

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Second Semester

Power Systems Engineering

PS4005 - Wind and Solar Energy Systems

Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

PART - A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Give the importance of wind characteristics in energy conversion.	UN	1	2
2.	Define Betz's limit in wind energy conversion.	RE	1	2
3.	Compare real and reactive power.	UN	2	2
4.	Write the significance of synchronized operation of wind generator with grid.	UN	2	2
5.	State the function of a solar cell in PV panel.	UN	3	2
6.	Name the semiconductor materials used in PV cells.	RE	3	2
7.	Give the use of string inverters in PV systems.	RE	4	2
8.	List the advantages and disadvantages of solar photovoltaic energy.	RE	4	2
9.	Classify the types of hybrid renewable energy systems.	RE	5	2
10.	Specify the grid related challenges in wind energy absorption.	UN	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a Describe the fundamental principles of wind energy conversion and discuss the major components of a wind energy conversion system in detail. Or	AP	1	13
	b Derive the expression for power generated by wind and explain the key factors affecting the efficiency of wind energy conversion.	AP	1	13
12.	a Discuss the operation principle of doubly fed induction generators in detail. Or	AN	2	13
	b Explain the controllers used for wind driven self excited systems and capacitor excited isolated systems.	AN	2	13
13.	a i Explain the structure and working principles of a PV cell in detail.	AN	3	9
	ii Explain the effect of irradiance and temperature on PV system performance.	AN	3	4
	Or			
	b Discuss the equivalent circuit models of PV systems and the characteristics of solar cells under various conditions.	AN	3	13

14.	a	Explain the design and working principle of a photovoltaic energy conversion system.	AP	4	13
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Or

	b	Describe the phenomenon of power conditioning and storage arrangement in photovoltaic energy conversion system.	AP	4	13
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15.	a	Describe the operation, control and technical issues of wind generated electrical energy in detail.	AN	5	13
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Or

	b	Describe the solar energy storage system and their economic aspects in detail.	AN	5	13
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*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>		<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a	Discuss the role of MPPT in PV systems and describe the methods used to realize in solar power generation.	AP	4	15
		Or			
	b	Discuss the applications of solar photovoltaic systems as solar cars and building-integrated PV systems.	AP	5	15