 Province of the

EASTERN CAPE

EDUCATION

**DIRECTORATE SENIOR CURRICULUM MANAGEMENT (SEN-FET)**

**HOME SCHOOLING SELF-STUDY WORKSHEET**

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| **SUBJECT** | ELECTRICAL TECHNOLOGY-POWER SYSTEMS | **GRADE** | 12 | **DATE** |  |
| **TOPIC** | THREE PHASE MOTORS & STARTERS | **TERM 1****REVISION** | (Please tick) | **TERM 2 CONTENT** | (✓) |
| **TIME ALLOCATION** | 1 HOUR | **TIPS TO KEEP HEALTHY**1. **WASH YOUR HANDS** thoroughly with soap and water for at least 20 seconds. Alternatively, use hand sanitizer with an alcohol content of at least 60%.2. **PRACTICE SOCIAL DISTANCING** – keep a distance of 1m away from other people.3. **PRACTISE GOOD RESPIRATORY HYGIENE**: cough or sneeze into your elbow or tissue and dispose of the tissue immediately after use.4. **TRY NOT TO TOUCH YOUR FACE.** The virus can be transferred from your hands to your nose, mouth and eyes. It can then enter your body and make you sick. 5. **STAY AT HOME.**  |
| **INSTRUCTIONS** | Use Step Into Electrical Technology Grade 12-Learner guide and read: Chapter 5-Three Phase Motors and Starters, then answer the questions on Worksheets below.  |

**WORKSHEET: THREE PHASE MOTORS AND STARTERS- LESSON 1**

* 1. Define the term synchronous speed of the motor. (2)

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* 1. Describe the operation of the squirrel-cage induction motor . (7)

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* 1. A three-phase motor with 18 poles is supplied from a 380V/50Hz supply.

**Given**$: V\_{L }=380V$

 $ f=50H\_{Z}$

 $number of poles=18$

Calculate the:

* + 1. Synchronous speed in r/min. (4)

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* + 1. Percentage slip if the rotor speed is 955 r/min. (3)

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* 1. TABLE 1.1 below shows the name plate of a three-phase induction motor. Answer the questions that follow.

**TABLE 1.1: NAME PLATE OF THREE-PHASE INDUCTION MOTOR**

|  |  |
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| **MOTOR MANUFACTURER SPECIFICATION** |  |
| Phase | 3 |
| Voltage  | 380V |
| Current  | 1,3A |
| Speed  | 1500 r/min |
| Power  | 7,5kW |
| Frequency  | 50HZ |
| Cos Ø | 0,8 lagging |
| Frame No. | 22SP27 |

* + 1. State the amount of current the motor will draw from the supply at full load. (1)

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* + 1. Explain why the motor is suitable for use in South Africa. (2)

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* + 1. State what the 7,5kW on the name plate indicates. (1)

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* + 1. Determine the total number of poles. (5)

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* + 1. Calculate the efficiency of the motor at full load if the total loss is 1,2kW. (5)

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**FORMULA SHEET**

**THREE-PHASE MOTORS AND STARTERS**

**STAR**

VL$=\sqrt{3}×V\_{PH} and I\_{L}=I\_{PH}$

**DELTA**

IL$=\sqrt{3}×I\_{PH} and V\_{L}=V\_{PH}$

**POWER**

S(Papp)$=\sqrt{3}×V\_{L}I\_{L}$

Q(PR)$=\sqrt{3}×V\_{L}I\_{L}×SinØ$

CosØ$=\frac{P}{S}$

P$=\sqrt{3}×V\_{L}I\_{L}CosØ$

Efficiency(n)$=\frac{P\_{out}}{P\_{in}}×100\%$

PIN$=P\_{OUT}+P\_{LOSSES}$