

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	: DEE 2242
COURSE	: FUNDAMENTAL OF RENEWABLE ENERGY
SEMESTER/SESSION	: 2 - 2022/2023
DURATION	: 3 HOURS

**Instructions:**

1. This booklet contains 4 questions. Answer **all** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

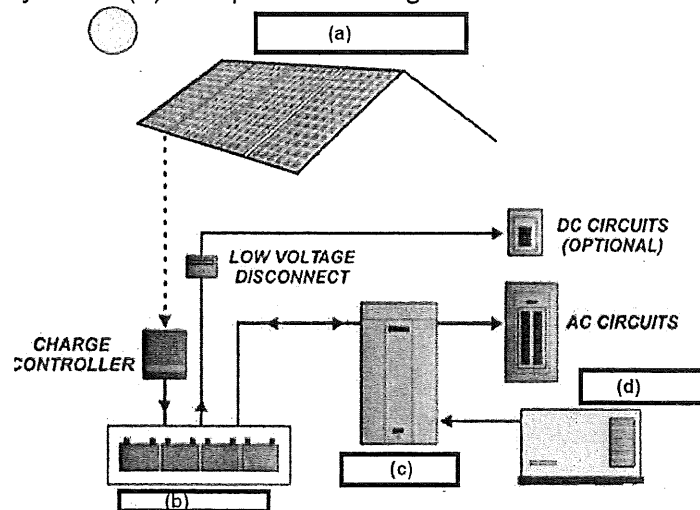
**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO**

**THIS BOOKLET CONTAINS 5 PRINTED PAGES INCLUDING COVER PAGE**

**QUESTION 1**

- a) Energy from the Sun can be generated with two (2) methods.
- i. List the methods (2 marks)
  - ii. Explain the methods listed in (i) (4 marks)

- b) Figure 1 shows the diagram for PV solar panels system:
- i. Complete the diagram in Figure 1. (4 marks)
  - ii. Explain any three (3) components in Figure 1. (6 marks)



**Figure 1**

- c) Explain the basic working principle of solar thermal system. (6 marks)
- d) A PV solar system will be used to supply power for a house with the following electrical appliances and usage:
- 4 unit of 18 Watt fluorescent lamp with electronic ballast (used for 6 hours per day)
  - 4 unit of 60 Watt fan (used for 6 hours per day)
  - One 75 Watt refrigerator (runs 24 hours per day, compressor: 12 hours ON, 12 hours OFF).

Calculate the number of PV module needed if the system will be powered by 12 Vdc, 130 Wp PV module. (11 marks)

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**QUESTION 2**

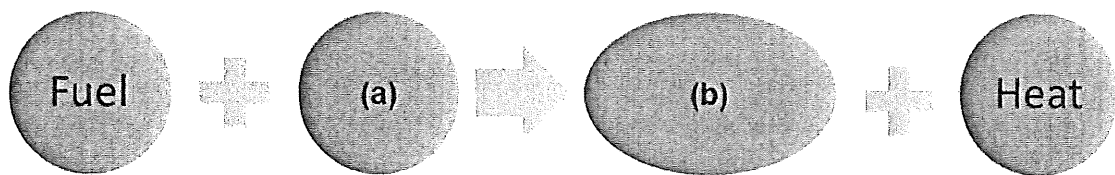
- a) Write down the definition of wind power (3 marks)
- b) State the full name of two(2) types wind turbine. (2 marks)
- c) Explain the following (HAWT) wind turbine positions:
- i. Upwind (2 marks)
  - ii. Downwind (2 marks)
- d) VAWT is one type of wind turbine.
- i. State three (3) design of VAWT wind turbine. (3 marks)
  - ii. Explain two(2) advantages of VAWT wind turbine (4 marks)
- e) Explain three(3) main component of a conventional HAWT wind turbine. (6 marks)

**QUESTION 3**

- a) Write down the definition of hydropower. (2 marks)
- b) Explain the following :
- i. Conventional Dam Electricity (8 marks)
  - ii. Run Of The River Hydroelectricity (6 marks)
- c) Explain two(2) type of hydroelectric facilities based on their generating capacity (6 marks)

**QUESTION 4**

- a) Write down the definition for fuel cell. (3 marks)
- b) Figure 2 shows the ordinary combustion process of fuel. Complete Figure 2. (2 marks)

**Figure 2**

- c) Explain the operation of the fuel cell system (6 marks)
- d) Describe the function of the following fuel cell component :
- i. Anode (2 marks)
  - ii. Cathode (2 marks)
  - iii. Electrolyte (2 marks)
- e) Explain three(3) advantages of fuel cell. (6 marks)

-----End of question-----

