

University of Technology-Electromechanical Engineering Dept.
Final Exam-First Attempt – 2013-2014

Class : 4th Year
Subject: Nuclear Power Plant
Examiner : Jalal M. Jalil



Time : 3 hours
Date: / 6 / 2014
Note: Answer 4 Questions Only

Name:

ID No.

Signature

- Q1: a) Define the followings: Nuclear Energy, Endothermic
b) Explain with plot the heat transfer considerations between pin and plate types fuel.
c) A BWR operating at a pressure of 75 bar, total heat generation 2.8 GW, total coolant flow rate through the core $7E+07$ kg/hr, inlet sub-cool 10 C. Calculate mass of steam generated and dryness fraction.
- Q2: a) Plot the moderating arrangements.
b) Calculate the energy produced by 1 g of U^{235} .
c) Explain the Magnox reactor.
- Q3: a) What are the desirable fuel materials properties?
b) What are the fuel cladding summary?
c) A cylindrical fuel rod consists of a fuel region of diameter 0.01 m, with a cladding of thickness 0.0005 m. If the temperature at outer surface of the cladding is 390 C, calculate the center temperature of the fuel region, given heat generation rate is 0.5 GW/m^3 and the thermal conductivities of fuel and cladding are 1.85 and 18 W/m C respectively.
- Q4: Describe the followings:
1) Sensitized condition of stainless steel
2) Nil ductility transition temperature (NDT)
3) Once-through steam generator with plot
- Q5: a) Give the reason for:
1) Spent fuel cooling and storage system
2) Protection system
b) Derive an expression for coolant outlet temperature in steam generator with preheats with graph.