

**PENTAKSIRAN DIAGNOSTIK AKADEMIK  
SEKOLAH BERASRAMA PENUH 2026****PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA****FIZIK****Kertas 1 & Kertas 2****Ogos 2026****4531/1 dan 4531/2 (PP)****PERATURAN PEMARKAHAN****FIZIK****KERTAS 1 & KERTAS 2****UNTUK KEGUNAAN PEMERIKSA SAHAJA****AMARAN**

Peraturan pemarkahan ini **SULIT** dan **Hak Cipta Sekolah Berasrama Penuh**. Kegunaannya khusus untuk pemeriksa yang berkenaan sahaja. Sebarang maklumat dalam peraturan pemarkahan ini tidak boleh dimaklumkan kepada sesiapa. Peraturan pemarkahan ini tidak boleh dikeluarkan dalam apa-apa jua bentuk penulisan dan percetakan.

|                                                                  |   |  |
|------------------------------------------------------------------|---|--|
| <b>NAMA PEMERIKSA</b>                                            | : |  |
| <b>NAMA SEKOLAH</b>                                              | : |  |
| <b>TANDA TANGAN<br/>PENERIMAAN<br/>PERATURAN<br/>PERMARKAHAN</b> | : |  |
| <b>TARIKH</b>                                                    | : |  |
| <b>COP SEKOLAH</b>                                               | : |  |

**PENTAKSIRAN DIAGNOSTIK AKADEMIK  
PEPERIKSAAN PERCUBAAN SPM SBP 2026**

**PANDUAN PEMARKAHAN FIZIK KERTAS 1 (PP 4531/1)**

| NO | JAWAPAN        | NO | JAWAPAN | NO | JAWAPAN | NO | JAWAPAN |
|----|----------------|----|---------|----|---------|----|---------|
| 1  | C              | 11 | D       | 21 | D       | 31 | D       |
| 2  | C              | 12 | B       | 22 | C       | 32 | A       |
| 3  | B              | 13 | C       | 23 | C       | 33 | C       |
| 4  | A <del>X</del> | 14 | A       | 24 | D       | 34 | C       |
| 5  | B              | 15 | D       | 25 | B       | 35 | A       |
| 6  | C              | 16 | A       | 26 | A       | 36 | B       |
| 7  | C              | 17 | C       | 27 | B       | 37 | C       |
| 8  | D              | 18 | C       | 28 | C       | 38 | C       |
| 9  | A              | 19 | D       | 29 | C       | 39 | B       |
| 10 | D              | 20 | C       | 30 | B       | 40 | D       |

**Analisis Skor dan Respon Murid Mengikut Kelas**

| Kelas/<br>Kumpulan | Skor<br>Purata | Skor<br>Terendah | Skor<br>Tertinggi | Respon salah yang ketara<br>(Nombor soalan) | Catatan |
|--------------------|----------------|------------------|-------------------|---------------------------------------------|---------|
|                    |                |                  |                   |                                             |         |
|                    |                |                  |                   |                                             |         |
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|                    |                |                  |                   |                                             |         |
|                    |                |                  |                   |                                             |         |

**PANDUAN PEMARKAHAN FIZIK KERTAS 2 (PP 4531/2)**

**SOALAN 1**

| Soalan        | Panduan Pemarkahan                                                                                                      | Markah | Jumlah Markah | Kesalahan Umum Murid / Catatan |
|---------------|-------------------------------------------------------------------------------------------------------------------------|--------|---------------|--------------------------------|
| (a)           | Kadar perubahan sesaran<br><i>Rate of change of displacement</i>                                                        | 1      | 1             |                                |
| (b)           | Sifar / 0 N<br><i>Zero</i>                                                                                              | 1      | 1             |                                |
| (c) (i)       | Pecutan seragam / Halaju bertambah dengan seragam<br><i>Uniform acceleration / Velocity increases uniformly</i>         | 1      | 1             |                                |
| (ii)          | Daya paduan terhasil / Daya paduan $\neq 0$<br><i>Resultant force is produced / Resultant force <math>\neq 0</math></i> | 1      | 1             |                                |
| <b>Jumlah</b> |                                                                                                                         |        | <b>4</b>      |                                |

Catatan:

