KUMARAGURU college of technology
character is life

Register Number:……

M.E. DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2014)

Second Semester

ENERGY ENGINEERING

P14EET204:Wind Energy Conversion Systems

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The schematic arrangement of mechanical component of a wind turbine are as follows [K_2]

   (i) rotor (ii) hub (iii) drive train (iv) nacelle (v)control system (vi) tower.

   a) i-ii-iii-iv-v-vi. b) vi-v-ii-i-iv-iii.

   c) v-i-iv-vi-iii-ii. d) iii-ii-v-iv-vi-i.

2. Betz limit has the value of [K_1]

   a) 0.538 b) 0.583

   c) 0.539 d) 0.593

3. Free yaw mechanism uses natural aerodynamic force to increase [K_1]

   a) Loading b) Strength

   c) Stiffness d) Capacity

4. Match the appropriate item from the RHS with those on LHS. [K_2]

List I	List II
A. Transducer.	i. Local grid.
B. WTG.	ii. Steel.
C. VAWT.	iii. Tacho generator.
D. Tubular tower.	iv. Induction Generator.

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

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

5. The structure of WTG connected to a grid follows [K_2]

   (i) Turbine rotor (ii) drive train (iii) generator (iv) interface (v) grid.

   a) i-iii-v-iv-ii b) iii-iv-ii-v-i

   c) v-iv-iii-i-ii d) i-ii-iii-iv-v

6. The maximum number of blades preferred in a horizontal axis WECS is [K_1]

a) One or two b) Two or three

c) Three or four d) One only

7. One of the following is an example of WTG modeling [K_1]

a) Wind diesel system b) Synchronous motor

c) Turbine model d) Power plant model

8. (A)The controller is based on a microprocessor. [K_2]

(B)The controller is modeled as an equivalent continuous controller.

The above two statements are

a) Both are relevant and true. b) Both are relevant (A) true (B) false.

c) Both are relevant (A) false (B) true. d) Both are irrelevant and false.

9. A. An airfoil works like a spinning cylinder. [K_2]

B. It has sharp trailing edge.

C. It rotates at high speed

a) A&B are TRUE and C is FLASE b) A&C are TRUE and C is FALSE

c) All are TRUE except A&C d) All are TRUE except A

10. The separated flow at the higher Reynolds number is the existence of thin boundary layer and it causes [K_1]

a) Aerodynamic flow. b) Aerodynamic dray.

c) Aerodynamic rotation. d) Aerodynamic lift.

PART B (10 x 2 = 20 Marks)

11. What is gradient wind? [K_1]
12. List the type of aerodynamic loads. [K_1]
13. List down the various external factors influencing on the final design of WECS. [K_1]
14. Compare fixed speed mode and variable speed mode. [K_2]
15. What is Betz limit? [K_1]
16. Explain village electrification. [K_2]
17. What do you understand by the term shadow flicker? [K_2]
18. Explain the term ‘CARABINERS’. [K_2]
19. What are the environmental benefits of wind turbine? [K_3]
20. Define lift and drag of aerodynamics. [K_1]

PART C (6 x 5 = 30 Marks)

21. What are the differences in the make up of the system equation between a horizontal axis and vertical axis wind turbine? [K_2]

22. Classify the anemometer based on the principle of operation. [K_2]

23. Explain the method of power regulation. [K_2]

24. Explain coning with neat sketch [K_2]

25. Discuss about cost of maintenance and life expectancy of wind turbines. [K_3]

26. Differentiate residential economics wind farm and business economics. [K_3]

PART D (4 x 10 = 40 Marks)

27. Describe the working of Mechanical Wind Pump with neat sketch [K_2]

28. Explain the functions of wind turbine parts [K_2]

29. Explain the method of battery charging wind system [K_2]

30. Write note on (a) Wind turbine safety (ii) Cost of energy and payback [K_1]

****