



Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai 400058



END SEM/RE-EXAM. EXAMINATION MAY/JUNE 2024-25

Program: M. Tech. Civil Engineering (PG) *PEPS. Sem II* Duration: 03 Hrs.

Course Code: OE-MTCM206/MTSE203

Maximum Points: 100

Course Name: Artificial Intelligence in Engineering Semester: II

Notes:

- Attempt **any five** questions.
- Answer to all sub questions should be grouped together.
- **Figure** to right indicates full marks.
- Assume suitable data wherever necessary and state it **clearly**.

Q. No.	Questions	Points	CO	BL	Module
1	(a) Explain the concept of computing and differentiate between soft computing and hard computing. State the advantages and disadvantages of each.	10	1	2	1
	(b) Discuss various applications of artificial intelligence techniques in engineering.	10	2	3	1
2	(a) Define and explain fuzzy logic system. Differentiate between fuzzy sets and crisp sets. Give an example of each.	10	2	3	2
	(b) What is membership function in fuzzy logic? Explain various types with neat diagram and expressions.	10	2	3	2
3	(a) Explain the concept and working of Artificial Neural Networks (ANN). Discuss and explain different types of Neural Networks	10	2	2	3
	(b) Write short notes on: (i) Activation Function in ANN; (ii) Perceptron learning rule	05 05	2	4	3
4	(a) Explain the concept of evolutionary algorithms and discuss Genetic algorithm (GA) and GA operators.	10	2	4	4
	(b) Give details of various applications of GA in engineering.	10	2	3	4
5	(a) What is Genetic Programming (GP)? Differentiate between GA and GP.	10	2	4	4
	(b) What is Data mining? Does learning imply intention?	10	2	4	4



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	Discuss and Explain Classification vs. association rules.				
6	(a) What is a meaning of concept? What do mean by Sparse data, missing values, unbalanced data and output as a Knowledge representation.	10	2	4	5
	(b) Explain the concept of hybrid system of artificial intelligence and its significance in engineering applications.	10	2	4	5
7	Write short notes on the following:				
	(i) Model Tree (MT)	05	2	3	
	(ii) Linguistic variables in Fuzzy Logic	05	2	3	2
	(iii) Supervised vs. Unsupervised learning	05	2	3	3
	(iv) The function set and terminal set in GP	05	2	4	4



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Program: M.Tech. Civil Engineering (PG) / *Elect* Duration: 03 Hrs.

Course Code: OE-MTCM206/MTSE203

Maximum Points: 100

Course Name: Artificial Intelligence in Engineering Semester: II

Notes:

- Attempt **any five** questions.
- Answer to all sub questions should be grouped together.
- **Figure** to right indicates full marks.
- Assume suitable data wherever necessary and state it **clearly**.

14/5/25

Q. No.	Questions	Points	CO	BL	Module
1	(a) Explain soft computing and hard computing. State capabilities of each technique in computing.	10	1	2	1
	(b) What are the examples of artificial intelligence (AI)? Discuss various applications of artificial intelligence (AI).	10	2	3	1
2	(a) What is fuzzy logic in natural language processing (NLP)? How fuzzy logic is used in real life?	10	2	3	2
	(b) What is the difference between fuzzy logic and probability? Explain the concepts of fuzzy sets.	10	2	3	2
3	(a) What is neural network and its function? Explain types of ANN.	10	2	2	3
	(b) Write short notes on: (i) Activation Function in ANN; (ii) Supervised vs. Unsupervised learning	05 05	2	4	3
4	(a) Explain the concept of evolutionary algorithms and discuss Genetic algorithm (GA) and GA operators.	10	2	4	4
	(b) Explain the role of Fitness function and Crossover techniques in GA.	10	2	3	4
5	(a) Write short notes on: (i) Genetic Programming (GP) and its applications (ii) Model Tree (MT)	05 05	2	4	4



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	(b) What is Data mining? Does learning imply intention? Discuss and Explain Classification vs. association rules.	10	2	4	4
6	(a) What do mean by Sparse data, missing values, unbalanced data and output as a Knowledge representation? Explain with an example.	10	2	4	5
	(b) Explain the concept of hybrid system, concept of hybrid system and its significance in general to engineering applications.	10	2	4	5
7	Write short notes on the following:				
	(i) Neural network Architecture	05	2	3	3
	(ii) Linguistic variables in Fuzzy Logic	05	2	3	2
	(iii) Perceptron learning rule	05	2	3	3
	(iv) The function set and terminal set in GP	05	2	4	4



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END/RE EXAMINATION MAY/JUNE 2025



Program: F.Y. M.Tech.

Course Code: PC-MTPX201

Course Name: Power System Dynamics and Control (R23)

Duration: 3 Hour.

Maximum Points: 100

Semester: II

Notes:

1. Question No. 1 is compulsory.
2. Solve any four questions from remaining six.
3. Draw neat diagrams wherever necessary.
4. Assume suitable data if necessary.