**SOALAN 2**

| Soalan        | Panduan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Markah                          | Jumlah Markah | Kesalahan Umum Murid / Catatan |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------|--------------------------------|
| (a)           | Kesan fotoelektrik<br><i>Photoelectric effect</i>                                                                                                                                                                                                                                                                                                                                                                                                                       | 1                               | 1             |                                |
| (b)           | <b>M1 Penukaran unit betul</b><br>$4.55 \times 10^{-7}$ atau $455 \times 10^{-9}$<br><b>M2 Gantian yang betul</b><br>$6.63 \times 10^{-34} \left( \frac{3 \times 10^8}{4.55 \times 10^{-7}} \right) = 3.67 \times 10^{-19} +$<br>$K_{\text{maks}}$ atau<br>$K_{\text{maks}} = 6.63 \times 10^{-34} \left( \frac{3 \times 10^8}{4.55 \times 10^{-7}} \right) -$<br>$3.67 \times 10^{-19}$<br><b>M3 Jawapan dan unit yang betul</b><br>$7.0142 \times 10^{-20} \text{ J}$ | 1<br><br>1<br><br><br><br><br>1 | 3             |                                |
| (c)           | Frekuensi cahaya (biru) < frekuensi ambang /<br>Tenaga foton < fungsi kerja<br><i>Frequency of light (blue) &lt; threshold frequency / Photon energy &lt; work function</i>                                                                                                                                                                                                                                                                                             | 1                               | 1             |                                |
| <b>Jumlah</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                 | <b>5</b>      |                                |

Catatan:

## SOALAN 3

| Soalan | Panduan Pemarkahan                                                                                                                                                                | Markah              | Jumlah Markah | Kesalahan Umum Murid / Catatan |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------|--------------------------------|
| (a)    | Kedalaman / Ketumpatan cecair /<br>Pecutan graviti<br><i>Depth / Density of liquid /<br/>Gravitational acceleration</i>                                                           | 1                   | 1             |                                |
| (b)    | <b>M1 Penukaran unit betul</b><br>0.285<br><b>M2 Gantian yang betul</b><br>(0.285)(1000)(9.81)<br><b>M3 Jawapan dan unit yang betul</b><br>2795.85 Pa / 2795.85 N m <sup>-2</sup> | 1<br><br>1<br><br>1 | 3             |                                |
| (c)    | (i) Bertambah<br><i>Increase</i>                                                                                                                                                  | 1                   | 1             |                                |
| (c)    | (ii) Ketumpatan (air laut) lebih tinggi<br><i>The density (of seawater) is higher</i>                                                                                             | 1                   | 1             |                                |
|        |                                                                                                                                                                                   | <b>Jumlah</b>       | <b>6</b>      |                                |

Catatan:

## SOALAN 4

| Soalan    | Panduan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Markah          | Jumlah Markah | Kesalahan Umum Murid / Catatan |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------|--------------------------------|
| (a)       | <p>Tindak balas nuklear apabila <u>satu nukleus berat</u> terbelah menjadi <u>dua</u> (atau lebih) <u>nukleus ringan</u> dengan <u>membebaskan dua</u> (atau tiga) <u>neutron</u> dan <u>tenaga</u> yang banyak.</p> <p><i>A nuclear reaction when a heavy nucleus splits into two (or more) lighter nuclei by releasing two (or three) neutrons and a lot of energy.</i></p>                                                                                                                                             | 1               | 1             |                                |
| (b)       | <p>Menyerap neutron berlebihan.</p> <p><i>Absorbs excess neutrons.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1               | 1             |                                |
| (c)       | <p><b>M1</b> <u>Neutron</u> yang dihasilkan dari pembelahan nukleus akan <u>membedil nukleus uranium</u> yang <u>lain</u></p> <p><i>Neutron produced from nuclear fission will bombard other uranium nuclei</i></p> <p><b>M2</b> Maka <u>neutron</u> yang <u>baharu</u> dihasilkan</p> <p><i>Then new neutrons are produced</i></p> <p><b>M3</b> <u>Pembelahan nukleus</u> berlaku (kepada nukleus uranium lain) <u>secara berterusan</u></p> <p><i>Nuclear fission occurs (to other uranium nuclei) continuously</i></p> | 1<br><br>1<br>1 | Maks<br>2     |                                |
| (d) (i)   | 144                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1               | 1             |                                |
| (d) (ii)  | <p><b>M1</b> <b>Gantian yang betul</b><br/> <math>[235.043923 + 1.008665 - 143.938945 - 89.907738 - 2(1.008665)] \times (1.66 \times 10^{-27})</math> atau<br/> <math>0.188575 (1.66 \times 10^{-27})</math></p> <p><b>M2</b> <b>Jawapan dan unit yang betul</b><br/> <math>3.130345 \times 10^{-28} \text{ kg}</math></p>                                                                                                                                                                                                | 1<br><br>1      | 2             |                                |
| (d) (iii) | <p><b>M1</b> <b>Gantian yang betul</b><br/> <math>(3.130345 \times 10^{-28})(3 \times 10^8)^2</math> atau<br/> <math>(\text{ecf } 4(c)(ii))(3 \times 10^8)^2</math></p> <p><b>M2</b> <b>Jawapan dan unit yang betul</b><br/> <math>2.8173105 \times 10^{-11} \text{ J}</math></p>                                                                                                                                                                                                                                         | 1<br><br>1      | 2             |                                |
|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Jumlah</b>   | <b>9</b>      |                                |

