the ambient temperature by almost 15 ℃ while a Simulink model

	showed rate difference of 26 ℃ at wind speed of 1 m/s, this difference attributed to the lack of devices to measure wind speed in the laboratory to determine the speed of the wind and that was to prove it influential factor on the temperature of the solar panel through fits directly proportional to the rate of heat exchange for the solar panel. The increasing of temperature degree from 25 – 50 ℃ causes decrease in P_max by about 14 % (Temperature coefficient for P_max = - 0.56 % /℃) from Simulink model and by 10 % (Temperature coefficient for P_max = - 0.4 % /℃) from Laboratory measurements also the results showed the comparison between the two models variation ratio of V_oc was by 1.9 % and this can be negligence. The effect of change of environmental parameters on the performance of the internal parameters of the PV panel using Simulink model as for the studied laboratory it is difficult for the fact that these factors prove by the factory and can't be changed, so we compare the results of the laboratory measurements at two temperature degrees 25 and 50 ℃ and compare them to see the effect of increasing the temperature degree on the performance of the PV panel. The proposed model can be very useful for PV engineers, researchers and experts who require a simple, fast and accurate PV simulator to design their systems.