25/6/25

Q.No.	Questions	Points	CO	BL	Module No.
Q.1.					
a.	Define rotor angle stability and voltage stability.	5	1,2	1,2	1
b.	Justify the use of Parks transformation in describing the model of synchronous machine.	5	1,2	3	2
c.	Describe equal area criterion for transient stability studies.	5	1,2	1,2	3,4
d.	What are the principal causes of voltage in stability?	5	1,2	1,2	6
Q.2					
a.	Consider $f_{as} = \cos t$ $f_{bs} = \frac{1}{2}t$ $f_{cs} = -\sin t$ Find expressions for f_{qs} , f_{ds} , and f_{0s} Resolve f_{as}, f_{bs} and f_{cs} into the directions of f_{qs}, f_{ds} for $t = \pi/3$ second and $\theta = \pi/4$ radian.	15 05	1,2 1,2	1,2,3 1,2,3	2 2
b.	Transform stationary three phase capacitive element to arbitrary reference frame.				
Q.3.a.	Define steady state and transient stability.	05	1,2	3	4
b.	A 60 Hz synchronous generator having inertia constant $H=9.94$ MJ/MVA and transient reactance of $X_d' = 0.3$ pu is connected to an infinite bus through a purely reactive circuit as shown below. Reactances are marked on the diagram on a common system	15	1,2	3	4

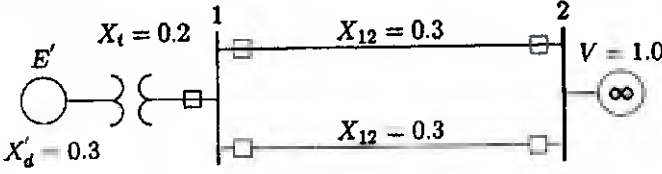
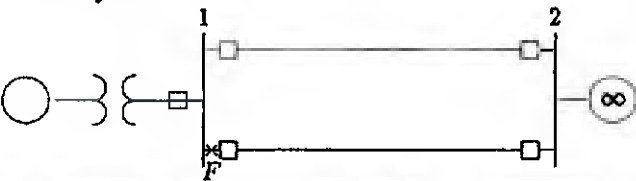
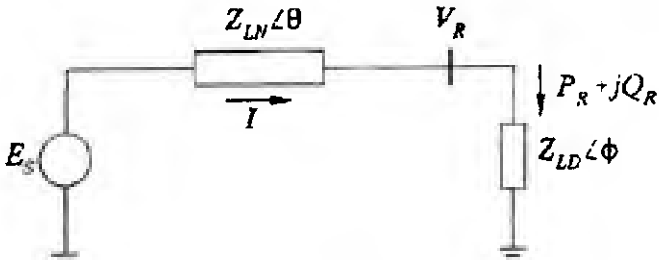


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END/RE EXAMINATION MAY/JUNE 2025

	base. The generator is delivering real power of 0.6 pu , 0.8 power factor lagging to the infinite bus at the voltage of $V = 1$ pu. Assuming the per unit damping power coefficient is $D = 0.138$. Consider a small disturbance of $\Delta\delta = 10^\circ = 0.1745$ radian. Obtain equations describing the motion of rotor angle and generator frequency. 				
Q.4 a.	For the system shown below, 	15	1,2	3,4	5
	Assume that input power is constant. And rotor is steadily operating and delivering power to the system with a power angle δ_0. A three phase fault occurs at the sending end as shown. Analyses the transient stability conditions using Equal area criterion. Derive the all relevant relationships.		1,2	1,2,3	5
b.	Describe synchronous machine model for stability studies.	05			
Q.5. a.	For the simple radial system shown below 	15	1,2	1,2,3	6
	Discuss the various transmission system characteristics by deriving appropriate equations and relevant relationships, using equations and graphical representations, among power system variables explaining the voltage stability phenomenon.				
b.	Discuss any one method for prevention of voltage instability.	05	1,2	1,2	6



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END/RE EXAMINATION MAY/JUNE 2025



Q. 6.	Write short notes on any two. a. High speed fault clearing. b. Steam turbine fast valving c. High speed excitation system d. Power system stabilizers.	10 10 10 10	1,2	1,2	7
Q. 7. a.	Describe the two important aspects in the analysis of voltage stability of a power system.	10	1,2	1,2	6
b.	For the elementary 2 pole, 3 phase, star connected salient pole synchronous machine as shown in Fig. No. 1, write the expressions for machine inductances, voltages and flux linkages.	10	1,2	1,2,3	2

