



**MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001
(PUNJAB), INDIA**

(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)

Department: **ELECTRICAL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU

Program: **M Tech Power System**

COURSE ARTICULATION MATRIX

Subject	Sub Code	Sem	Credit	Duration	L T P	CO No.	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
POWER SYSTEM ANALYSIS	MELEE1-101	1	3	40	3 0 0	CO1.	Able to calculate voltage phasor at all buses, given the data using various methods of load flow		3								3	2
						CO2.	Able to calculate fault currents in each phase		3								3	2
						CO3.	Rank various contingencies according to their severity.			3							3	2
						CO4.	Estimate the bus voltage phasor given various quantities viz. power flow, voltages, taps, CB status etc		3								3	2
						CO5.	Estimate closeness to voltage collapse and calculate PV curves using continuation power flow		3	3							3	2
POWER SYSTEM DYNAMICS - I	MELEE1-103	1	2		0 0 4	CO1.	Understand the modeling of synchronous machine in details.				3					1	3	2
						CO2.	Carry out simulation studies of power system dynamics using MATLAB-SIMULINK, MI POWER.					3				1	3	2
						CO3.	Carry out stability analysis with and without power system stabilizer (PSS).		3							1	3	2
						CO4.	Understand the load modeling in power system.				3					1	3	2

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Research Methodology and IPR	MRMIP-101	1	2	28	2 0 0	CO1.	Understand research problem formulation, analyze research related information, Follow research ethics.		3	3					2			3		
						CO2.	Understand that today's world is controlled by computer, information technology, but tomorrow world will be ruled by ideas, concept, and creativity.	3									3			
						CO3.	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.	3										3		
						CO4.	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.	3										3		
Renewable Energy System and Distributed Generation	MELEE1-156	1	3	40	3 0 0	CO1.	Know about various renewable energy sources.	3									3			
						CO2.	Understand the working of distributed generation system in autonomous / grid connected modes.	3										3		
						CO3.	Know the impact of distributed generation on power system	3											3	
Smart Grids	MELEE1-157	1	3	40	3 0 0	CO1.	Appreciate the difference between smart grid & conventional grid.	3	1								3			
						CO2.	Apply smart metering concepts to industrial and commercial installations.	3				3						3	3	
						CO3.	Formulate solutions in the areas of smart substations, distributed generation and wide area measurements.	3			3	2						3	3	
						CO4.	Come up with smart grid solutions using modern communication technologies	3			3	3						3	3	

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						CO4.	Understanding the concept of random variables, functions of random variable and their probability distribution.	3										3					
						CO5.	Understand stochastic processes and their classification	3	3												3		
Pulse Width Modulation for PE Converters	MELJEE1-162	1	3	40	3 0 0	CO1.	Appreciate importance of PWM techniques.	3	3								3	2					
						CO2.	Implement PWM using different strategies.	3			3								3	2			
						CO3.	Control CSI and VSI using PWM.	3			3										3	2	
						CO4.	Compare performance of converter for different PWM techniques		3													2	3
Electric and Hybrid Vehicles e:	MELJEE1-163	1	3	40	3 0 0	CO1.	Acquire knowledge about fundamental concepts, principles, analysis and design of hybrid and electric vehicles.	3	3		3						3	3	2				
						CO2.	To learn electric drive in vehicles/traction	3			3	1								3	3		
English Research Paper Writing	MHUMA0-101	1	0	30	2 0 0	CO1.	Understand that how to improve your writing skills and level of readability	3								3			3				
						CO2.	Learn about what to write in each section.	3									3					3	
						CO3.	Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission	3	3										3				3
Disaster Management	MCIVE0-101	1	0	30	2 0 0	CO1.	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.	3	3								3	3					
						CO2.	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.	3	3	3									3	3			
						CO3.	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	3	3											3	3		
						CO4.	Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in	3	3												3	3	

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Sanskrit for Technical Knowledge	MHUMA0-102	1	0	30	2 0 0	CO1.	Understanding basic Sanskrit language.	3							1	3				
						CO2.	Ancient Sanskrit literature about science & technology can be understood.	3						1	3					
						CO3.	Being a logical language will help to develop logic in students	3		1				1	3					
	Value Education	MHUMA0-103	1	0	30	2 0 0	CO1.	Knowledge of self-development.	3								3			
							CO2.	Learn the importance of Human values.	3							3				
							CO3.	Developing the overall personality	3							3				
Constitution of India	MHUMA0-104	1	0	30	2 0 0	CO1.	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.	3									3			
						CO2.	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India. .	3									3			
						CO3.	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.	3	3									3		
						CO4.	Discuss the passage of the Hindu Code Bill of 1956	3												3
Pedagogy Studies	MHUMA0-105	1	0	30	2 0 0	CO1.	What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?	3									3			
						CO2.	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?	3	3									3	3	1
						CO3.	How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?	3	3		1							3	3	1
Stress Management by	MHU-MA0-	1	0	30	2 0 0	CO1.	Develop healthy mind in a healthy body thus improving social health also.	3		1	1					3				
						CO2.	Improve efficiency	3		1	1						3			