## SOALAN 5

| Soalan        | Panduan Pemarkahan                                                                                                                                                                                                                                                                                   | Markah | Jumlah Markah | Kesalahan Umum Murid / Catatan |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|--------------------------------|
| (a)           | Bilangan ayunan/getaran lengkap dalam satu saat.<br><i>Number of complete oscillations/vibrations in one second.</i>                                                                                                                                                                                 | 1      | 1             |                                |
| (b)           | (i) frekuensi tala bunyi Rajah 5.1 > Rajah 5.2 /<br>frekuensi tala bunyi X > Y<br><i>frequency of tuning fork Diagram 5.1 &gt; Diagram 5.2 / frequency of tuning fork X &gt; Y</i>                                                                                                                   | 1      | 1             |                                |
|               | (ii) jarak antara dua kawasan mampatan berturutan<br>Rajah 5.1 < Rajah 5.2 / jarak antara dua<br>kawasan mampatan berturutan X < Y<br><i>the distance between two consecutive compression region Diagram 5.1 &lt; Diagram 5.2 / the distance between two consecutive compression region X &lt; Y</i> | 1      | 1             |                                |
|               | (iii) panjang gelombang Rajah 5.1 < Rajah 5.2 /<br>panjang gelombang X < Y<br><i>the wavelength Diagram 5.1 &lt; Diagram 5.2 / the wavelength X &lt; Y</i>                                                                                                                                           | 1      | 1             |                                |
|               | (iv) Sama<br><i>Same</i>                                                                                                                                                                                                                                                                             | 1      | 1             |                                |
| (c)           | Frekuensi tala bunyi berkurang, panjang gelombang bertambah<br><i>the frequency of tuning fork decreases, the wavelength increases</i>                                                                                                                                                               | 1      | 1             |                                |
| (d)           | <b>M1 Gantian yang betul</b><br>$\frac{340}{512}$                                                                                                                                                                                                                                                    | 1      |               |                                |
|               | <b>M2 Jawapan dan unit yang betul</b><br>0.6640625 m                                                                                                                                                                                                                                                 | 1      | 2             |                                |
| (e)           | Tenaga dipindahkan<br><i>Energy is transferred</i>                                                                                                                                                                                                                                                   | 1      | 1             |                                |
| <b>Jumlah</b> |                                                                                                                                                                                                                                                                                                      |        | <b>9</b>      |                                |

Catatan:

## SOALAN 7

| Soalan |      | Panduan Pemarkahan                                                                                                                                                                                                                                                                                                                     | Markah                      | Jumlah Markah             | Kesalahan Umum Murid / Catatan |
|--------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------|--------------------------------|
| (a)    |      | Pancaran termion<br><i>Thermionic emission</i>                                                                                                                                                                                                                                                                                         | 1                           | 1                         |                                |
| (b)    |      | <b>M1</b> Penukaran unit betul<br>2500 atau $2.5 \times 10^3$<br><b>M2</b> Gantian yang betul<br>$(1.6 \times 10^{-19})(2500) = \frac{1}{2}(9.11 \times 10^{-31})(v)^2$<br>atau<br>$v = \sqrt{\frac{2(1.6 \times 10^{-19})(2500)}{(9.11 \times 10^{-31})}}$<br><b>M3</b> Jawapan dan unit yang betul<br>$29633694.89 \text{ m s}^{-1}$ | 1<br><br>1<br><br><br><br>1 | <br><br><br><br><br><br>3 |                                |
| (c)    | (i)  | <b>M1</b> Tinggi<br><i>High</i><br><br><b>M2</b> Kekuatan medan elektrik bertambah /<br>Daya bertambah /<br>Pesongan sinar katod bertambah<br><i>Electric field strength increases /</i><br><i>Power increases /</i><br><i>Deflection of cathode rays increases</i>                                                                    | 1<br><br>1                  | <br><br>2                 |                                |
| (c)    | (ii) | <b>M1</b> Aluminium<br><i>Aluminium</i><br><br><b>M2</b> Rintangan rendah /<br>Kekuatan medan elektrik bertambah<br><i>Low resistance /</i><br><i>Electric field strength increases</i>                                                                                                                                                | 1<br><br>1                  | <br><br>2                 |                                |
| (d)    |      | <b>R</b>                                                                                                                                                                                                                                                                                                                               | 1                           | 1                         |                                |
|        |      |                                                                                                                                                                                                                                                                                                                                        | <b>Jumlah</b>               | <b>9</b>                  |                                |