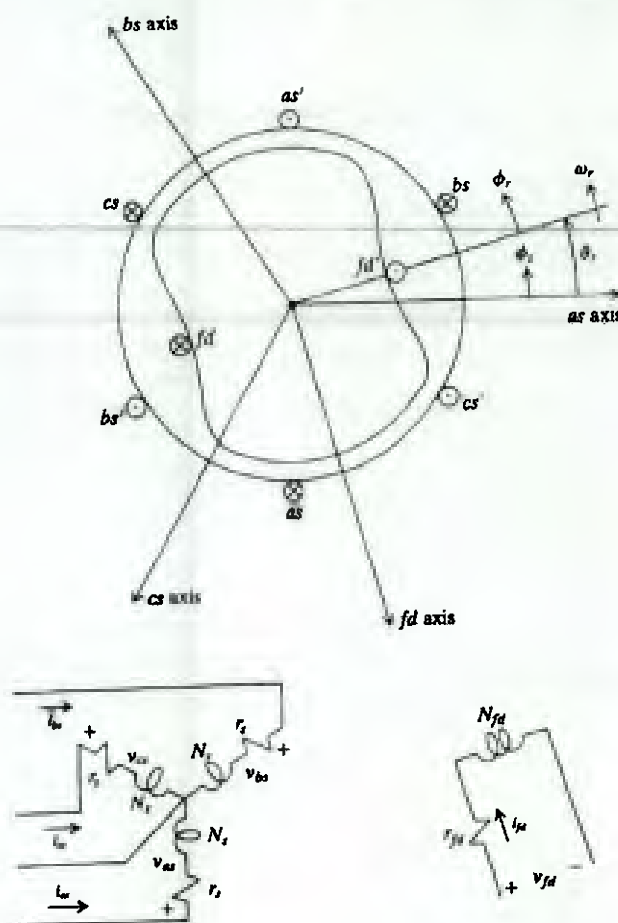


Fig. No. 1



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END SEMESTER MAY 2025



Program: F.Y. M.Tech.

Unit (PQRS) Sem II

Duration: 3 Hour.

Course Code: PC-MTPX201

Maximum Points: 100

Course Name: Power System Dynamics and Control (R23)

Semester: II

Notes:

1. Question No. 1 is compulsory.
2. Solve any four questions from remaining six.
3. Draw neat diagrams wherever necessary.
4. Assume suitable data if necessary.

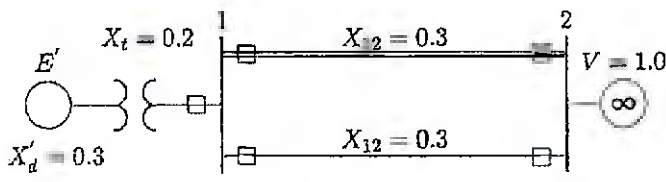
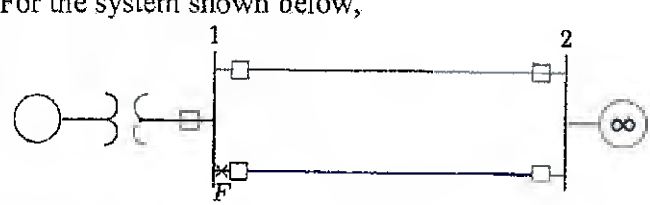
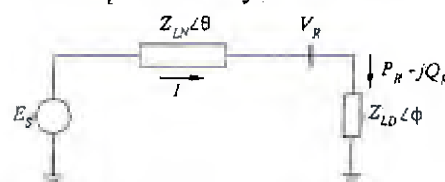
20/5/25

Q.No.	Questions	Points	CO	BL	Module No.
Q.1					
a.	Define rotor angle stability and voltage stability.	5	1,2	1,2	1
b.	Write the expressions for air gap MMF distribution for each phase and resultant if each phase stator phase winding is sinusoidal distributed.	5	1,2	3	2
c.	Describe equal area criterion for transient stability studies.	5	1,2	1,2	6
d.	Describe reduction of transmission system reactance for transient stability enhancement.	5	1,2	1,2	7
Q.2					
a.	Transform stationary three phase resistive, inductive and capacitive element to arbitrary reference frame.	15	1,2	1,2,3	2
b.	Justify the use of Parks transformation in describing the model of synchronous machine.	05	1,2	1,2,3	2
Q.3.					
a.	A 60 Hz synchronous generator having inertia constant $H=9.94$ MJ/MVA and transient reactance of $X_d' = 0.3$ pu is connected to an infinite bus through a purely reactive circuit as shown below. Reactance's are marked on the diagram on a common system base. The generator is delivering real power of 0.6 pu, 0.8 power factor lagging to the infinite bus at the voltage of $V = 1$ pu. Assuming per unit damping power coefficient is $D = 0.138$. Consider a small disturbance of $\Delta\delta = 10^\circ = 0.1745$ radian.	15	1,2	3	4



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END SEMESTER MAY 2025



	Obtain equations describing the motion of rotor angle and generator frequency.				
					
b.	If the generator in the above example is operating in the steady state at $\delta_0 = 16.79^\circ$ when the input power is increased by a small amount $\Delta P = 0.2$ per unit. The generator excitation and the infinite bus bar voltages are the same as before, i.e., $E' = 1.35$ per unit and $V = 1.0$ per unit. Obtain the expression for step response for the rotor angle and the generator frequency.	05	1,2	3	4
Q.4	a. For the system shown below,  Assume that input power is constant. And rotor is steadily operating and delivering power to the system with a power angle δ_0. A three phase fault occurs at the sending end as shown. Analyses the transient stability conditions using Equal area criterion. Derive the all relevant relationships.	15	1,2	3,4	5
b.	Describe synchronous machine model for stability studies.	05	1,2	1,2,3	5
Q.5.	For the simple radial system shown below	15	1,2	1,2,3	6
a.					



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END SEMESTER MAY 2025



b.	Discuss the various transmission system characteristics by deriving appropriate equations and relevant relationships, using equations and graphical representations, among power system variables explaining the voltage stability phenomenon.				
	Describe typical scenario of voltage collapse.	05	1,2	1,2	6
Q. 6.	Write short notes on any two. a. Direct methods of transient stability. b. High speed excitation system. c. Power system stabilizers. d. Steam turbine fast valving	10 10 10 10	1,2	1,2	7
Q. 7.					
a.	Describe the two important aspects in the analysis of voltage stability of a power system.	10	1,2	1,2	6
b.	Transform three phase balance set of abc sequence into arbitrary reference frame and comment on the same for different speed of arbitrary reference frames.	10	1,2	1,2,3	2



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~~END SEMESTER~~ / Re-Exam EXAMINATION ~~MTPE~~ / JUNE 2025

Program: M. Tech. Electrical (PEPS) *sem II*

Duration: 3 Hrs.

