

Exam of (Basics of Energy Conversion)
For 2nd Grad Electrical Engineering Dept. students.

Answer All The Following Questions.

First Question:

- Remember the advantages of electrical energy.
- From the main sources of energy discuss two of them.
- Define the following expressions:
Calorific values of heat, thermal energy, and initial and running cost.
- Explain the losses occurs in the steam plant equipments.

Second Question:

- Remember the advantages and disadvantages of the thermal power stations.
- Draw the schematic diagrams of:
Flue gas circuit, feed water circuit, and steam circuit.
- Demonstrate factors taken into consideration in selecting the site of steam power station.
- Explain the following equipments:
Economizer, pre-heater, prime-mover, and condenser.

Third Question:

- Classify the hydro-electric plants.
- Remember the different types of water turbines according its head.
- A hydro-electric power station is supplied from a reservoir having an area of 60 Km² and a head of 70 m. If the overall efficiency of the plant is 65 %, find the rate at which the water level will fall when the station is generating 25000 Kw.

Fourth Question:

- Draw a schematic diagram showing the different layers of a solar cell and Show the function of each layer .
- A solar cell is rated 600 mA, 0.45 V at 100 mw/cm² and 25° C. Calculate the I_{mp} and U_{mp} at 75, 50, and 25 mw/cm².
- A 6×6" square solar cell has a rating at 25° C of 120 mA and 0.45 V in a full sun. what is the efficiency.
- Define the following: \bar{K}_T , \bar{H} , \bar{H}_o , \bar{H}_T , and \bar{R} .
- A solar module is rated 0.5 V, 2.5 W. It is used to power 50 V supply requiring 20 A of current . what is their connection.

Fifth Question:

- Illustrate the circuit use in executing I-V c/cs.
- A solar panel is rated 20 W at 5 V. How many panels are required to provide 20 A at 80 V? How should they be connected ? what should be the value of the load resistance?
- Draw the relation between power and voltage of the silicon solar cells and the conclusions can be drawn.
- A solar panel is rated 1 A, 16 V, 25° C, determine:
1- R_L. 2- power output at 0.5 sun. 3- power output at 0.25 sun and 50° C.
- Write the value of $\frac{\Delta \max. P}{\Delta T}$, $\frac{\Delta V_{oc}}{\Delta T}$, $\frac{\Delta I_{sc}}{\Delta T}$, E_o , and I_o .