Catatan:

## SOALAN 8

| Soalan | Panduan Pemarkahan                                                                                                                                                                                                                             | Markah     | Jumlah Markah | Kesalahan Umum Murid / Catatan |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|--------------------------------|
| (a)    | Pembiasan<br><i>Refraction</i>                                                                                                                                                                                                                 | 1          | 1             |                                |
| (b)    | <b>M1</b> Gantian yang betul<br>$\frac{10.5}{200} = \frac{h_1}{75}$<br><b>M2</b> Jawapan dan unit yang betul<br>3.9375 cm                                                                                                                      | 1<br><br>1 | <br><br>2     |                                |
| (c)    | (i) <b>M1</b> Tinggi / Lebih / Besar<br><i>High / More / Big</i><br><b>M2</b> Banyak cahaya masuk ke dalam kanta /<br>Imej lebih terang<br><i>More light enter into the lens / Brighter image</i>                                              | 1<br><br>1 | <br><br>2     |                                |
|        | (ii) <b>M1</b> Tinggi / Lebih / Besar<br><i>High / More / Big</i><br><b>M2</b> Panjang fokus pendek / Pembesaran linear besar /<br>Imej lebih besar<br><i>Focal length is short / Large linear magnification /<br/>           Larger image</i> | 1<br><br>1 | <br><br>2     |                                |
|        | (iii) <b>M1</b> Hasil tambah panjang fokus kedua-dua kanta /<br>$L = f_o + f_e$<br><i>The sum of the focal lengths of the two lenses</i><br><br><b>M2</b> Pelarasan normal<br><i>Normal adjustment</i>                                         | 1<br><br>1 | <br><br>2     |                                |
| Jumlah |                                                                                                                                                                                                                                                |            | 9             |                                |

## SOALAN 9

| Soalan | Panduan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Markah                                | Jumlah Markah                     | Kesalahan Umum Murid / Catatan |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------|--------------------------------|
| (a)    | Penghasilan d.g.e. dalam suatu konduktor apabila terdapat gerakan relatif konduktor merentasi suatu medan magnet.<br><i>Production of d.g.e. in a conductor when there is a relative motion of the conductor across a magnetic field.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                                     | 1                                 |                                |
| (b)    | (i) <b>M1</b> Apabila magnet bergerak mendekati gelang, kadar perubahan fluks magnet berlaku di gelang (aluminium ringan)<br><i>As the magnet moves closer to the ring, the rate of change of magnetic flux occurs in (light aluminium) ring</i><br><br><b>M2</b> D.g.e. aruhan terhasil dalam gelang<br><i>Induced e.m.f. is produced in the ring</i><br><br><b>M3</b> Arus aruhan mengalir dalam gelang<br><i>Induced current flows in the ring</i><br><br><b>M4</b> Mengikut Hukum Lenz, arus aruhan mengalir ke arah yang menentang perubahan fluks magnet yang menyebabkannya<br><i>According to Lenz's Law, the induced current flows in the direction that opposes the change in magnetic flux that causes it.</i><br><br><b>M5</b> Arus aruhan menghasilkan daya (tolakan yang menyebabkan cincin tersesar).<br><i>Induced current produce a (repulsive) force (cause the ring displaced).</i> | 1<br><br>1<br><br>1<br><br>1<br><br>1 | <br><br><br><br><br><br>Maks<br>3 |                                |
| (b)    | (ii) Bilangan magnet bertambah / Laju (gerakan) relatif magnet bertambah<br><i>Number of magnets increases / Relative speed (motion) of magnets increases</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                                     | 1                                 |                                |
| (c)    | (i) <b>M1</b> Gantian yang betul<br>$\frac{V_p}{3.2} = \frac{11}{7}$<br><b>M2</b> Jawapan dan unit yang betul<br>$V_p = 5.028 \text{ V}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1<br><br>1                            | <br><br>2                         |                                |

