Name: **Enrolment No:**	

UPES

End Semester Examination, May 2024

Course: Modelling and Simulation **Semester: II**

Program: M.Tech (E-Mobility) **Time : 03 hrs.**

Course Code: MEEM 7011 **Max. Marks: 100**

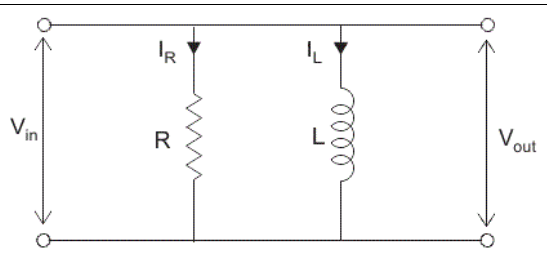
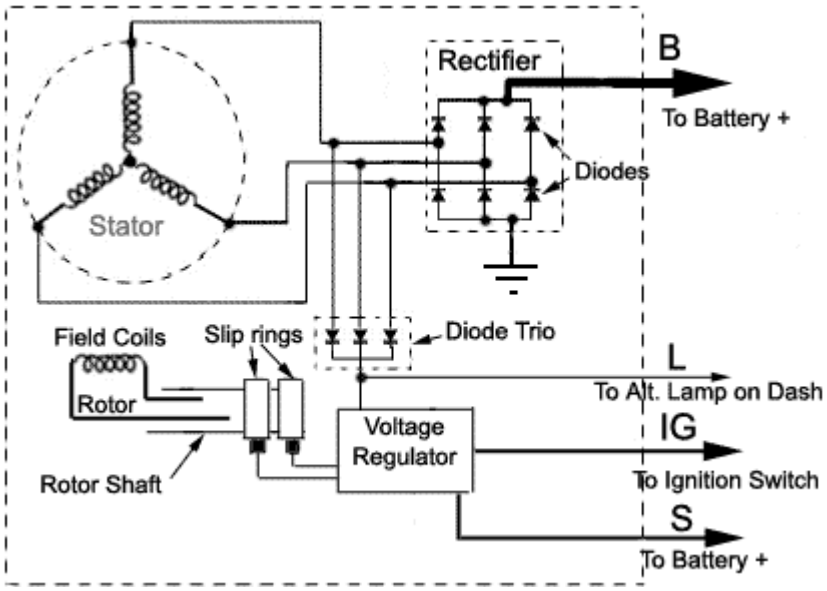
Instructions: Read all the questions carefully. Assume if any data is missing.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Write a MATLAB program to compute n! (Factorial of n) for any integer $n \geq 0$. Use a while loop.	**4**	**CO2**
Q 2	Differentiate Continuous and Discrete Models.	**4**	**CO1**
Q 3	What is PID control? Explain in brief the benefits of P, I, D controller individually.	**4**	**CO2**
Q 4	Differentiate between analog and digital simulations in MATLAB Simulink.	**4**	**CO1**
Q 5	Let y = [1 3 5 7]. Write the MATLAB command for each of the following: a) Add 20 to each element b) Add 2 to just the odd-index elements c) Compute the square root of each element d) Compute the square of each element	**4**	**CO1**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Given the arrays A = [1 2 3 4 5 6 7] and B= [1 3 5] provide the commands needed to a) merge A and B horizontally b) insert the value 10 between A(4) and A(5) c) insert an array [2 4 6] between A(3) and A(4) d) merge A and B vertically	**10**	**CO3**
Q 7	A simple electrical circuit is shown in the figure. Derive an expression for the mathematical model for the system. Write MATLAB program to get results.	**10**	**CO3**

			
Q 8	Suppose a force of 100 Newtons is placed on an object and displaced by 3 meters. Use MATLAB program to compute the work done on the object (W = F d cos α) if the angle between the force and displacement vectors is α = [0; 15; 30; 45; 60; 75] degrees. Write a program to plot the work done versus the angle using a plot program of your choice.	**10**	**CO4**
Q 9	Write a MATLAB program to plot fn (θ) = sin(nθπ) over the interval θ ∈ [−π, π] for n = 1/2, 1, 2. Write command to plot all on the same graph with thick lines of different colors.	**10**	**CO3**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	Identify the circuit shown below and explain the working principle & circuit with suitable waveforms in detail.  OR With the help of neat sketch explain the working principle of three phase induction motor used in EV. Also describe various methods of speed control for induction motor drives.	**20**	**CO4**
Q 11	A liquid level system is shown in the figure where qi and qo are the inflow and outflow rates, respectively. The system has two fluid	**20**	**CO4**

	resistances, R1 and R2, in series. Derive an expression for the mathematical model for the system. Write MATLAB program to get results and plot.