Course Code: PE-BTE601 MTPX206

Maximum Points: 100

Course Name: Renewable Energy Sources and Grid Integration

Semester: II

Notes:

1. Question number 1 compulsory.
2. Attempt any **four** questions out of remaining six.
3. Draw neat diagrams.
4. Assume suitable data if necessary.

27/7/25

Q. No.	Questions	Points	CO	BL	Module No.
1.(a)	How to calculate hosting capacity for the transmission and distribution system for connecting distributed renewable energy sources?	10	3	3	07
1.(b)	The hydro-electric power plant consist of following details a. Capacity of hydroelectric power plant = 30 MW b. Elevation difference, $h = 300$ meter c. Maximum flow rate, $Q_{max} = 150 \text{ m}^3/\text{s}$ d. Minimum flow rate, $Q_{min} = 50 \text{ m}^3/\text{s}$ e. Efficiency of turbine-generator unit = $\eta = 0.7 + 0.001Q$ f. Time period = Sinusoidal rate pattern Calculate : 1. Efficiency 2. Power output at maximum and minimum flow rate 3. How to calculate average power output based on capacity of plant.	10	3	2,3	05
2.(a)	Discuss in detail the control strategies used for grid connected residential and industrial solar power plant with the help of following points. 1. Main challenges faced in PV grid integration. 2. Explanation of different control strategies such as Maximum Power Point Tracking (MPPT), voltage control, frequency control and reactive power control.	15	5	3,4	07
2.(b)	Consider a wind turbine with 5m diameter rotor speed of the rotor at 10 m/s, wind velocity is 130 rev./min. and power coefficient at this point is 0.35. Calculate tip speed ratio and torque coefficient of the turbine. What will be the torque available at the rotor shaft? Assume the density of the air to be 1.24 kg/m^3 .	05	2	2	02



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~~END SEMESTER~~ Re-Exam EXAMINATION ~~MAY~~ / JUNE 2025

03	A residential solar PV system is to be designed to power the following electrical loads: <table><tr><th>Sr. No.</th><th>Load Name</th><th>Power on Load (W)</th><th>No. of Load</th><th>Operating Hrs</th></tr><tr><td>1</td><td>LED Light</td><td>9</td><td>6</td><td>6</td></tr><tr><td>2</td><td>Ceiling Fan</td><td>75</td><td>3</td><td>8</td></tr><tr><td>3</td><td>TV</td><td>100</td><td>1</td><td>4</td></tr><tr><td>4</td><td>Refrigerator</td><td>180</td><td>1</td><td>24</td></tr><tr><td>5</td><td>Miscellaneous</td><td>100</td><td>1</td><td>2</td></tr></table> Consider following data 1. The refrigerator operates with a duty cycle of 0.5 2. Efficiency of battery : 90 % 3. Efficiency of Inverter : 95 % 4. Efficiency of charge controller and cables : 85 % 5. Safety factor of inverter : 1.25 6. Assume suitable rating of PV panels and battery Find out 1. PV Array Sizing 2. Battery Bank Sizing 3. Inverter Sizing 4. Charge Controller Sizing	Sr. No.	Load Name	Power on Load (W)	No. of Load	Operating Hrs	1	LED Light	9	6	6	2	Ceiling Fan	75	3	8	3	TV	100	1	4	4	Refrigerator	180	1	24	5	Miscellaneous	100	1	2	20	2,5	4	03
Sr. No.	Load Name	Power on Load (W)	No. of Load	Operating Hrs																															
1	LED Light	9	6	6																															
2	Ceiling Fan	75	3	8																															
3	TV	100	1	4																															
4	Refrigerator	180	1	24																															
5	Miscellaneous	100	1	2																															
4.(a)	Explain in detail the principles of different renewable energy resources (RES) with emphasis on global and Indian statistics. Include relevant graphs to support your explanation.	10	1	1,2	01																														
4.(b)	The Central Electricity Authority (CEA) has established specific grid codes for the integration of renewable energy sources with the electricity grid to ensure stability and reliability. Discuss the key requirements outlined by the CEA for renewable energy generators regarding grid connectivity.	10	2,3	2,3																															
5.(a)	With the help of following points describe how a typical hydropower plant generates electricity. 1. Schematic diagram of hydro power plant 2. Role of the dam 3. Role of reservoir 4. Role of penstock 5. Role of turbine and generator. Also prove that Actual output power = $\eta \times \rho \times Q \times g \times h$	15	1,2	2	05																														



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5.(b)	Describe the different types of hydropower plants and discuss major advantage and disadvantage of each type. (Don't draw diagram)	05	1,2	2	05
6.(a)	What is an MPPT system in a solar PV system? With the help of a flowchart, explain the working principle of the Perturb and Observe (P&O) method and discuss its key advantages and limitations.	10	2,3	3	03
6.(b)	A photo voltaic cell has an open circuit voltage of 0.6V and a short circuit current of 350 A/m ² at a cell temperature of 40 ⁰ C. Calculate the voltage and current density that maximizes the power of the cell. What would be the corresponding maximum power output per unit cell area? What is fill factor of the cell?	10	2,3	2,3	03
7.(a)	With the help of neat diagram Explain the different types of tidal energy systems and their working principles.	10	1	1,2	06
7.(b)	Draw the layout of a flash type geothermal power plant and explain the process of how geothermal energy is harnessed and converted into electricity	10	1	1,2	06



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END SEMESTER / ~~Re-Exam~~ EXAMINATION MAY / JUNE 2025

Program: M. Tech. Electrical (PEPS)

Duration: 3 Hrs.

