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**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2021/2022**

COURSE NAME : RENEWABLE ENERGY  
COURSE CODE : BWC 32402  
PROGRAMME CODE : BWC  
EXAMINATION DATE : JANUARY / FEBRUARY 2022  
DURATION : 2 HOURS 30 MINUTES  
INSTRUCTION : 1. ANSWER ALL QUESTIONS.  
2. THIS FINAL EXAMINATION IS AN  
**ONLINE ASSESSMENT AND  
CONDUCTED VIA CLOSED BOOK.**

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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- Q1** (a) Define in detail why fossil has become one of the important resource for energy production around the world. (2 marks)
- (b) In chemistry, hydrocarbons include methane, ethane, propane, butane, and octane. Determine in ascending order for all of these hydrocarbons based on the amount of energy released by each of these hydrocarbons and justify your answer (4 marks)
- (c) (i) Energy transformation is important in energy production. Describe “energy transformation”. (4 marks)
- (ii) An electric motor consumes 100 watts (W) of electricity to obtain 90 watts of mechanical power. Calculate its efficiency (E). (4 marks)
- (d) (i) Nuclear energy is regarded as non-renewable. Please conclude why this type of energy is classified as non-renewable. (5 marks)
- (ii) Renewable resources come in a variety of forms, including solar, wind, biomass, geothermal, and hydrogen technology. Explain in detail the energy production mechanism for one of these renewable energy resources. Your response must include a specific diagram or picture. (6 marks)
- Q2** (a) (i) Insulator and conductor are essential materials for energy storage. Differentiate between the term of conductor and insulator for a material. (2 marks)
- (ii) Material properties, such as conductivity and insulation, are extremely important in energy storage technology. Determine the function of both parameters, conductivity and insulation in energy storage technology. (4 marks)
- (b) (i) Thermal energy storage is a technology that stocks thermal energy by heating or cooling a storage medium so that the stored energy can be used at a later time for heating and cooling applications and power generation. Differentiate the term of thermal conductance and thermal resistance. (4 marks)
- (ii) Correlate the relationship between thermal conductance and thermal resistance. (4 marks)

(c) (i) Distinguish thermal energy storage and electrical energy storage. (4 marks)

(ii) Mechanical energy technology, electrochemical processes, and thermal energy technology are the three major categories of energy storage technology. Present **TWO (2)** examples of each of these energy-storage technologies. (7 marks)

**Q3** (a) (i) Describe the term of blackbody radiation. (2 marks)

(ii) Describe the term of emissivity. (2 marks)

(iii) Two black and grey objects were exposed to sunlight. Compare the emissivity for both objects. Justify your answer. (4 marks)

(b) (i) Demonstrate the mechanism of electrons and holes production at  $P-N$  junction in solar panel. Support your answer with appropriate schematic diagram. (5 marks)

(ii) **Figure Q3(b)(ii)** illustrates a component of a solar cell. Identify components A, B and C? Explain the function of components A, B, and C as well. (6 marks)

(iii) Some solar panel (photovoltaic cell) may contain several layers such as Gallium arsenide (GaAs), gallium antimonide (GaSb) and indium phosphide (InP). Point out the advantages of using this multilayer solar panel in solar power collecting. (6 marks)

**Q4** (a) (i) Describe the term of nuclear reactor. (2 marks)

(ii) List all main components of nuclear reactor and determine the function of each component. (8 marks)

(iii) Distinguish between pressurized water reactor (PWR) and boiling water reactor (BWR). (8 marks)



(b) (i) Describe the term of hybrid renewable energy.

(2 marks)

(ii) Present **TWO (2)** example of hybrid renewable energy and explain its mechanism to product an electricity or thermal energy.

(5 marks)

- **END OF THE QUESTIONS** -

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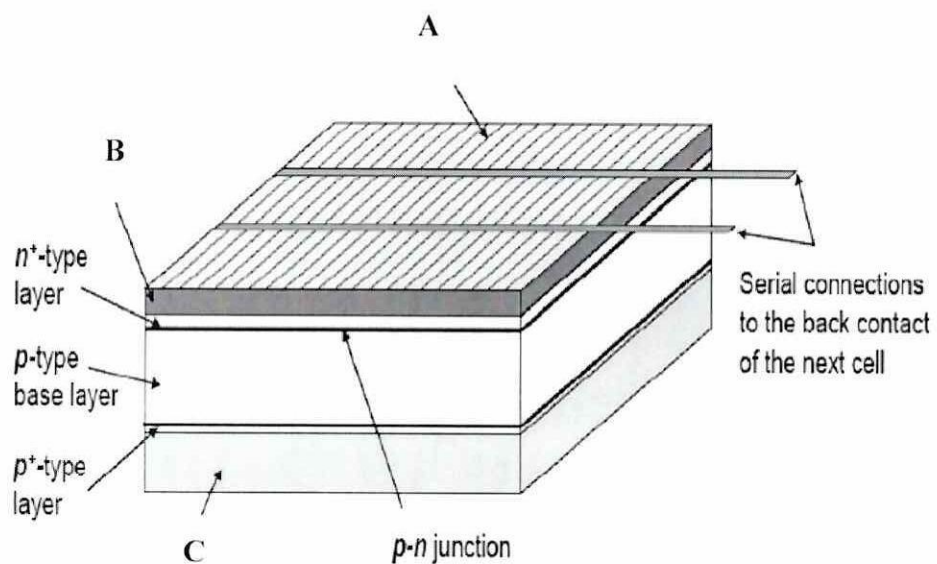


Figure Q3(b)(ii)

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