



Daffodil international University

Department of Electrical & Electronic Engineering

Course Code: EEE 450

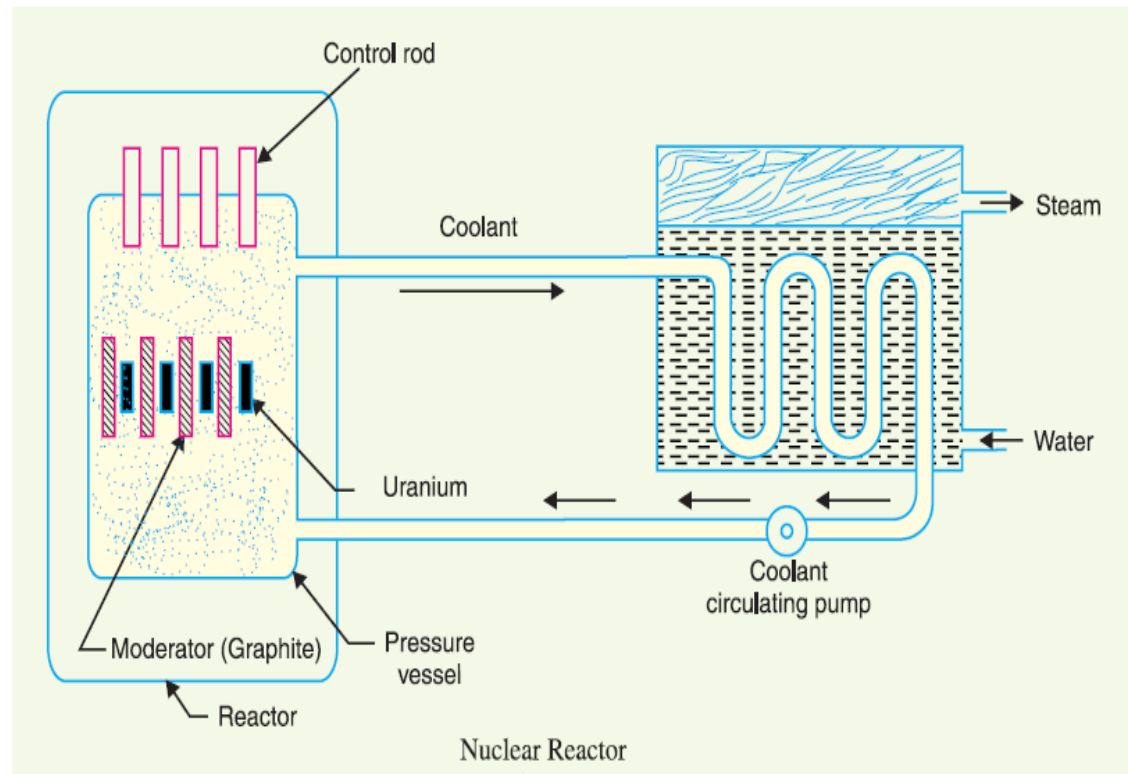
Course Title: Power Plant Engineering Lab

