

DEPARTMENT OF EDUCATION
REPUBLIC OF SOUTH AFRICA
NATIONAL CERTIFICATE
ELECTROTECHNICS N5
TIME: 3 HOURS
MARKS: 100

QUESTION 1

1.1 By reversing either the field \checkmark or armature connections. \checkmark (2)

1.2 They are placed in slots in the pole shoes. \checkmark They are connected in series with the armature windings. \checkmark (2)

1.3 $V = 550 \text{ V}$ $P = 44 \text{ kW}$ $N = 1500 \text{ rpm}$ $\eta = 85\% = 0.85$
 $R_a = 0.32$ $I_f = 1.8 \text{ A}$ $I_a R_b = 3.5 \text{ V}$

1.3.1 $\text{Input} = \frac{\text{Output}}{\eta} = 44 / 0.85 = 51.765 \text{ kW} \checkmark$

$I_L = P / V = 51765 / 550 \checkmark = 94.12 \text{ A} \checkmark$ (3)

1.3.2 $\text{Output} = \frac{2 \pi N T}{60}$

$44000 = \frac{2 \pi 1500 T}{60} \checkmark$

$T = \frac{44000 \times 60}{2 \pi 1500} \checkmark$

$= 280.25 \text{ Nm} \checkmark$ (3)

1.3.3 $\text{Starting current} = 1.75 \text{ (full load)} = 1.75 \times 94.12 = 164.7 \text{ A} \checkmark$

$I_a = I - I_f = 164.7 - 1.8 = 162.9 \text{ A} \checkmark$

$V = E + V_b + V_a \text{ (at start)} \quad E = 0 \quad V_a = I_a (R_a + x)$

$550 = 0 + 3.5 + 162.9 (0.32 + x) \checkmark$

$x = \frac{550 - 55.63}{16.9}$

$= 2.035 \text{ ohms} \checkmark$

(4)

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L Reisser



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