| (c)    | (ii) | M1 Penukaran unit betul<br>20×10 <sup>-3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1                                                                                                                                                                                                                                                             | 3                      |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|--------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------|-----|----|--|
|        |      | M2 Gantian yang betul<br>(5.028) I <sub>p</sub> = (3.2) (20×10 <sup>-3</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1                                                                                                                                                                                                                                                             |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        |      | M3 Jawapan dan unit yang betul<br>I <sub>p</sub> = 0.0127 A / 0.013 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                                                                                                                                                                                                                                                             |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                               |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
| (d)    |      | <table><tr><th>Ciri<br/><i>Characteristic</i></th><th>Sebab<br/><i>Reason</i></th></tr><tr><td>M1<br/>Bilangan gegelung pemancar :<br/>Tinggi/Besar<br/><i>Number of transmitter coil : High/Large</i></td><td>M2<br/>Kekuatan medan magnet bertambah<br/><i>The strength of the magnetic field increases</i></td></tr><tr><td>M3<br/>Bilangan lilitan gegelung penerima :<br/>Tinggi<br/><i>Number of turns of receiver coil : High</i></td><td>M4<br/>Kadar perubahan fluks magnet bertambah /<br/>Arus aruhan bertambah<br/><i>The rate of change of magnetic flux increases /<br/>Induced current increases</i></td></tr><tr><td>M5<br/>Ketebalan dawai gegelung : Tebal<br/><i>Thickness of coil wire : Thick</i></td><td>M6<br/>Rintangan rendah / Arus bertambah /<br/>Kekuatan medan magnet bertambah /<br/>Kadar perubahan fluks magnet bertambah<br/><i>Low resistance / Current increases /<br/>Magnetic field strength increases /<br/>Rate of change of magnetic flux increases</i></td></tr><tr><td>M7<br/>Jenis arus yang mengalir dalam gegelung pemancar :<br/>Arus ulang-alik<br/><i>Type of current flows in the transmitter coil :<br/>Alternating current</i></td><td>M8<br/>Berlaku kadar perubahan fluks magnet dalam logam atau gegelung penerima<br/><i>The rate of change of magnetic flux in the metal or receiver coil occurs</i></td></tr><tr><td>M9<br/>T</td><td>M10<br/>Semua ciri dinyatakan betul.</td></tr></table> | Ciri<br><i>Characteristic</i>                                                                                                                                                                                                                                 | Sebab<br><i>Reason</i> | M1<br>Bilangan gegelung pemancar :<br>Tinggi/Besar<br><i>Number of transmitter coil : High/Large</i> | M2<br>Kekuatan medan magnet bertambah<br><i>The strength of the magnetic field increases</i> | M3<br>Bilangan lilitan gegelung penerima :<br>Tinggi<br><i>Number of turns of receiver coil : High</i> | M4<br>Kadar perubahan fluks magnet bertambah /<br>Arus aruhan bertambah<br><i>The rate of change of magnetic flux increases /<br/>Induced current increases</i> | M5<br>Ketebalan dawai gegelung : Tebal<br><i>Thickness of coil wire : Thick</i> | M6<br>Rintangan rendah / Arus bertambah /<br>Kekuatan medan magnet bertambah /<br>Kadar perubahan fluks magnet bertambah<br><i>Low resistance / Current increases /<br/>Magnetic field strength increases /<br/>Rate of change of magnetic flux increases</i> | M7<br>Jenis arus yang mengalir dalam gegelung pemancar :<br>Arus ulang-alik<br><i>Type of current flows in the transmitter coil :<br/>Alternating current</i> | M8<br>Berlaku kadar perubahan fluks magnet dalam logam atau gegelung penerima<br><i>The rate of change of magnetic flux in the metal or receiver coil occurs</i> | M9<br>T | M10<br>Semua ciri dinyatakan betul. | 1+1 | 10 |  |
|        |      | Ciri<br><i>Characteristic</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Sebab<br><i>Reason</i>                                                                                                                                                                                                                                        |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        |      | M1<br>Bilangan gegelung pemancar :<br>Tinggi/Besar<br><i>Number of transmitter coil : High/Large</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | M2<br>Kekuatan medan magnet bertambah<br><i>The strength of the magnetic field increases</i>                                                                                                                                                                  |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        |      | M3<br>Bilangan lilitan gegelung penerima :<br>Tinggi<br><i>Number of turns of receiver coil : High</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | M4<br>Kadar perubahan fluks magnet bertambah /<br>Arus aruhan bertambah<br><i>The rate of change of magnetic flux increases /<br/>Induced current increases</i>                                                                                               |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        |      | M5<br>Ketebalan dawai gegelung : Tebal<br><i>Thickness of coil wire : Thick</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | M6<br>Rintangan rendah / Arus bertambah /<br>Kekuatan medan magnet bertambah /<br>Kadar perubahan fluks magnet bertambah<br><i>Low resistance / Current increases /<br/>Magnetic field strength increases /<br/>Rate of change of magnetic flux increases</i> |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        |      | M7<br>Jenis arus yang mengalir dalam gegelung pemancar :<br>Arus ulang-alik<br><i>Type of current flows in the transmitter coil :<br/>Alternating current</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | M8<br>Berlaku kadar perubahan fluks magnet dalam logam atau gegelung penerima<br><i>The rate of change of magnetic flux in the metal or receiver coil occurs</i>                                                                                              |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        |      | M9<br>T                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | M10<br>Semua ciri dinyatakan betul.                                                                                                                                                                                                                           |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        | 1+1  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                               |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        | 1+1  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                               |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        | 1+1  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                               |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        | 1+1  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                               |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        | 1+1  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                               |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
|        | 1+1  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                               |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |
| Jumlah |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 20                                                                                                                                                                                                                                                            |                        |                                                                                                      |                                                                                              |                                                                                                        |                                                                                                                                                                 |                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                               |                                                                                                                                                                  |         |                                     |     |    |  |