Experiment 05

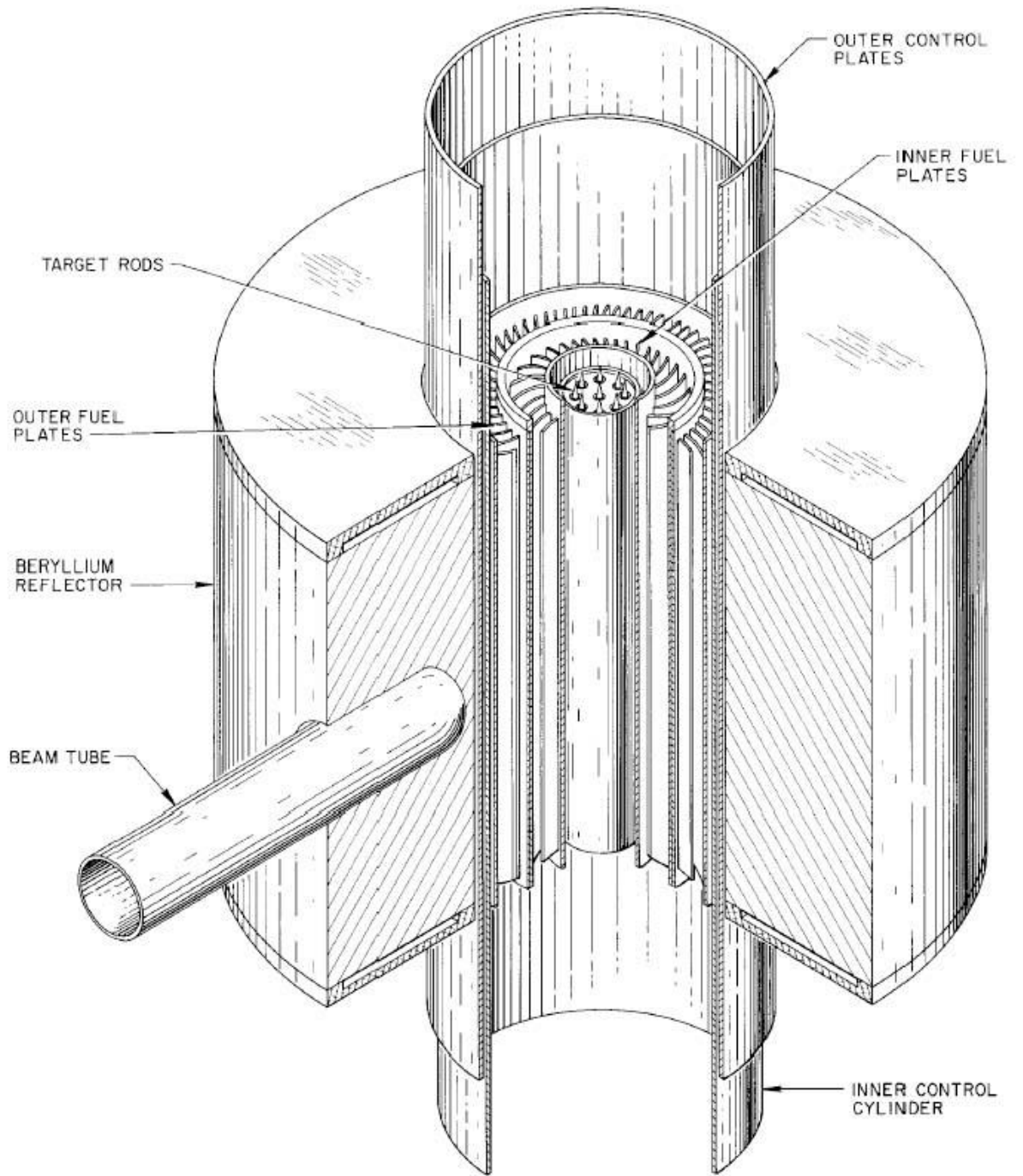
Familiarization of various Nuclear Power Plant equipments

Objective: To be familiar with the various apparatus or equipments of Nuclear power plant.

- 1. Nuclear Reactor:** It is an apparatus in which nuclear fuel (U235) is subjected to nuclear fission. It controls the *chain reaction* that starts once the fission is done. If the chain reaction is not controlled, the result will be an explosion due to the fast increase in the energy released. A nuclear reactor is a cylindrical stout pressure vessel and houses fuel rods of Uranium, moderator and control rods. The fuel rods constitute the fission material and release huge amount of energy when bombarded with slow moving neutrons. The moderator consists of graphite rods which enclose the fuel rods. The moderator slows down the neutrons before they bombard the fuel rods. The control rods are of cadmium and are inserted into the reactor. Cadmium is strong neutron absorber and thus regulates the supply of neutrons for fission. When the control rods are pushed in deep enough, they absorb most of fission neutrons and hence few are available for chain reaction which, therefore, stops. However, as they are being withdrawn, more and more of these fission neutrons cause fission and hence the *intensity* of chain reaction (or heat produced) is increased. Therefore, by pulling out the control rods, power of the nuclear reactor is increased, whereas by pushing them in, it is reduced. In actual practice, the lowering or raising of control rods is accomplished automatically according to the requirement of load. The heat produced in the reactor is removed by the coolant, generally a sodium metal. The coolant carries the heat to the heat exchanger.



2. **Heat exchanger:** The coolant gives up heat to the heat exchanger which is utilized in raising the steam. After giving up heat, the coolant is again fed to the reactor.
3. **Reflector:** A neutron reflector is any material that [reflects neutrons](#). This refers to [elastic scattering](#) rather than to a [specular reflection](#). The material may be [graphite](#), [beryllium](#), [steel](#), [tungsten carbide](#), or other materials. A neutron reflector can make an otherwise [subcritical](#) mass of [fissile material](#) critical, or increase the amount of [nuclear fission](#) that a [critical or supercritical mass](#) will undergo. Such an effect was exhibited twice in accidents involving the [Demon Core](#), a subcritical [plutonium pit](#) that went [critical](#) in two separate fatal incidents when the pit's surface was momentarily surrounded by too much neutron reflective material
4. **Biological shielding:** The protection of people from harmful effects of exposure to [ionizing radiation](#) like alpha, beta and gama ray.
5. **Steam Turbine:** See experiment sheet no 01.



Results/Observations: