



**MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)**  
**B.Tech. VII Semester End Examinations**  
**(Electrical and Electronics Engineering)**  
**(Model Question Paper)**

**MR-21**

**Course Title: Power System Operation and Control**  
Time: 3 hours

**Course Code: EE701PC**  
Max. Marks: 70

*Note: Answer ALL Questions*  
*Part-A (10 x 2 = 20 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	What is the significance of penalty factor in economic dispatch of Generating stations?	2	1	1	1
1. b)	List the assumptions in the analysis of B-loss coefficients?	2	1	1	1
<b>Unit-II</b>					
1. c)	What is the necessity of hydro-thermal scheduling?	2	1	2	1
1. d)	Define short term scheduling of generating units?	2	1	2	1
<b>Unit-III</b>					
1. e)	List the components of speed governor system?	2	1	3	1
1. f)	Classify the control channels in the load frequency control Mechanism.	2	1	3	1
<b>Unit-IV</b>					
1. g)	Define control area?	2	1	4	1
1. h)	What is free-governor operation?	2	1	4	1
<b>Unit-V</b>					
1. i)	Define area control error?	2	1	5	1
1. j)	List the advantages of interconnected systems or power pool Operation.	2	1	5	1

*Part-B (5 x 10 = 50 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	Illustrate the significance of economic dispatch of generating units in electrical engineering?	5	2	1	1
2. b)	Outline the significance of cost function of generation in terms of cost coefficients a, b and c?	5	2	1	1
<b>OR</b>					
2. c)	Derive and analyze the economic operation of n-thermal generating stations considering losses?	5	4	1	3
2. d)	Two thermal generating units are operating in parallel with incremental cost characteristics, Generating unit 1: $\frac{dF_1}{dP_1} = 8 + 0.008P_1$ Rupees Generating unit 2: $\frac{dF_2}{dP_2} = 6.4 + 0.0096P_2$ Rupees The limits of each generating unit is $100 \leq P \leq 625$ MW (i) For economic operation, find $P_1$ and $P_2$ for total load demand of 900 MW? (ii) For economic operation, find $P_1P_2$ for total load demand of 250 MW?	5	2	1	2
<b>Unit-II</b>					
3. a)	Analyze scheduling of energy for power system network consisting of Thermal and hydro generating units?	5	4	2	3
3. b)	Derive and illustrate short term hydro-thermal scheduling by penalty factor method?	5	2	2	1
<b>OR</b>					
3. c)	Illustrate the significance of hydro-thermal scheduling of generating units in electrical engineering?	5	2	2	1

