**Physics Year 11 : Applications of Nuclear Physics: Due Tues 30th April (T2W1)**

***Assessment: Validation test only:*** *The test assumes you will bring your own notes, these need to be organised using diagrams, summaries, dot points or graphic organisers. It is not acceptable to have chunks of texts copied from the internet. (5 marks for notes, include references)*

***(Maximum length of notes 4 pages****). Make sure you research all components of this assignment*

*The following has lots of information;*

* *ANSTO Publications, videos and PDFs*
* [*http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/*](http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/)

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| **1.** | Briefly note the similarities and differences between them  a) ANSTO OPAL reactor Lucas Heights Sydney  b) advanced gas cooled reactor  c) pressurised water reactor?  d) Fast breeder reactor |
| **2.(a)** | (i) Choose a nuclear reactor type. Draw a simple schematic diagram of the nuclear reactor and label the key parts listed in question 2(b).  (ii) State the nuclear reaction equation and indicate the speeds of the neutrons involved. |
| **2 (b)** | Explain how the nuclear reactor works and how the chain reaction is controlled, including the function of the following parts and the following terms:   1. Reactor vessel 2. nuclear fuel rod 3. Moderator 4. Coolant 5. Radiation shield 6. Control rod |
| **3.** | What methods are used to dispose of radioactive waste? How long do different types of radioactive waste need to be stored. |
| **4.** | (a) What type of radiation is emitted during the reaction?  (b) What precautions are taken to protect humans in the reactor and during the transport of radioactive material? |
| **5.** | a) What is a safe level of radiation for humans.  b) Which radiation type is more dangerous to human beings, why?  c) Describe some biological effects of excessive radiation exposure to humans. |
| **6.** | Be prepared to discuss the **advantages** and **disadvantages** of nuclear power and argue a case for using it and for not using it.  Consider protection from radiation under normal operation and in emergencies (ie Chernobyl and Fukishma), energy advantages, disadvantages and consider current technology. |