DARBHANGA COLLEGE OF ENGINEERIG, DARBHANGA

ELECTRICAL ENGINEERING (8th SEM)

DIRECT ENERGY CONVERSION

UNIT I

DIRECT ENERGY CONVERSION:

1. Why non-conventional energy sources have become important?
2. What is conventional and non-conventional energy?
3. Give examples of various bio-fuels?
4. What are tidal energy and its application?
5. Relate civilization to energy and explain?
6. Give various resources of non-conventional energy generation?
7. How geothermal energy is harnessed?
8. In what way wind energy can be utilized?
9. What is solar-pond? Discuss its application?
10. How fuel cell can be used for power generation
11. Explain how geothermal energy is used to generate electricity?
12. Discuss the advantage and limitation of tidal power gestation?
13. What is difference between Renewable and Non-renewable energy resources? Give examples?
14. What do you mean by solar collector
15. Name the various direct energy conversion systems.
16. What are the various sources of geothermal energy?
17. What is tidal energy?
18. What are the main sources of bio-mass?
19. List various Non-conventional energy resources. Give their availability, relative merits and demerits.
20. What are the main strategies you think for meeting the future energy requirements?
21. Distinguish between conventional and non-conventional energy sources?

UNIT II

THERMOELECTRIC POWER GENERATION:

1. What is thermoelectric effect?
2. Explain Seedback and Peltier effect?
3. Which are the thermoelectric materials? Mention its application?
4. Explain the working principle of thermionic power conversion with the main advantages and disadvantages?
5. Explain the principles of thermo-electric generator?
6. Describe briefly thermal electric power?
7. Explain the cascade multistage operation of thermoelectric generators?
8. What is direct band gap energy?
9. Illustrate the thermoelectric effect with neat sketch?
10. What are the thermoelectric materials?
11. Explain the thermal efficiency of thermoelectric generator?
12. Derive the overall efficiency of the combined thermoelectric steam power plant?
13. What are the heat input and heat output rejected from the thermoelectric generator?
14. What is open circuit voltage?
15. What is the condition for generation of electron hole pair in term of band gap and energy in photon?
16. Discuss performance parameter of a thermoelectric module?
17. Discuss the p and n type unit thermocouple for a thermoelectric generator?
18. What are the limitations of thermoelectric generator?
19. Explain the types of material used in thermoelectric generator?
20. Write short notes on Thomson effect?

UNIT III

FUEL CELL:

1. Write a note on ideal and real efficiencies of fuel cell?
2. Discuss the relation between activation energy and reaction rate?
3. What are the major requirements for a candidate fuel cell electrolyte?
4. Discuss the various methods to improve the kinetic performance of a fuel cell?
5. List the important qualities required for an effective fuel cell catalyst material?
6. List two major advantages and two major disadvantages of fuel cells compared to other power conversion devices?
7. Explain the four major steps in the generation of electricity within a fuel cell?
8. Write a note on stack clamping?
9. List the technologies for hydrogen storage?
10. Write the cell reaction of alkaline fuel cell?
11. Explain advantages and disadvantages of fuel cell?
12. Explain basic reaction in fuel cell and enthalpy formation and enthalpy change of reacting system?
13. Explain Efficiency and power due to entropy change and internal ohmic heating?
14. Explain Acid and Molten carbonate fuel cell?
15. Explain the difference between ordinary batteries and fuel cell?
16. Discuss the application and economic aspect of fuel cell?
17. How fuel cell can be used for power generation?
18. What are the different types of fuel cells?
19. What are limitations of fuel cell?
20. What is the operation of hydrogen fuel cell?
21. Discuss different type of polarization that occurs in fuel cell?
22. Explain the thermodynamics of fuel cell reaction and give their applications?

UNIT IV

SOLAR CELL:

1. Explain photo electricity with the help of neat sketch?
2. Mention major advantages of solar photovoltaic cells over conventional power system?
3. Write note on solar cell classification?
4. Explain solar cell applications?
5. Explain solar cell, module, panel and array constructions?
6. Explain with sketches maximum power point tracker (MPPT) using buck-boost converter?
7. A PV system feeds a DC motor to produce 1hp power at the shaft. The motor efficiency is 85%. Each module has 36 multi crystalline silicon solar cells arranged in 9X4 matrix. The cell size is 125X125mm and cell efficiency is 12%. Calculate the number of modules required in the array. Assuming global radiation incident normally to the panel as $1kW/m^2$?
8. Discuss various techniques available to utilize solar energy?
9. What are the applications of solar energy?
10. What are various types of solar collector? Explain the design procedure?
11. Discuss the performance analysis of cylindrical and parabolic solar collector?
12. What is solar constant?
13. What do you understand by figure of merit?
14. How is solar cell fabricated?
15. Show the basic principal of p-n junction photovoltaic converter?
16. Develop various solar radiation angles considering the flat surface on ground facing south?
17. What are the factors which limit the solar efficiency?
18. What is the range of efficiency of solar cell?
19. Write the mathematical form of I-V characteristics of solar cell?
20. Write short notes on:
    (a) Magnetic Hydrodynamic (MHD) Generator.
    (b) Tidal energy.
    (c) Solar energy storage systems.

UNIT V

MHD GENERATOR:

1. Explain the basic principles of a magneto hydrodynamic power (MHD) conversion system?
2. Draw suitable sketch and explain open cycle MHD power generating system?
3. Explain with suitable sketch and explain closed cycle MHD power generating system?
4. Discuss the environmental aspect of MHD?
5. What are the main types of MHD (Magnetic Hydrodynamic) systems?
6. Write short note on seeding?
7. Explain the material for MHD generator?
8. What is the open circuit voltage for MHD generator?
9. Discuss maximum power of MHD generator?
10. Explain the types of power generation through MHD generation?
11. What are the advantage and disadvantages of MHD generation?
12. Derive the working of the MHD?
13. What is the MHD cycle?
14. What is the speed recovery system?
15. Demonstrate the working principle of MHD closed cycle system?
16. Define the pre-heater and combustor?
17. Explain the hybrid MHD generator?
18. Define compressor?
19. Derive the maximum power of MHD generator?
20. Demonstrate the working principle of MHD open cycle system?

UNIT VI

FUSION POWER AND WIND POWER:

1. Explain energy release during nuclear fusion reaction?
2. What is the principle of fusion power?
3. Discuss the various advantages and disadvantages of fusion power?
4. What are problem associated with controlled thermo-nuclear reaction? How these problem resolve?
5. List the various components of Wind turbines?
6. What is wind energy? Discuss the factor affecting the site selection for wind mills?
7. Explain various basic components of wind energy conversion system?
8. What is the wind mill? Mention dynamic forces acting on wind mill blades?
9. What is total power density in wind stream?
10. Explain the torque and axial thrust on horizontal shaft blade turbine?
11. Derive the formula of coefficient of performance C_p of wind energy conversion?
12. What are the various wind turbines?
13. Explain the wind turbine power plant with a systematic diagram?
14. What are the different causes of local Winds?
15. What are the factors determine the output from a wind energy converter
16. Give the expression for available wind power?
17. Draw the curve that shows the combined effects of wind Speed and Rotor diameter on wind power generation?
18. Define Power Co-efficient?
19. Write the general Energy Equation for Steady State Flow?
20. What are the different types of forces acting on propeller type wind turbine?
21. What are the mechanisms for producing forces from wind?