

Register Number.....

**M.E. DEGREE EXAMINATIONS: OCTOBER/NOVEMBER -2008**

Third Semester

**POWER ELECTRONICS AND DRIVES**

**P07 PEE 20 Renewable Energy Resources**

**Time: Three Hours**

**Maximum Marks: 100**

**Answer ALL Questions:-**

**PART A (20 x 1 = 20 Marks)**

1. The total installed capacity of power from renewable energy sources (including hydro) in Tamilnadu is  
a) 3835MW                      b) 2880MW                      c) 1350MW                      d) 1600MW
2. The availability of energy source which is used to generate the maximum capacity.  
a) coal                              b) nuclear                              c) Hydel                              d) wind
3. Aerobic conversion means  
a) Thermal process      b) Hydro process      c) Gasification      d) Composting
4. A calorific value of 1 m<sup>3</sup> of natural gas is 10,000 K Cal. The volume of gas equivalent of 1 MBDOE is nearly  
a) 52 X 10<sup>9</sup> m<sup>3</sup>      b) 10 Km<sup>3</sup>      c) 500 Km<sup>3</sup>      d) 100 Km<sup>3</sup>
5. Which type of material is most useful for solar cell work  
a) Metals                      b) Insulators                      c) Semi-conductors      d) Liquid Crystals
6. The energy  $\mu$  in equation  $[1 + e^{-(\mu-E)/KT}]^{-1}$  is the energy at which the probability of occupied states is  
a) e<sup>-1</sup>                              b) 0.5                              c) 1/3                              d) 1/KT
7. The fermi level in a crystal is 3.3eV. The corresponding temperature is  
a) 23,200K                      b) 38280K                      c) 11,600K                      d) 50,000K.
8. The Fill factor is also known as  
a) reflection factor      b) refractive index      c) efficiency      d) short circuit factor
9. A wind is blowing at a velocity v through an area at right angles to it. The density of wind is  $\rho$ . The kinetic energy of wind is  
a)  $\rho A v^3$                       b)  $\rho A v^2$                       c)  $\frac{1}{2} \rho v^3/A$                       d)  $\frac{1}{2} \rho A v^2$
10. The Betz criterion of maximum or optimum performance has the value of C<sub>p</sub> equal to  
a) 0.35                              b) 16/27                              c) 2/3                              d) 0.5

11. At a wind speed of 10m/s and 100KW turbine output, the rotor diameter is nearly  
 a) 63m                      b) 11.2m                      c) 22.35m                      d) 90m
12. In WECS the rated out put power is maintained constant upto a wind speed called  
 a) cut – in speed              b) pick-up speed              c) cut-off speed              d) cut-out speed
13. Tidal cycles at any location have a periodic time of  
 a) 24hr                      b)24hr 50min                      c)6hr 12.5min                      d) 12hr 25min
14. Desalination is a process in which  
 a) salt is added                      b) waste products are removed  
 c) salt is removed                      d) chemicals are added
15. Tide occurs  
 a) twice in a day              b) once in a day              c) 4 times a day              d) thrice a day
16. The efficiency of OTEC System is nearly  
 a) 50%                      b) 15%                      c) 5%                      d) 30%
17. A hydro electric scheme operates at a head of 100m and the water flow is  
 2000m<sup>3</sup>/sec. The power potential is :  
 a)1962KW                      b) 2000MW                      c) 1200MW                      d)1962MW
18. 1 g of Pu-239generates roughly  
 a) 0.5 MW-d                      b) 1 MW-d                      c) 2 MW-d                      d) 0.05 MW-d
19. The force on electron  $F=-qv_c \times B$  is known as  
 a) Faraday force              b) Hall force                      c) Lorentz force                      d) Maxwell force
20. MHD generator delivers a power of 200MWe at  $K=0.6$  with  $\sigma = 20$  mho m=2.5T, and  
 gas velocity  $u=200$ m/s. The volume of the duct is nearly  
 a) 10m<sup>3</sup>                      b) 2600 m<sup>3</sup>                      c)200 m<sup>3</sup>                      d) 1000 m<sup>3</sup>

**PART B (5X16=80 Marks)**

- 21.a. Discuss about conventional and non conventional energy sources with special  
 reference to Indian context. (16)

**OR**

- 21.b.(i) Discuss the needs to develop new energy technologies and world energy  
 scenario. (8)

- (ii) Write a note on social implications in the renewable energy sources. (8)

- 22.a.(i) Discuss the reasons for variation in solar radiation reaching the earth received at  
 the outside of the atmosphere. (8)

- (ii)Describe in detail solar thermal power generation using Brayton cycle. (8)

**OR**

- 22.b.(i) Clearly explain thr characterization of a solar cell with its equivalent circuit. (8)

- (ii) Writ a note on SPV cells fabrication. (8)

23.a. At the Betz value for  $C_p$ ,  $\rho = 1.293\text{Kg/m}^3$  at zero degree centigrade and 1 atm, inlet velocity  $v_i = 24\text{m/s}$  and rotor angular velocity of 83 rpm, calculate:

- (i) The force developed by the blade per meter;
- (ii) Rotor blade radius if the tip speed ratio is 6;
- (iii) The average torque developed by the two blades;
- (iv) The power developed. (16)

**OR**

23 b. Explain the working of wind electric system with a block diagram and principle of operation of its basic components. (16)

24.a. Describe the closed cycle OTEC system with its advantages and disadvantages. (16)

**OR**

24.b. Explain the various methods of tidal power generation with a conceptual diagram. What are the limitations? (16)

25.a. i) What type of turbine is suited for microhydel power plant? Describe it. (8)

ii) Explain the working principle of MHD power generation system. (8)

**OR**

25.b. i) Write a note on hydrogen storage system. (8)

ii) Draw the CANDU reactor and explain its working. (8)

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