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Personality Development through Life Enlightenment	MHUMA0-107	1	0	30	2 0 0	CO1.	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.	3								3		
						CO2.	The person who has studied Geeta will lead the nation and mankind to peace and prosperity.	3							3			
						CO3.	Study of Neetishatakam will help in developing versatile personality of students.	3							3			
Digital Protection of Power System	MELEE1-205	2	3	40	3 0 0	CO1.	Learn the importance of Digital Relays.	3								3		
						CO2.	Apply Mathematical approach towards protection.				3						3	
						CO3.	Learn to develop various Protection algorithms.				3						3	
Power System Dynamics-II	MELEE1-206	2	3	40	3 0 0	CO1.	Gain valuable insights into the phenomena of power system dynamics including obscure ones.	3									3	
						CO2.	Understand the power system stability problem.		3								3	
						CO3.	Analyse the stability problems and implement modern control strategies.		3								3	
						CO4.	Simulate small signal and large signal stability problems.		2			3					3	2
Mini Project e:	MELEE1-210	2	2		0 0 4	CO1.	Define the objective, formulate the problem and prepare an action plan for conducting the investigation.			3								
						CO2.	Then perform the required Experiment/Develop a Simulation Model/Solve the Problem/Develop a Design/Explore the feasibility/Conduct a survey etc. depending upon the action plan.			3	3	3						
						CO3.	Analyse the results and prepare a written report on the study conducted for presentation to the Department		3						3			
						CO4.	Final seminar, as oral presentation before a departmental committee								3			

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SCADA System and Applications	MELEE1-269	2	3	40	3 0 0	CO3.	To compile and debug a Program	3			3						3				
						CO4.	To generate an executable file and use it	3			3							3			
						CO1.	Describe the basic tasks of supervisory control and data acquisition systems (SCADA) as well as their typical applications.	3											3		
						CO2.	Acquire knowledge about SCADA architecture, various advantages and disadvantages of each system	3												3	
						CO3.	Knowledge about single unified standard architecture IEC 61850	3												3	
						CO4.	To learn about SCADA system components: remote terminal units, PLCs, intelligent electronic devices, HMI systems, SCADA server.	3			3	3									3
Power Quality	MELEE1-270	2	3	40	3 0 0	CO5.	Learn and understand about SCADA applications in transmission and distribution sector, industries etc	3			3						3	1			
						CO1.	Acquire knowledge about the harmonics, harmonic introducing devices and effect of harmonics on system equipment and loads.	3	3	3						3	3	2			
						CO2.	Develop analytical skills needed for modeling and analysis of harmonics in networks and components		3		3								3		
						CO3.	To introduce the students to active power factor correction based on static VAR compensators and their control techniques.			3	3									3	2
Artificial Intelligence Techniques	MELEE1-271	2	3	40	3 0 0	CO4.	To introduce the students to series and shunt active power filtering techniques for harmonics.				3						3	2			
						CO1.	Learn the concepts of biological foundations of artificial neural networks	3									3				
						CO2.	Learn Feedback networks and radial basis function networks and fuzzy logics.	3									3		3		
						CO3.	Identifications of fuzzy and neural networks		3								3		3		
						CO4.	Acquire the knowledge of GA and EP.	3							3		3				

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Dynamics Of Linear Systems	MELEE1-375	3	3	40	3 0	CO1.	To learn linear system modeling, analysis and design so as to obtain the ability to apply the same to engineering problems in a global perspective.	3	3	3	3	1				3	3	2
						CO2.	Knowledge on carrying out detailed stability analysis of both linear and nonlinear systems	3	3			1				3	3	2
						CO3.	Design observers and controllers for linear systems	3			3	1				3	3	3
						CO4.	Acquire knowledge of discrete time linear systems modeling, analysis and design.	3	3	3	3	1				3	3	3
						CO5.	Develop and utilize modern software tools for analysis and design of linear continuous and discrete time systems	3	3		3	3				3	3	3
Business Analytics	MELEE1-391	3	3	40	3 0 0	CO1.	Students will demonstrate knowledge of data analytics.	3	3							3		
						CO2.	Students will demonstrate the ability of think critically in making decisions based on data and deep analytics	3	3								3	
						CO3.	Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.	3			3						3	1
Operations Research	MELEE1-393	3	3	40	3 0 0	CO1.	Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.	1		3								
						CO2.	Students should be able to apply the concept of non-linear programming.	1	2	3								
						CO3.	Students should able to carry out sensitivity analysis.	1	3									
Major Project	MELEE1-412	4	16		0 0 32	CO1.	Execute a meaningful research project that demonstrates spatial thinking and uses the knowledge and skills.	1	2					3			3	
						CO2.	Able to learn effectively record data and experiments so that others can understand them.							3	2			3

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						CO3.	Communicate the findings by means of a thesis, written in the format specified by the department/institute. Each student will be required to complete a Dissertation and submit a written report on the topic on any of the areas of modern technology related to Electrical Engineering including interdisciplinary fields in the final semester of M. Tech Course.								3			3

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - upto 30% 2. Moderate (Medium) – above 30% and upto70% 3. Substantial (High) – above 70%