

SECTION A: 80 MARKS***BAHAGIAN A: 80 MARKAH*****INSTRUCTION:**

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan berstruktur. Jawab SEMUA soalan.

QUESTION 1***SOALAN 1***CLO1
C1

- a) Describe about Renewable Energy and name TWO (2) types of Renewable Energy that are available.

Terangkan maksud Tenaga Boleh di perbaharui dan namakan DUA (2) jenis Tenaga boleh diperbaharui yang tersedia.

[4 marks]

[4 markah]

CLO1
C2

- (b) Feed-in tariffs (FITs) and Net Energy Metering (NEM), are both methods designed to accelerate investments in renewable energy technologies. Compare the differences between these two technologies.

Feed-in tariffs (FITs) dan Net Energy Metering (NEM) adalah dua kaedah yang di wujudkan bagi menjana pelaburan dalam bidang teknologi boleh diperbaharui. Bandingkan perbezaan di antara kedua-dua teknologi tersebut.

[6 marks]

[6 markah]

CLO1
C3

- (c) With the aid of a diagram, sketch a complete Off-Grid Solar System Components and write all its basic functions.

Dengan bantuan gambarajah, lakarkan komponen lengkap bagi Sistem Solar Tidak Tersambung Grid dan tuliskan penerangan fungsi asasnya.

[10 marks]

[10 markah]

QUESTION 2
SOALAN 2

CLO1
C1

- (a) List **FOUR (4)** important considerations of solar PV system.

Senaraikan EMPAT (4) jenis pertimbangan penting bagi sistem Solar Fotovoltan.

[4 marks]

[4 markah]

CLO1
C2

- (b) Using the provided conditions, interpret the maximum possible power (in megawatts), taking into account Betz Law, that could be produced by the wind turbine proposed to power a convenience store.

Berdasarkan daripada kondisi yang di beri, kenalpasti nilai kuasa maksima (megawatts) turbin angin yang di cadangkan bagi membekalkan tenaga kepada sebuah kedai runcit dengan mengambil kira Hukum Betz:

Turbine & Location Details

- Blade length, $l = 22$ meters
- Number of blades = 3
- Average Island Wind speed, $v = 10$ m/sec
- Air Density, $\rho = 1.23$ kg/m³

[6 marks]

[6 markah]

CLO1
C3

(c) Show how does a Wind Turbine aerodynamics works:

Tunjukkan bagaimanakah aerodinamik bagi Turbin Angin berfungsi

[10 marks]

[10 markah]

QUESTION 3
SOALAN 3CLO1
C1(a) List **FOUR (4)** types of turbine used in a hydroelectric plant.*Senaraikan EMPAT (4) jenis turbin yang digunakan dalam loji hidroelektrik.*

[4 marks]

[4 markah]

CLO1
C2

(b) Express in details the theoretical hydropower (kW) that can be generated from following conditions.

Net head: 40m

Design discharge: $1 \text{ m}^3/\text{s}$ Gravitational acceleration: $9.8 \text{ m}^2/\text{s}^2$ *Nyatakan secara terperinci kuasa hidroelektrik (kW) yang dapat dijanakan dalam keadaan berikut:**Aras puncak: 40m**Luahan: $1 \text{ m}^3/\text{s}$* *Pecutan graviti: $9.8 \text{ m}^2/\text{s}^2$*

[6 marks]

[6 markah]

CLO1
C2

(c) Explain the production of liquid fuels from biomass below:

- a. Pyrolysis
- b. Synthesizing
- c. Biodiesel

Terangkan pengeluaran bahan api cecair dari biomass berikut:

- i. Pyrolysis*
- ii. Penyegerakan*
- iii. Biodiesel*

[10 marks]

[10 markah]

QUESTION 4***SOALAN 4***CLO1
C1

(a) Define the wave characteristics below:

- i. Crest
- ii. Trough
- iii. Wave height
- iv. Wavelength

Nyatakan ciri gelombang di bawah:

- i. Crest*
- ii. Palung*
- iii. Ketinggian gelombang*
- iv. Panjang gelombang*

[4 marks]

[4 markah]

CLO1
C2

(b) Discuss the challenges of Proton Exchange Membrane (PEM) fuel cell.

Bincangkan cabaran-cabaran jenis sel bahan api Membran Pertukaran Proton (PEM).

[6 marks]

[6 markah]

CLO1
C3

(c) Sketch and write how electricity is generated by using Fuel Cell.

Lakar dan tulis bagaimana penjanaan elektrik menggunakan Sel Bahan Api.

[10 marks]

[10 markah]

SECTION B: 20 MARKS***BAHAGIAN B: 20 MARKAH*****INSTRUCTION:**

This section consists of **ONE (1)** essay questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi SATU (1) soalan esei. Jawab SEMUA soalan.

QUESTION 1***SOALAN 1***

CLO1
C3

Sketch a backup power supply system utilizing Proton Exchange Membrane (PEM) fuel cells in telecommunication site and write down all important components used and FIVE (5) of its advantages.

Lakarkan sistem bekalan kuasa sokongan jenis sel bahan api Membran Pertukaran Proton (PEM) yang digunakan di tapak Menara telekomunikasi dan tulis kesemua komponen penting bagi sistem tersebut beserta LIMA (5) kelebihanannya.

[20 marks]

[20 markah]

SOALAN TAMAT