KUMARAGURU
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Register Number:……..…

M.E DEGREE EXAMINATIONS: JUNE 2017

(Regulation 2015)

Second Semester

ENERGY ENGINEERING

P15EET204: Wind Energy Conversion Systems

COURSE OUTCOMES

CO1: Describe the parameters of wind energy conversion systems

CO2: Illustrate the terminologies involved in wind turbine technology

CO3: Explain the functions of wind turbine parts

CO4: Discuss the siting, operation and maintenance of wind turbines

CO5: Outline the environmental benefits of wind turbines

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The sequence with which the siting is performed CO1 [K_2]

   1.Building permits 2. Survey 3. Planning permission 4.Public safety

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

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

2. Which of the following is not a rotor control ? CO3 [K_1]

   a) Horizontal furling b) vertical furling

   c) Mechanical brakes d) Drive trains

3. Maximum wind energy available is proportional to CO1 [K_1]

   a) Air density b) Cube of wind velocity

   c) Square of the rotor diameter d) All

4. Match list I with list II and select the correct answer using the codes given below CO5 [K_2]

List I	List II
A.Positioning belts	i. Short sections of rope with snap hooks attached
B.Sit Harness	ii. Used for clipping gear onto a work or tool
C.Carabiner	iii. Can give a false sense of security
D. Lanyards	iv. Can allow free use of hands of worker

   a) A-i, B-ii ,C-iv ,D-iii b) A-iii , B-iv ,C- ii ,D-i

   c) A-iv ,B-i ,C- ii ,D-iii d) A- iv , B- ii ,C-i ,D-iii

5. Which type of Generator is employed in wind power plant CO3 [K_1]

a) Synchronous generator b) Induction generator

c) Permanent magnet motor d) Brushless motor

6. Match the following. CO2 [K_1]

A. Pumping head - i. Changes the tip speed ratio of the rotor

B. Packer head - ii. Always greater than the static head

C. Friction in pipe - iii. To pump water into a storage tank

D. Change in wind speed - iv. Is directly proportional to the rate of flow

a) A-i, B-ii ,C-iv ,D-iii b) A-iv , B-iii ,C- ii ,D-i

c) A-iv ,B-i ,C- ii ,D-iii d) A- iv , B- ii ,C-i ,D-iii

7. Assertion (A) – The term darrious and savonius rotor are related to Wind energy. CO2 [K_2]

Reason (R) – Wind machine with darrious type of rotor is a Vertical axis machine

a) Both A and R is true, R is the correct explanation for A b) Both A and R is true, but R is not the correct explanation for A

c) A is true but R is false d) R is true but A is false

8. Which of the following statements are true? CO1 [K_2]

1.Mass of the wind turbine is proportional to cube of its blade length

2.Mass of the wind turbine is proportional to square of its blade length

3.Mass of the wind turbine is proportional to square root of its blade length

4.Mass of the wind turbine is proportional to inverse square of blade length

a) 1,2 b) 3,4

c) 1 only d) 2 only

9. Which of the following is true? CO5 [K_2]

i –Steel cable is the most commonly used lifeline material

ii –Work belts cannot cause any injury when end of lifeline is reached during a fall

iii – With carabiner attached a nylon sling can be used like a lanyard

iv – Lanyards are short sections of rope with snap hooks attached

a) i, ii, iii b) i, iii, iv

c) iii, iv d) i, iii

10. The main disadvantage of wind power is that. CO4 [K_2]

a) It is available only in coastal areas b) Wind energy systems are noisy when in operation

c) Large land area is required d) The capacity utilization is less

PART B (10 x 2 = 20 Marks)

11.	Write about stand alone power systems.	CO2	[K_2]
12.	How do you estimate farm wind mill pumping capacity?	CO2	[K_1]
13.	Write about dual generators.	CO3	[K_2]
14.	Express the power density variation with height.	CO1	[K_1]
15.	Recall Magnus effect.	CO1	[K_1]
16.	Discuss planning permission, building permits and noise propagation in siting the wind turbines.	CO4	[K_2]
17.	Explain interconnected wind systems.	CO4	[K_1]
18.	Outline the importance of yaw mechanism.	CO3	[K_1]
19.	Explain impact of wind mills on flora and fauna.	CO5	[K_1]
20.	How wind farm affects employment and tourism?	CO5	[K_2]

PART C (6 x 5 = 30 Marks)

21.	Analyze beaufort scale and wind directions.	CO1	[K_2]
22.	Explain about micro hybrid power system.	CO2	[K_2]
23.	Discuss the working of dual generators.	CO3	[K_2]
24.	Explain tower types with neat sketches.	CO3	[K_2]
25.	Appraise the physical restrictions in siting the wind turbines with sketches.	CO4	[K_2]
26.	Explain wind farm impacts on people and land.	CO5	[K_2]

Answer any FOUR Questions

PART D (4 x 10 = 40 Marks)

27.	Evaluate wind turbine technology based on orientation, yaw systems and aerodynamics.	CO2	[K3]
28.	Explain the types of deformation of wind with neat sketches and wind shear.	CO1	[K_2]
29.	Discuss about blade and tower cleaning and painting.	CO4	[K_2]
30.	Discuss various rotor controls with sketches.	CO3	[K_2]
31.	Explain various tower safety and climbing gears.	CO5	[K_3]

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