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3. d)	Derive and analyze short term hydro-thermal scheduling by $\gamma - \lambda$ method (neglecting losses)?	5	4	2	3							
<b>Unit-III</b>												
4. a)	Illustrate the load frequency problem in power systems?	5	2	3	1							
4. b)	Analyze P-f control channel and Q-V control channel along with dynamic interaction between the two channels?	5	4	3	3							
<b>OR</b>												
4. c)	Analyze the turbine model and develop its transfer function and block diagram?	5	4	3	3							
4. d)	A 125 MVA turbo-alternator operator on full load operates at 50 Hz. A load of 50 MW is suddenly reduced on the machine. The steam valves to the turbine commence to close after 0.5 s due to the time lag in the governor system. Assuming the inertia to be constant, $H = 6$ kW-sec per kVA of generator capacity, find the change in frequency that occurs in this time?	5	2	3	2							
<b>Unit-IV</b>												
5. a)	Derive and illustrate the dynamic response of single area load frequency control?	5	2	4	1							
5. b)	Derive and analyze the uncontrolled steady state operation of single area load frequency control?	5	4	4	3							
<b>OR</b>												
5. c)	Derive and analyze the integral control of single area load frequency control and prove that change in steady state frequency is zero?	5	4	4	3							
5. d)	Given a single area with three generating units.	5	2	4	4							
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th><i>Unit</i></th> <th><i>Rating (MVA), S</i></th> <th><i>Speed droop R (per unit on unit base)</i></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>100</td> <td>0.010</td> </tr> <tr> <td>2</td> <td>500</td> <td>0.015</td> </tr> <tr> <td>3</td> <td>500</td> <td>0.015</td> </tr> </tbody> </table>					<i>Unit</i>	<i>Rating (MVA), S</i>	<i>Speed droop R (per unit on unit base)</i>	1	100	0.010	2
<i>Unit</i>	<i>Rating (MVA), S</i>	<i>Speed droop R (per unit on unit base)</i>										
1	100	0.010										
2	500	0.015										
3	500	0.015										
The units are loaded as $P_1 = 80$ MW; $P_2 = 300$ MW; $P_3 = 400$ MW. Assume $B = 0$ ; Find the new generation on each unit for a 50 MW load increase? Assume base MVA=1000.												
<b>Unit-V</b>												
6. a)	Derive and analyze the equations for change in frequency ( $\Delta F_1(s)$ ), change in tie-line powers of a two area system, ( $\Delta P_{TL,1}(s)$ , $\Delta P_{TL,2}(s)$ )?	5	4	5	3							
6. b)	Illustrate the significance of interconnected systems in power systems?	5	2	5	1							
<b>OR</b>												
6. c)	Derive and analyze the uncontrolled steady state operation of two area load frequency control?	5	4	5	3							
6. d)	Two interconnected Area-1 and Area-2 have the capacity of 2,000 and 500 MW, respectively. The incremental regulation and damping torque coefficient for each area on its own base are 0.2 p.u. and 0.8 p.u., respectively. Find the steady-state change in system frequency from a nominal frequency of 50 Hz and the change in steady-state tie-line power following a 750 MW change in the load of Area-1?	5	2	5	4							

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome



Course Title: Electrical and Hybrid Vehicles

Time: 3 hours

Course Code: EE713PE

Max. Marks: 70

Note: Answer ALL Questions

Part-A (10 x 2 = 20 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	What is the difference between conventional and electrical vehicle	2	1	1	1
1. b)	What is rolling resistance	2	1	1	2
<b>Unit-II</b>					
1. c)	What is environmental importance of electric vehicle	2	2	2	2
1. d)	Draw series drive train topology	2	1	2	1
<b>Unit-III</b>					
1. e)	What is electric traction	2	1	3	1
1. f)	Write the speed equation of dc series motor	2	1	3	3
<b>Unit-IV</b>					
1. g)	Draw the schematic diagram of Fuel cell	2	1	4	4
1. h)	What is super capacitor	2	2	4	1
<b>Unit-V</b>					
1. i)	What is the advantage of energy management strategies	2	1	5	2
1. j)	What is the unit of energy rating of a battery	2	1	5	1

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	Explain the performance issues of electric vehicle	5	2	1	1
2. b)	Illustrate the power source characterization of electrical vehicle	5	2	1	1
<b>OR</b>					
2. c)	Illustrate the mathematical models to describe vehicle performance	5	2	1	2
2. d)	Explain about transmission characteristics of power within the electric vehicle	5	3	1	3
<b>Unit-II</b>					
3. a)	Explain historical development of hybrid electric vehicles	5	4	2	2
3. b)	Explain environmental impact and importance of hybrid electric vehicles	5	2	2	1
<b>OR</b>					
3. c)	Explain parallel drive train topology with power flow diagram	5	2	2	4
3. d)	What is the purpose and importance of fuel efficiency of hybrid electric vehicle	5	3	2	6
<b>Unit-III</b>					
4. a)	Explain power floe control in series-parallel electric drive train topology	5	2	3	1
4. b)	Illustrate various electrical components used in hybrid and electric vehicles	5	4	3	2
<b>OR</b>					
4. c)	How does induction motor drives are used in electric vehicles	5	5	3	1
4. d)	What is the configuration and control of Permanent magnet motor drives in electric vehicles	5	2	3	2
<b>Unit-IV</b>					
5. a)	What are the various battery based energy storage systems used in electric vehicles	5	2	4	3