Catatan:

## SOALAN 10

| Soalan   | Panduan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                               | Markah              | Jumlah Markah | Kesalahan Umum Murid / Catatan |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------|--------------------------------|
| (a)      | Kadar pengaliran cas.<br><i>Rate of flow of charge</i>                                                                                                                                                                                                                                                                                                                                                           | 1                   | 1             |                                |
| (b)      | <b>M1</b> Apabila cahaya matahari dikenakan ke atas sel suria, kesan fotoelektrik berlaku<br><i>When sunlight falls on a solar cell, the photoelectric effect occurs.</i><br><b>M2</b> Tenaga cahaya/suria ditukarkan kepada tenaga elektrik<br><i>Light/solar energy is converted into electrical energy</i><br><b>M3</b> Arus mengalir (untuk mengecas bateri)<br><i>Current flows (to charge the battery)</i> | 1<br><br>1<br><br>1 | Maks<br>2     |                                |
| (c)      | <b>M1</b> Dawai kuprum yang lebih tebal<br><i>Thicker copper wire</i><br><b>M2</b> Rintangan rendah<br><i>Low resistance</i><br><b>M3</b> Kurang tenaga haba dihasilkan<br><i>Less heat energy is produced</i>                                                                                                                                                                                                   | 1<br><br>1<br><br>1 | Maks<br>2     |                                |
| (d) (i)  | <b>M1</b> Gantian yang betul<br>$\frac{(9^2)}{(20)}$<br><b>M2</b> Jawapan dan unit yang betul<br>$4.05 \Omega$                                                                                                                                                                                                                                                                                                   | 1<br><br>1          | 2             |                                |
| (d) (ii) | <b>M1</b> Penukaran unit betul<br>$30 \times 60$<br><b>M2</b> Gantian yang betul<br>$(9)(2.22)(30 \times 60)$<br><b>M3</b> Jawapan dan unit yang betul<br>$35964 \text{ J}$                                                                                                                                                                                                                                      | 1<br><br>1<br><br>1 | 3             |                                |

| (e)     |                                                                             | <table><tr><th>Ciri<br/><i>Characteristic</i></th><th>Sebab<br/><i>Reason</i></th></tr><tr><td>M1<br/>Bilangan sel suria :<br/>Banyak<br/><i>Number of solar cell : More</i></td><td>M2<br/>Banyak tenaga suria/cahaya ditukar kepada tenaga elektrik<br/><i>More solar/light energy is converted into electrical energy</i></td></tr><tr><td>M3<br/>Saiz kipas : Besar<br/><i>Size of fan : Big</i></td><td>M4<br/>Banyak haba disedut keluar ke persekitaran<br/><i>More heat is sucked out into surrounding</i></td></tr><tr><td>M5<br/>Bilangan bateri :<br/>Banyak<br/><i>Number of batteries : More</i></td><td>M6<br/>d.g.e. bertambah / Voltan bertambah / Arus bertambah<br/><i>e.m.f. increases / Voltage increases / Current increases</i></td></tr><tr><td>M7<br/>Susunan bateri:<br/>Bersiri<br/><i>Arrangement of batteries: Series</i></td><td>M8<br/>d.g.e. bertambah / Voltan bertambah / Arus bertambah<br/><i>e.m.f. increases / Voltage increases / Current increases</i></td></tr><tr><td>M9<br/>M</td><td>M10<br/>Semua ciri dinyatakan betul.</td></tr></table> | Ciri<br><i>Characteristic</i> | Sebab<br><i>Reason</i> | M1<br>Bilangan sel suria :<br>Banyak<br><i>Number of solar cell : More</i> | M2<br>Banyak tenaga suria/cahaya ditukar kepada tenaga elektrik<br><i>More solar/light energy is converted into electrical energy</i> | M3<br>Saiz kipas : Besar<br><i>Size of fan : Big</i> | M4<br>Banyak haba disedut keluar ke persekitaran<br><i>More heat is sucked out into surrounding</i> | M5<br>Bilangan bateri :<br>Banyak<br><i>Number of batteries : More</i> | M6<br>d.g.e. bertambah / Voltan bertambah / Arus bertambah<br><i>e.m.f. increases / Voltage increases / Current increases</i> | M7<br>Susunan bateri:<br>Bersiri<br><i>Arrangement of batteries: Series</i> | M8<br>d.g.e. bertambah / Voltan bertambah / Arus bertambah<br><i>e.m.f. increases / Voltage increases / Current increases</i> | M9<br>M | M10<br>Semua ciri dinyatakan betul. | 1+1 | 1+1 | 1+1 | 1+1 | 10 |
|---------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------|-----|-----|-----|-----|----|
|         | Ciri<br><i>Characteristic</i>                                               | Sebab<br><i>Reason</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                               |                        |                                                                            |                                                                                                                                       |                                                      |                                                                                                     |                                                                        |                                                                                                                               |                                                                             |                                                                                                                               |         |                                     |     |     |     |     |    |
|         | M1<br>Bilangan sel suria :<br>Banyak<br><i>Number of solar cell : More</i>  | M2<br>Banyak tenaga suria/cahaya ditukar kepada tenaga elektrik<br><i>More solar/light energy is converted into electrical energy</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |                        |                                                                            |                                                                                                                                       |                                                      |                                                                                                     |                                                                        |                                                                                                                               |                                                                             |                                                                                                                               |         |                                     |     |     |     |     |    |
|         | M3<br>Saiz kipas : Besar<br><i>Size of fan : Big</i>                        | M4<br>Banyak haba disedut keluar ke persekitaran<br><i>More heat is sucked out into surrounding</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                               |                        |                                                                            |                                                                                                                                       |                                                      |                                                                                                     |                                                                        |                                                                                                                               |                                                                             |                                                                                                                               |         |                                     |     |     |     |     |    |
|         | M5<br>Bilangan bateri :<br>Banyak<br><i>Number of batteries : More</i>      | M6<br>d.g.e. bertambah / Voltan bertambah / Arus bertambah<br><i>e.m.f. increases / Voltage increases / Current increases</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                        |                                                                            |                                                                                                                                       |                                                      |                                                                                                     |                                                                        |                                                                                                                               |                                                                             |                                                                                                                               |         |                                     |     |     |     |     |    |
|         | M7<br>Susunan bateri:<br>Bersiri<br><i>Arrangement of batteries: Series</i> | M8<br>d.g.e. bertambah / Voltan bertambah / Arus bertambah<br><i>e.m.f. increases / Voltage increases / Current increases</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                        |                                                                            |                                                                                                                                       |                                                      |                                                                                                     |                                                                        |                                                                                                                               |                                                                             |                                                                                                                               |         |                                     |     |     |     |     |    |
| M9<br>M | M10<br>Semua ciri dinyatakan betul.                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                               |                        |                                                                            |                                                                                                                                       |                                                      |                                                                                                     |                                                                        |                                                                                                                               |                                                                             |                                                                                                                               |         |                                     |     |     |     |     |    |
| Jumlah  |                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                               |                        | 20                                                                         |                                                                                                                                       |                                                      |                                                                                                     |                                                                        |                                                                                                                               |                                                                             |                                                                                                                               |         |                                     |     |     |     |     |    |

Catatan:

## SOALAN 11

| Soalan | Panduan Pemarkahan                                                                                                                                                                                                             | Markah | Jumlah Markah | Kesalahan Umum Murid / Catatan |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|--------------------------------|
| (a)    | Kuantiti haba yang diperlukan untuk menaikkan suhu sebanyak 1°C bagi jisim 1 kg bahan<br><i>Quantity of heat energy needed to raise the temperature of 1 kg mass by 1°C</i>                                                    | 1      | 1             |                                |
| (b)    | <b>M1</b> Besi mempunyai muatan haba tentu lebih rendah daripada kayu<br><i>Iron has a lower specific heat capacity than wood</i>                                                                                              | 1      |               |                                |
|        | <b>M2</b> Kedua-dua bangku menerima tenaga haba yang sama daripada matahari<br><i>Both benches receive the same amount of heat energy from the sun.</i>                                                                        | 1      |               |                                |
|        | <b>M3</b> Perubahan suhu bangku besi lebih tinggi bila menerima haba daripada cahaya matahari<br><i>Changes in the temperature of iron bench is high when receiving heat from sunlight</i>                                     | 1      |               |                                |
|        | <b>M4</b> Suhu bangku besi > bangku kayu<br><i>Temperature of iron bench &gt; wooden bench</i>                                                                                                                                 | 1      |               |                                |
|        | <b>M5</b> Maka lebih banyak haba dipindahkan dari bangku besi ke tangan dalam masa yang singkat<br><i>So more heat is transferred from the iron bench to hand in a short time</i>                                              | 1      | Maks<br>4     |                                |
| (c)    | (i) <b>Menyatakan perbandingan dengan betul</b>                                                                                                                                                                                |        |               |                                |
|        | <b>M1</b> Muatan haba tentu kualiti seramik > kualiti keluli<br><i>Specific heat capacity ceramic pan &gt; steel pan</i>                                                                                                       | 1      |               |                                |
|        | <b>M2</b> Perubahan suhu daging dalam kualiti seramik < kualiti keluli<br><i>Change in temperature of meat in ceramic pan &lt; steel pan</i>                                                                                   | 1      |               |                                |
|        | <b>M3</b> Kadar pemindahan haba dari kualiti seramik ke daging < kualiti keluli<br><i>Rate of heat transfer from ceramic pan to meat &lt; steel pan</i>                                                                        | 1      | 3             |                                |
| (c)    | (ii) <b>Menyatakan hubungan dengan betul</b>                                                                                                                                                                                   |        |               |                                |
|        | <b>M4</b> Muatan haba tentu kualiti berkurang, perubahan suhu daging bertambah<br><i>Specific heat capacity of pan decrease, change in temperature of the meat increases.</i>                                                  | 1      |               |                                |
|        | <b>M5</b> Perubahan suhu daging bertambah, kadar pemindahan haba dari kualiti ke daging bertambah<br><i>The change in temperature of the meat increases, and the rate of heat transfer from the pan to the meat increases.</i> | 1      | 2             |                                |