Course Code: PE-~~ETE601~~ MTPX206.

Maximum Points: 100

Course Name: Renewable Energy Sources and Grid Integration

Semester: II

Notes:

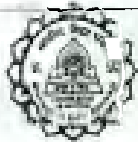
1. Question number 1 compulsory.
2. Attempt any **four** questions out of remaining six.
3. Draw neat diagrams.
4. Assume suitable data if necessary.

26/5/25

Q. No.	Questions	Points	CO	BL	Module No.
1.(a)	Discuss in detail the control strategies used for grid connected residential and industrial solar power plant with the help of following points. 1. Main challenges faced in PV grid integration. 2. Explanation of different control strategies such as Maximum Power Point Tracking (MPPT), voltage control, frequency control and reactive power control.	15	5	3,4	07
1.(b)	A wind turbine system has the following data: Blade Length = 52m Wind Speed = 12 m/s Air density = 1.23 Kg/m ³ Power coefficient = 0.4 Calculate power converted from wind into rotational Energy.	05	1,2	2	05
2.(a)	Describe how a typical hydropower plant generates electricity, including the diagram of the plant and the roles of the dam, reservoir, penstock, turbine, and generator. Also prove that Actual output power = $\eta \times \rho \times Q \times g \times h$	15	1,2	2	05
2.(b)	Consider a wind turbine with 5m diameter rotor speed of the rotor at 10 m/s, wind velocity is 130 rev./min. and power coefficient at this point is 0.35. Calculate tip speed ratio and torque coefficient of the turbine. What will be the torque available at the rotor shaft? Assume the density of the air to be 1.24 kg/m ³ .	05	2	2	02

**END SEMESTER / Re-Exam-EXAMINATION MAY / JUNE 2025**

03	A residential solar PV system is to be designed to power the following electrical loads: <table><tr><th>Sr. No.</th><th>Load Name</th><th>Power on Load (W)</th><th>No. of Load</th><th>Operating Hrs</th></tr><tr><td>1</td><td>LED Light</td><td>9</td><td>4</td><td>6</td></tr><tr><td>2</td><td>Ceiling Fan</td><td>75</td><td>3</td><td>8</td></tr><tr><td>3</td><td>TV</td><td>100</td><td>1</td><td>4</td></tr><tr><td>4</td><td>Refrigerator</td><td>180</td><td>1</td><td>24</td></tr><tr><td>5</td><td>Miscellaneous</td><td>200</td><td>1</td><td>2</td></tr></table> Consider following data 1. The refrigerator operates with a duty cycle of 0.4 2. Efficiency of battery : 90 % 3. Efficiency of Inverter : 95 % 4. Efficiency of charge controller and cables : 90 % 5. Safety factor of inverter : 1.25 6. Assume suitable rating of PV panels and battery Find out 1. PV Array Sizing 2. Battery Bank Sizing 3. Inverter Sizing 4. Charge Controller Sizing	Sr. No.	Load Name	Power on Load (W)	No. of Load	Operating Hrs	1	LED Light	9	4	6	2	Ceiling Fan	75	3	8	3	TV	100	1	4	4	Refrigerator	180	1	24	5	Miscellaneous	200	1	2	20	2,5	4	03
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4.(b)	The Central Electricity Authority (CEA) has established specific grid codes for the integration of renewable energy sources with the electricity grid to ensure stability and reliability. Discuss the key requirements outlined by the CEA for renewable energy generators regarding grid connectivity.	10	2,3	2,3	04																														



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5.(a)	Draw the layout of a flash type geothermal power plant and explain the process of how geothermal energy is harnessed and converted into electricity	10	1	1,2	06
5.(b)	What is an MPPT system in a solar PV system? With the help of a flowchart, explain the working principle of the Perturb and Observe (P&O) method and discuss its key advantages and limitations.	10	2,3	3	03
6.(a)	How to calculate hosting capacity for the transmission and distribution system for connecting distributed renewable energy sources?	10	3	3	07
6.(b)	Explain in detail the principles of different renewable energy resources (RES) with emphasis on global and Indian statistics. Include relevant graphs to support your explanation.	10	1	1,2	01
7.(a)	With the help of neat diagram Explain the different types of tidal energy systems and their working principles.	10	1	1,2	06
7.(b)	A photo voltaic cell has an open circuit voltage of 0.6V and a short circuit current of 350 A/m ² at a cell temperature of 40 ⁰ C. Calculate the voltage and current density that maximizes the power of the cell. What would be the corresponding maximum power output per unit cell area? What is fill factor of the cell?	10	2,3	2,3	03



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(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058



