KUMARAGURU
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Register Number:……

M.E DEGREE EXAMINATIONS: JUNE 2018

(Regulation 2015)

Second Semester

POWER ELECTRONICS AND DRIVES

P15PETE08: Power Electronics In Wind And Solar Power Conversion

COURSE OUTCOMES

CO1: Choose a power converter for the control and conversion of wind and solar energy.

CO2: Use the skills, modern engineering tools necessary for engineering practice.

CO3: Design a system, component or process to meet desired needs.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A): A solar cell is made up of silicon. CO2 [K_1]
   Reason (R): Bandgap of silicon falls in the visible spectrum, so it is able to absorb much of the light that hits the Earth's surface.
   a) Both A and R are Individually true and R is the correct explanation of A
   b) Both A and R are Individually true but R is not the correct explanation of A
   c) A is true but R is false
   d) A is false but R is true

2. The wind speed at which a wind turbine starts to operate is called _____. CO2 [K_1]
   a) Cut-in speed
   b) Cut-out speed
   c) Down speed
   d) Up speed

3. Solar radiation received on the earth's surface without change in direction, is called _____. CO2 [K_1]
   a) Beam radiation
   b) Diffuse radiation
   c) Total radiation
   d) Global radiation

4. Match List I with List II. CO1 [K_2]

List I	List II
A. Furnace	i. check alignment
B. motors	ii. Provide temperature controllers
C.Drives	iii. Use variable speed drives for large variable load
D. compressors	iv. Use a synthetic lubricant

	A	B	C	D
a)	Ii	i	iii	iv
b)	Iii	iv	ii	i
c)	Ii	iv	iii	i
d)	Iii	i	ii	Iv

5. Assertion (A): Use of offshore wind turbines are expensive. CO2 [K_1]
Reason (R): They need specific technology for construction and maintenance.

a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

6. The ratio between the tangential speed of the tip of a blade and the actual speed of the wind is called _____. CO1 [K_1]

a) Efficiency
b) Tip speed ratio
c) Power coefficient
d) Pitch angle

7. Which of the following statements are true with respect to doubly fed induction generator (DFIG)? CO2 [K_2]

1. These are wound rotor induction generators.
2. These have the ability to get ride through fault by its uninterruptable operation.
3. These have poor controllability over active and reactive power.

a) 1,3
b) 1 only.
c) 1,2
d) 2,3

8. Temperature coefficient of a particular type panel is -0.5%. These panels are installed and meet the demand of the following cities, CO1 [K_2]

Ooty, Coimbatore, Chennai, Trichy. During may month which city generates the maximum power?

a) Ooty
b) Trichy
c) Coimbatore
d) Chennai

9. Wind velocity required to produce wind power is CO1 [K_1]

a) 10m/s
b) 20m/s
c) 3m/s
d) 15m/s

10. Arrange energy consumption of the following sources in Tamil Nadu from maximum to minimum. CO1 [K_2]

1. Wind
2. Coal
3. Hydro
4. Nuclear

a) 2-3-1-4
b) 1-3-2-4
c) 3-4-2-1
d) 4-1-3-2

PART B (10 x 2 = 20 Marks)

11. Write the needs to promote renewable energy technologies. CO1 [K_2]
12. State the reasons for Tamilnadu leads in wind power generation. CO2 [K_2]
13. Is solar energy eco-friendly? Justify your answers. CO1 [K_2]
14. Define solar constant. CO2 [K_1]
15. List out the various classifications of WECS. CO2 [K_1]
16. What are the various types of generators used in wind energy conversion system? CO1 [K_1]
17. Draw the electrical connection of the wind farm with the grid. CO2 [K_2]
18. What is line commutated inverter? State its advantages. CO2 [K_L]
19. What is hybrid systems? Draw its structure. CO3 [K_1]
20. List the factors on which the battery sizing depends. CO2 [K_2]

PART C (6 x 5 = 30 Marks)

21. What are the measures taken by world energy council and India to reduce emission level? CO1 [K_2]

22.	Explain the working of any two types of solar cells.	CO2	[K_1]
23.	With neat block diagram explain the principle of operation of wind energy conversion system.	CO1	[K_2]
24.	Explain the grid related problems and its causes.	CO2	[K_2]
25.	Draw the circuit diagram of diode clamped multilevel inverter and mention its components.	CO3	[K_2]
26.	Write short notes on optimization of system components.	CO3	[K_2]

Answer any FOUR Questions
PART D (4 x 10 = 40 Marks)

27.	Explain any two methods for measurement of solar radiation in detail.	CO2	[K_2]
28.	Explain the concept of maximum power point tracking (MPPT) and specify the types of MPPT algorithms used. Also explain in detail any one algorithm.	CO2	[K_2]
29.	Explain with neat diagram the application of matrix converter in wind energy conversion system.	CO1	[K_2]
30.	With neat block diagram explain the grid connected solar energy conversion system.	CO2	[K_2]
31.	What is cogeneration? Explain with neat diagrams the two types of cogeneration process.	CO3	[K_2]

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