(d)

| Ciri<br><i>Characteristic</i>                                                                                                                                  | Sebab<br><i>Reason</i>                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>M1</b><br>Bahan penutup atas: Kaca lutsinar / Plastik lutsinar<br><i>Top cover material: Transparent glass / Transparent plastic</i>                        | <b>M2</b><br>Mengurangkan kehilangan haba ke persekitaran /<br>Membenarkan cahaya melaluinya dan memerangkap haba (kesan rumah hijau)<br><i>Reduces heat loss to surrounding / Allows light to pass through and traps heat (greenhouse effect)</i> |
| <b>M3</b><br>Penutup atas : Nipis<br><i>Top cover: Thin</i>                                                                                                    | <b>M4</b><br>Banyak haba masuk ke dalam pemanas air solar /<br>Memerangkap lebih banyak haba<br><i>More heat flow into the solar water heater / Trap more heat</i>                                                                                 |
| <b>M5</b><br>Bahan paip aliran air: Keluli / Kuprum / muatan haba tentu rendah<br><i>Water flow pipe material: Steel / Copper / low specific heat capacity</i> | <b>M6</b><br>Banyak haba dipindahkan dalam satu masa / Konduktor haba yang baik<br><i>More heat is transferred at one time / Good heat conductor</i>                                                                                               |
| <b>M7</b><br>Bentuk paip aliran air: Banyak gegelung / Banyak lingkaran<br><i>Water flow pipe material: Many coils / Many circles</i>                          | <b>M8</b><br>Banyak haba dipindahkan dalam satu masa<br><i>More heat is transferred at one time</i>                                                                                                                                                |
| <b>M9</b><br>Bahan panel penyerap haba: Muatan haba tentu rendah<br><i>Heat absorber panel material: Low specific heat capacity</i>                            | <b>M10</b><br>Konduktor haba yang baik / Banyak haba diserap dalam satu masa<br><i>Good heat conductor / More heat is absorbed at one time</i>                                                                                                     |
| <b>M11</b><br>Panel penyerap haba: (warna) hitam<br><i>Heat absorber panel: black (color)</i>                                                                  | <b>M12</b><br>Banyak haba diserap dalam satu masa / Penyerap haba yang baik<br><i>More heat is absorbed at one time / Good heat absorber</i>                                                                                                       |

1+1

1+1

1+1

1+1

1+1

1+1

Maks  
10

|               |                                                                                                                                                                                             |                                                                                                                                                                                         |           |  |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--|
|               | <p><b>M13</b><br/>Bahan lapisan luar tangki simpanan: Gentian kaca / Muatan haba tentu tinggi<br/><i>Outer layer material of storage tank: fiberglass / High specific heat capacity</i></p> | <p><b>M14</b><br/>Kurang kehilangan haba dari air panas ke persekitaran / Penebat haba yang baik<br/><i>Less heat loss from hot water to the surroundings / Good heat insulator</i></p> | 1+1       |  |
|               | <p><b>M15</b><br/>Lapisan luar tangki simpanan: Tangki dinding berlapis<br/><i>Outer layer of storage tank: Double-walled tank</i></p>                                                      | <p><b>M16</b><br/>Kurang kehilangan haba dari air panas ke persekitaran<br/><i>Less heat loss from hot water to the surroundings</i></p>                                                | 1+1       |  |
| <b>Jumlah</b> |                                                                                                                                                                                             |                                                                                                                                                                                         | <b>20</b> |  |

Catatan:

#### PERATURAN PEMARKAHAN TAMAT