5. b)	Illustrate the advantages of hybridisation of different energy storage devices		2	4	1
<b>OR</b>					
5. c)	Explain the principle of operation super capacitor based energy storage system	5	3	4	2
5. d)	Explain the procedure for sizing the propulsion motor and appropriate power electronic devices	5	4	4	1
<b>Unit-V</b>					
6. a)	What are various energy management strategies used in hybrid and electric vehicles	5	2	5	12
6. b)	Illustrate the classification of different energy management strategies	5	4	5	1
<b>OR</b>					
6. c)	Explain the design procedure of Hybrid electric vehicle	5	2	5	2
6. d)	Explain the design procedure of Battery electric vehicle	5	2	5	3

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MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)  
B.Tech.VII Semester End Examinations  
(Electrical and Electronics Engineering)  
(Model Question Paper)

MR-21

Course Title: Power Quality and FACTS  
Time: 3 hours

Course Code: EE714PE  
Max. Marks: 70

Note: Answer ALL Questions  
Part-A (10 x 2 = 20 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	Write short notes on electrical transient with example.	2	3	1	1
1. b)	What are the difference between voltage sag and swell in power system?	2	2	1	2
<b>Unit-II</b>					
1. c)	What is the significance of reactive power in AC transmission lines.	2	4	2	3
1. d)	What are the advantages of placing reactive power compensation at the mid-point of an AC line?	2	2	2	3
<b>Unit-III</b>					
1. e)	List the voltage source converter type FACTS controllers.	2	2	3	5
1. f)	What are the primary objectives of static shunt compensation?	2	2	3	3
<b>Unit-IV</b>					
1. g)	Draw the operating characteristics of TCSC.	2	2	4	3
1. h)	Define a variable impedance type series compensator.	2	1	4	1
<b>Unit-V</b>					
1. i)	What is combined compensator?	2	3	5	1
1. j)	Why is the UPFC considered a versatile device?	2	5	5	5

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	Describe the different types of waveform distortions and their causes.	5	2	1	1
2. b)	Explain the phenomena of under voltage, over voltage and sustained interruptions in long duration voltage variations in power system. Discuss the causes, and effects on equipment.	5	2	1	2
<b>OR</b>					
2. c)	Explain the different categories of transients in power distribution systems by considering typical spectral content, duration and voltage magnitude.	5	1	1	2
2. d)	Explain the phenomena of sags, swells, and interruptions under short duration voltage variations in power system. Discuss the causes, and effects on equipment.	5	3	1	2
<b>Unit-II</b>					
3. a)	Analyze the impact of uncompensated transmission lines. What are the consequences of not using reactive power compensation?	5	4	2	2
3. b)	Explain about reactive power compensation at the mid-point of an AC transmission line. How does it enhance system performance?	5	1	2	1
<b>OR</b>					
3. c)	Compare and contrast shunt and series compensation in AC transmission systems.	5	2	2	2
3. d)	Analyze the effects of shunt compensation on voltage regulation and power transfer capability in AC transmission lines.	5	2	2	3
<b>Unit-III</b>					
4. a)	Explain the various methods of controllable VAR generation.	5	3	3	2
4. b)	Explain the operation and characteristics of a Static Var Compensator (SVC).	5	4	3	1

P.T.O.

<b>OR</b>					
4. c)	Discuss the operation and characteristics of a Fixed Capacitor – Thyristor Controlled Reactor (FC–TCR).	5	2	3	3
4. d)	Discuss the basic operating principle and characteristics of a STATCOM.	5	2	3	2
<b>Unit-IV</b>					
5. a)	Explain the operating principle and power-angle characteristics of SSSC with a neat sketch.	5	2	4	1
5. b)	What are the importance of external control in series compensators?	5	1	4	2
<b>OR</b>					
5. c)	Discuss the objectives of series compensation in power systems. How does series compensation improve power transfer capability and system stability?	5	6	4	3
5. d)	Compare the differences between TCSC and TSSC in terms of their operation, control, and effectiveness in series compensation.	5	4	4	2
<b>Unit-V</b>					
6. a)	Analyze the conventional control capabilities of a UPFC. How does it regulate voltage, power flow, and improve system stability?	5	2	5	5
6. b)	What is UPFC? Explain its principle of operation and characteristics.	5	3	5	3
<b>OR</b>					
6. c)	Discuss the benefits of using UPFC for independent control of real and reactive power in transmission networks.	5	5	5	3
6. d)	Compare the UPFC with other FACTS devices in terms of functionality and control capabilities. What makes the UPFC unique?	5	2	5	2

