

**SECTION B : 60 MARKS****BAHAGIAN B: 60 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) List **THREE (3)** types of conventional power station.

*Senaraikan TIGA (3) jenis sistem penjanaan konvensional.*

[3 marks]

[3 markah]

CLO1  
C2

- (b) A power plant has a daily load demand as shown in Table B1(b).

Determine the maximum demand and average load.

*Loji janakuasa berikut mempunyai permintaan beban harian seperti Jadual B1(b).*

*Tentukan permintaan maksimum dan beban purata.*

Table B1(b)/ *Jadual B1(b)*.

Time (hours)	0 – 6	6 – 10	10 – 12	12 – 16	16 – 20	20– 24
Load (MW)	50	80	100	120	70	60

[5 marks]

[5 markah]

CLO2  
C3

- (c) By using a suitable diagram, illustrate and explain the generation of hydro power station.

*Dengan menggunakan gambarajah yang sesuai, lukis dan terangkan sistem penjanaan hidro.*

[7 marks]

[7 markah]

## QUESTION 2

## SOALAN 2

CLO1  
C2

- (a) Identify **THREE (3)** types of transmission lines. Specify the length for each lines.

*Kenalpasti **TIGA (3)** jenis talian penghantaran. Nyatakan panjang untuk setiap talian tersebut.*

[3 marks]

[3 markah]

CLO1  
C3

- (b) Draw the phase diagram of lagging power factor, leading power factor and unity power factor.

*Lukiskan gambarajah fasa bagi faktor kuasa mengekor, faktor kuasa mendahului dan faktor kuasa uniti.*

[6 marks]

[6 markah]

CLO2  
C3

- (c) A 6.6 kV single phase overhead transmission line delivers 5 MW at 0.8 power factor lagging. The total resistance and inductance of the line are  $1.5 \Omega$  and  $j3\Omega$  respectively. Calculate the sending end voltage and percentage of regulation.

*Sebuah talian penghantaran atas satu fasa 6.6 kV menghantar 5 MW pada faktor kuasa 0.8 mengekor. Talian ini mempunyai jumlah rintangan dan aruhan masing-masing  $1.5\Omega$  dan  $j3\Omega$ . Kirakan voltan hujung penghantaran dan peratus pengaturan.*

[6 marks]

[6 markah]

**QUESTION 3****SOALAN 3**

- CLO1  
C2
- (a) Identify **THREE (3)** types of busbar arrangements.  
*Tentukan **TIGA (3)** jenis susunan busbar.*
- [3 marks]  
[3 markah]
- CLO1  
C3
- (b) Sketch and label the structure of underground transmission cable.  
*Lakar dan labelkan struktur binaan kabel penghantaran bawah tanah*
- [6 marks]  
[6 markah]
- CLO2  
C3
- (c) Illustrate the single line diagram for single busbar and dual busbar arrangement.  
*Lukiskan gambarajah garis tunggal bagi susunan busbar tunggal dan dwi busbar.*
- [6 marks]  
[6 markah]

## QUESTION 4

## SOALAN 4

CLO1  
C1

- (a) Show the per unit impedance of a transmission line that consists of impedance at  $3+j4 \Omega$  on 20 MVA and 33 kV base voltage.

*Tunjukkan galangan per unit talian penghantaran yang mengandungi galangan  $3+j4 \Omega$  pada 20MVA dan 33 kV voltan asas.*

[3 marks]

[3 markah]

CLO1  
C2

- (b) Identify **THREE (3)** diagrams that represent the unsymmetrical faults. *Kenalpasti **TIGA (3)** gambarajah yang menunjukkan kerosakan tidak simetri.*

[5 marks]

[5 markah]

CLO1  
C3

- (c) Figure B4(c) is a three-phase single line diagram. Given the voltage base will be taken 33 kV single phase and VA base is 50 MVA. With the aid of an impedance diagram, calculate the total impedance and fault current if the fault occur at point label F.

*Rajah B4(c) menunjukkan litar satu garis bagi sistem tiga fasa. Di beri voltan dasar 33 kV dan VA dasar 50 MVA. Dengan bantuan gambarajah galangan, kirakan jumlah galangan dan arus rosak ( $I_F$ ) jika kerosakan berlaku pada titik yang bertanda F.*

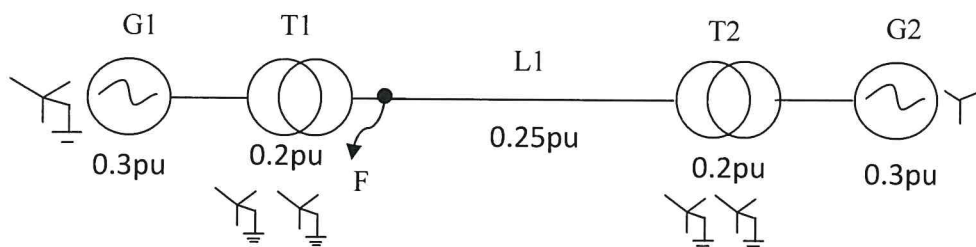


Figure B4(c) / Rajah B4(c)

[7 marks]

[7 markah]

**SECTION C: 30 MARKS****BAHAGIAN C: 30 MARKAH****INSTRUCTION:**

This section consists of **TWO (2)** essay questions. Answer **ALL** questions.

**ARAHAN:**

*Bahagian ini mengandungi DUA (2) soalan esei. Jawab SEMUA soalan.*

**QUESTION 1****SOALAN 1**

CLO2  
C3

A 33 kV three phase transmission line has a resistance of  $3\Omega$  and reactance of  $5\Omega$  per phase. Calculate the transmission efficiency and percentage regulation of the line, when the total load of 50MVA at 0.8 lagging power factor is supplied at 33 kV at the receiving end.

*Sebuah talian penghantar tiga fasa 33 kV mempunyai rintangan  $3\Omega$  dan kearuhan  $5\Omega$  bagi setiap fasa. Kirakan kecekapan penghantaran dan peratus pengaturan talian jika beban hujung penerima ialah 50MVA, faktor kuasa 0.8 mengekor dan voltan di hujung penerima adalah 33 kV.*

[15 marks]

[15 markah]

**QUESTION 2****SOALAN 2**CLO2  
C3

Electricity supply starts from generating system, transmission system and distribution system. Transmission system consists of the main transmission system and the secondary transmission system while the distribution system consists of the main distribution system and a secondary distribution system. Sketch a single line diagram for the above system starting from an 11 kV generation station, and explain briefly about the distribution system.

*Bekalan kuasa elektrik bermula dari sistem penjanaan, sistem penghantaran dan sistem pengagihhan. Sistem penghantaran terdiri daripada penghantaran utama dan penghantaran sekunder manakala sistem pengagihhan pula terdiri daripada sistem pengagihhan utama dan sistem pengagihhan sekunder. Lakarkan gambarajah garis tunggal bagi sistem bermula dari stesen janakuasa 11 kV, dan terangkan dengan ringkas sistem pengagihhan tersebut.*

[15 marks]

[15 markah]

**SOALAN TAMAT**