END SEM/RE-EXAMINATION MAY/JUNE 2025

Program: M. Tech (PEPS)

Course Code: PE-MTPX202

Course Name: Smart Grid Technologies

Duration: 03 Hour

Maximum Points: 100

Semester: II

Instructions:

1. Attempt any FIVE questions.
2. Draw neat diagrams wherever possible.

30/6/25

Q.No.	Questions	Points	CO	BL	Module No.
Q. 1(a)	What is the need of smart grid implementation? Discuss the important functions and opportunities of smart grid. Hence, explain CDM opportunities in smart grid.	01+06 +03	01	L-1	01
Q. 1(b)	Explain the different tasks to be performed by home area network (HAN) in smart grid environment. Hence, list the different types of smart appliances used in smart home. Explain the key features of smart appliances in smart grid.	04+ 02+ 04	01	L-1	02
Q. 2 (a)	Explain the role of Plug in Hybrid Electric Vehicle (PHEV) in making greener future. Hence state advantages and disadvantages of PHEV.	04+ 03+ 03	01	L-1	02
Q. 2 (b)	Discuss accurate customer to electrical system model of modern outage management system with block diagram to provide accurate predictions of outage locations.	02+ 08	02	L-1	02
Q. 3 (a)	Explain the significance of smart storage. Hence describe superconducting magnetic energy storage (SMES) and pumped hydro compressed air energy storage with diagram.	02+ 05+ 05	02	L-1	03
Q. 3 (b)	Explain the working of Phasor Measurement Unit with block diagram in detail. State the advantages of PMU over the conventional methods.	06+ 02	02	L-1	03

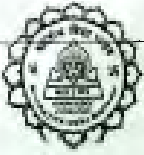


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~~END SEM~~/RE-EXAMINATION MAY/JUNE 2025

Q. 4 (a)	What are the different challenges related to protection of microgrid? Hence explain the various control strategies used in.	04+ 04	03	L-1	04
Q. 4 (b)	Write detail notes on the following by explaining working principle, diagram, advantages, disadvantages and application. (1) Variable speed wind generator. (2) Fuel cells. (3) Microturbines.	04+ 04+ 04	03	L-1	04
Q. 5 (a)	Explain the different power quality issues of grid connected renewable energy sources integrated in Smart Grid. Hence, what is power quality conditioner? Explain different power quality conditioners used in Smart Grid (Any Two).	03+ 01+ 04+ 04	03	L-1	05
Q. 5 (b)	Why power quality audit is necessary in smart grid? Hence explain the various steps followed to conduct power quality audit.	03+ 05	03	L-1	05
Q. 6 (a)	What is the importance of information and communication technology system (ICT) in smart grid environment? Hence, explain Home area network (HAN), neighbourhood area network (NAN), wide area network (WAN) and do their comparative analysis.	02+ 04+ 04+ 04	04	L-1	06
Q. 6 (b)	Explain the following communication protocols/networks used in smart grid. (1) Zigbee (2) Bluetooth (3) Wi-Fi	02+02 +02	04	L-1	06
Q. 7 (a)	Explain the different cloud computing opportunities and challenges. Hence explain cloud based smart meter.	04+ 04+ 02	04	L-1	07
Q. 7 (b)	What are the different security challenges in smart grid system? Hence, explain the solution to smart grid cyber security system.	05+ 05	04	L-1	07



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Course Code: PE-MTPX202

Maximum Points: 100

Course Name: Smart Grid Technologies

Semester: II

Instructions:

1. Attempt any FIVE questions.
2. Draw neat diagrams wherever possible.

Q.No.	Questions	Points	CO	BL	Module No.
Q. 1(a)	What is the need of smart grid implementation? Discuss the important functions and opportunities of smart grid. Hence, explain CDM opportunities in smart grid.	01+ 06+ 03	01	L-1	01
Q. 1(b)	Explain the role of Plug in Hybrid Electric Vehicle (PHEV) in making greener future. Hence state advantages and disadvantages of PHEV from smart grid point of view.	04+ 03+ 03	01	L-1	02
Q. 2 (a)	List the different types of Smart appliances used in smart grid. Explain the key features of smart appliances. Hence, describe the different tasks to be performed by home area network (HAN) in smart grid environment.	02+ 04+ 04	01	L-1	02
Q. 2 (b)	What is GIS? Explain the complete GIS process with flowchart and it's application in different fields. State advantages and disadvantages of GIS.	01+ 02+ 01+ 03+ 03	02	L-1	03
Q. 3 (a)	Explain the working of Phasor Measurement Unit with block diagram in detail. State the advantages of PMU over the conventional methods.	02+ 06+ 02	02	L-1	03
Q. 3 (b)	Explain the significance of smart storage. Hence describe pumped hydro compressed air energy storage with diagram in detail.	02+ 08	02	L-1	03



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Q. 4 (a)	What is the need of microgrid? How microgrid formation takes place? Hence explain different modes of operation of microgrid.	01+ 02+ 05	03	L-1	04
Q. 4 (b)	Write detail notes on the following by explaining working principle with diagram and it's applications. (1) Micro turbine. (2) Thin film solar cell. (3) Fuel cells.	04+ 04+ 04	03	L-1	04
Q. 5 (a)	Why power quality audit is necessary in smart grid? Hence explain the various steps followed to conduct power quality audit.	04+ 04	03	L-1	05
Q. 5 (b)	Explain the different power quality issues of grid connected renewable energy sources integrated in Smart Grid. Hence, what is power quality conditioner? Explain different power quality conditioners used in Smart Grid (Any Two).	03+ 01+ 04+ 04	03	L-1	05
Q. 6 (a)	What is the importance of information and communication technology system (ICT) in smart grid environment? Hence explain the advanced metering infrastructure (AMI) used for Smart Grid in detail. Discuss the wireless mesh network used for smart grid communication.	04+ 04+ 04	04	L-1	06
Q. 6 (b)	Explain Home area network (HAN), neighbourhood area network (NAN), wide area network (WAN) and do their comparative analysis.	02+02 +02+02	04	L-1	06
Q. 7 (a)	What is cloud computing? Hence draw and explain the cloud computing architecture. Explain the solution to smart grid cyber security system.	01+01 +04 04	04	L-1	07
Q. 7 (b)	Explain the different cloud computing opportunities and challenges. Hence explain cloud based smart meter.	04+ 04+ 02	04	L-1	07



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End Semester 2025 Examinations



Program: M Tech
Course Code: AE MTSE 201-202
Course Name: **English For Research Paper Writing**

Duration: **03 hours**
Maximum Points: **100**
Semester: **II**

Note:

- Total Seven Questions
- Question 01 is Compulsory
- Out of remaining 06 questions attempt any four

Sr.No	Questions	Poi nts	CO	BL	Mo dule
Q.1.	Briefly Explain ant two from the following: 1. Evaluation Criteria for Group Discussion 2. Explain why an abstract should be Concise, Clear and Self-Contained. What common mistakes should be avoided while writing an abstract? 3. Difference between editing and Proof reading 4. Define technical report. How is technical report writing different from Academic writing	20	01, 2,3, 4,5	02	01,
Q.2. A	Explain the MAP (Message-Audience-Purpose) framework in academic writing. Provide a paragraph of your own and identify the MAP elements within it.	10	01	L2	01
Q.2. B	Rewrite the following sentences to reflect academic tone with clarity, objectivity, and precision. Explain your changes. Given Sentences a) I think the results are quite good. b) We did this study to check what happens. c).A lot of scientists believe this is important. d) This paper talks about solar panels. e) Our results were very surprising!	10	02	L3	04
Q.3.A	Explain the purpose of the following types of reports based on audience.	10	3	L1	03

	Then explain their structure. a) Memo Report b) Letter Report c) Project Report d) Survey-Based Report				
Q.3.B	Explain how academic proposals differ from technical proposals. Write a short academic proposal outline on the topic: "Reducing Plastic Waste in Academic Campuses."	10	4	L3	03
Q.3.B	Prepare the SWOT analysis of the branch and institute that you are currently studying	10	4	L4	06
Q.4. A.	Write a detailed report for any one of the following situations: 1. You are the chairperson of the maintenance department of Sardar Patel College of Engineering. You are instructed to prepare a report on feasibility of making a boys and girls hostel for SPCE undergraduate and post graduate students with a capacity of 1800 students on the campus along with your recommendations. Write the report in Memo format Note: Mention all the contents in sequence and an outline of points and sub-points of your report as taught in class.	20	1	L6	03
Q.5.A	Describe the process of reading and analyzing a primary research article. Include how to skim, scan, and critically evaluate the content.	10	2	L4	02
Q.5. B	Explain the Interview process in detail. Describe the different types of interviews a candidate has to face.	10	4	L1	06
Q.6.A	Here is a first-hand account of a very good public speaker who trains professionals in public speaking. I train business professionals in public speaking and also in preparing their project proposals and presentations. One day, my friend Mohan called and asked if I could help his boss, Mr. Andrew's who had to speak at the convocation ceremony of an engineering institute in Mumbai. I asked if his boss knew what he wanted to say, and Mohan said yes, but the talk was not developed yet and his boss wouldn't have time to devote to it until the weekend. I learnt from Mohan that Mr. Andrews was really smart but not experienced in speaking to large groups. We set up two meetings with Mr. Andrews- the first to discuss what the	15	5	L3	05

message would be; the second to practice it. I asked for a general summary of what would be said. Mohan replied, 'He is going to say something about today's job market for Engineering graduates due to the impact of pandemic and about its future as well. I was expecting to be briefed by Mohan on the content of his talk.

When I walked for the meeting, the receptionist escorted me into a meeting room off the lobby. Mohan too arrived, handed me his business card, and briefed me on the status of the scripts and slides (a work in progress). Shortly, Mr. Andrews arrived with a handful of wrinkled papers in his hand. They were his notes. He did not know how to connect his computer to the projector, or how to use power point well enough to re-sequencing the slides and add appropriate designs, insert tables and animate the slides where needed. However, his knowledge of contemporary job market was encyclopedic and the rate at which he spoke was supersonic. When I asked questions about his topic so that he could clarify what he wanted to say, and in what order, he was wonderfully patient with my modest understanding of his discipline, and used analogies and metaphors to explain his point-a sign, I think, of a good communicator.

In addition to speaking very fast he did not look me in the eye, and also did not relate what he said to the bar charts on the screen. But he spoke with visceral passion and emphatic verve about the way multinational companies are working these days – and that made up for his other flaws as a speaker. He could lift up his whole body and jump into a keyword with both feet-giving it real meaning and significance.

The challenge, however, was to develop his topic so that the audience would think they were hearing a standard talk about globalization and job markets for fresher's in particular and further developing to talk to strategies to get placed in good companies.

After two meetings, we cut the slides down to 40 and the timing down to One hour. He had no time to rehearse. He promised he would work on it in his hotel room when he arrived in Mumbai. I continued to email him suggestions over the weekend.

I learned from Andrews that he did not rehearse until he was on the plane, and then he stayed up most of the night in a panic working on it. Two days after the event, he called to say it went well, and that me emails helped. I called Mohan to get his assessment, who said it was a little short- much shorter than the presentations made by other speakers. I pointed out that short presentations are not a bad thing- 'For a speech to be immortal, it not be interminable'.

The points Andrews needed to remember were as follows:

1. Get attention of his audience
2. Sustain the attention
3. Make a clear point in a memorable way
4. Be unique in his own way

	5. Persuade people to come to talk to him His job was to generate trust and curiosity among his audience and sustain their interest in his convocation address. Questions: 1. 'Mr. Andrews had not adequately planned and prepared his presentation'. Do you agree or disagree with this statement? Explain in detail the steps that Mr. Andrews needs to work on for planning the presentation. 10 2. What are the factors that Mr. Andrews need to keep in mind regarding the designing of his power point slides his body language, time and word budgeting during presentation. 05				
Q.6.B	Prepare an Introduction to Mr. Andrews's presentation keeping the Delivering effective presentations syllabus topic in mind.	05	5	L2	05
Q.7.A	In response to the advertisement below prepare a 1. Cover Letter and Curriculum Vitae. Exciting Career Opportunity for Core Branch Engineers Company: Larsen & Toubro (L&T) Position: Senior Engineer Core Engineering Roles Eligible Branches: Civil, Mechanical, Electrical Eligible Students: M tech (Batch of 2026) Location: Pan-India Project Sites & Offices What We Offer: Hands-on training on real-world mega projects Opportunity to work with industry experts Career growth in core engineering fields Competitive compensation and benefits Eligibility Criteria: • Currently pursuing MTech in Civil, Mechanical, or Electrical Engineering • Minimum 60% aggregate across academics (B.Tech semesters till date) • Strong technical fundamentals and aptitude for fieldwork Excellent communication and teamwork skills	20	4	L6	07



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End Semester Examination/ ~~Re-Examination~~
May / June-2025

R. Y. M. T. C. P. E. P. S. Sumit
Elect.

Max. Marks: 100

Class: **M.TECH.**

Semester: **II**

Duration: **03 Hours**

Program: **M.TECH (PEPS)**

Name of the Course: **Advanced Control of Electric Drives**

Course Code: **PC-MTPX202**

Instructions:

- Solve Any Five Questions
- Answers to all sub questions should be grouped together
- Figures to the right indicates full mark
- Assume suitable data if required and justify the same.

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Ques. No	Description of question	Max. Marks	CO
Q.1a.	Compare the dynamic model of three phase induction motor in: (i) Three phase system and (ii) Synchronously rotating reference frame.	08	01
Q.1b.	Why the control of separately excited DC motor is easy? How the concept of control of DC motor is used in advanced control of three phase Induction motor.	12	01
Q.2a.	Develop the model of three phase induction motor in stationary reference frame. Draw the equivalent circuit.	10	02
Q.2b.	Compare the rotor flux oriented control and stator flux oriented control of three phase induction motor. (Only phasor diagram and orientation of reference frame is expected) What are the advantages of Rotor Flux Oriented control of three phase induction motor over Stator Flux Oriented control? (Derivations are not expected)	10	02.

Q. 3a.	Prove that the magnitude of output voltage of three phase inverter in sine triangle PWM technique plus third harmonic injection is same as the magnitude of output voltage of space vector modulation technique.	10	03
Q. 3b.	Discuss the synthesis of space vector in SPVM. For space vector modulation technique, derive the expression for switching times (T_1 , T_2 and T_z) over a one sampling time T_s .	10	03
Q.4a.	Draw the block diagram and Discuss the indirect rotor flux oriented control of three phase induction motor.	10	02
Q.4b.	What are the advantages of PM machines? Compare the PMSM and BLDC motor.	10	01
Q.5a.	Discuss the sine-triangle PWM control of three phase inverter. Compare the peak value of phase voltage in sine triangle PWM technique with square wave inverter technique.	10	03
Q.5b.	What are the benefits of control of motor in synchronously rotating reference frame? Draw the schematic diagram of synchronous machine and write the equation of stator, rotor and shaft in synchronous reference frame.	10	03
Q.6a.	What is direct torque control (DTC) of three phase induction motor? Draw the block diagram and explain the implementation of DTC of three phase IM.	14	03
Q.6b.	Compare the Direct Torque Control (DTC) and Field Oriented Control (FOC) of three phase induction motor.	06	03
Q.7a.	What is the working principle and configuration of switched reluctance motor (SRM)? Discuss the control techniques of SRM drive.	10	02
Q.7b.	What is four quadrant operation of separately excited DC motor drive? Discuss the four quadrant operation of SEDC motor drive fed by DC-DC converter.	10	01