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MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)  
B.Tech.VII Semester End Examinations  
(Electrical and Electronics Engineering)  
(Model Question Paper)

MR-21

Course Title: Python Programming (Open Elective – III)  
Time: 3 hours

Course Code: CS7210E  
Max. Marks: 70

Note: Answer ALL Questions  
Part-A (10 x 2 = 20 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	State two features of Python	2	1	1	1
1. b)	How to perform adding operations on lists?	2	1	1	1
<b>Unit-II</b>					
1. c)	Name a built-in function in Python that can be used to find the maximum value in a list.	2	1	2	1
1. d)	How do you check if a key exists in a dictionary using an operator?	2	1	2	1
<b>Unit-III</b>					
1. e)	What is the difference between try-except and try-finally?	2	1	3	1
1. f)	How do you import modules into your code?	2	1	3	1
<b>Unit-IV</b>					
1. g)	How can you add a new attribute to a class after it's been defined in Python?	2	1	4	1
1. h)	What is the relationship between a class and an object?	2	1	4	1
<b>Unit-V</b>					
1. i)	What is a web crawler?	2	1	5	1
1. j)	Name a popular GUI toolkit for Python that is included with the standard library.	2	1	5	1

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	Discuss some commonly used built-in types, standard type operators, built-in functions in python.	5	2	1	1
2. b)	<pre>age = int(input("Enter your age: ")) print("You are", age, "years old.")</pre> Explain the above code	5	1	1	1
<b>OR</b>					
2. c)	Write a Python program that asks the user for their name and then greets them with a personalized message.	5	1	1	1
2. d)	Write down Bitwise Operators with example.	5	2	1	1
<b>Unit-II</b>					
3. a)	What is a string? List and discuss in detail about the built-in functions for python strings.	5	2	2	1
3. b)	Explain various operators and built-in functions related to list and tuples in python.	5	2	2	1
<b>OR</b>					
3. c)	Explain the difference between the in and get() methods when accessing elements in a dictionary.	5	2	2	1
3. d)	Explain the difference between the append() and extend() methods in Python lists.	5	2	2	3
<b>Unit-III</b>					
4. a)	How various exceptions are detected and handled in python?	5	3	3	1
4. b)	Discuss various statements and methods used for exception handling in python using sample script.	5	2	3	1

P.T.O.

<b>OR</b>					
4. c)	Create a list of n numbers whose numbers come from user input and determine their mean. Use floating point division to obtain accurate result. Use exception Handling here.	5	3	3	1
4. d)	How do you call a function in python? Give example.	5	2	3	1
<b>Unit-IV</b>					
5. a)	With an example script demonstrate the following methods of file object in python: a) file.next() b) file.truncate() c) file.fileno() d) file.flush().	5	2	4	2
5. b)	Prompt for a number N and file F, and display the first N lines of F.	5	2	4	1
<b>OR</b>					
5. c)	Write a program to compare two text files. If they are different, give the line and column numbers in the files where the first difference occurs	5	3	4	2
5. d)	Illustrate the following file methods: readline, readlines, tell, seek.	5	1	4	1
<b>Unit-V</b>					
6. a)	Outline the five main steps that are required to get your GUI application up and running.	5	1	5	2
6. b)	Discuss any five Tk widgets used in GUI programming.	5	1	5	1
<b>OR</b>					
6. c)	Discuss on modules and importing modules?	5	1	5	2
6. d)	Explain the concept of event handling in Tkinter.	5	1	5	1

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome