St clements University Higher Education School

NIUE

HIGH LIGHT COMPUTER GROUP

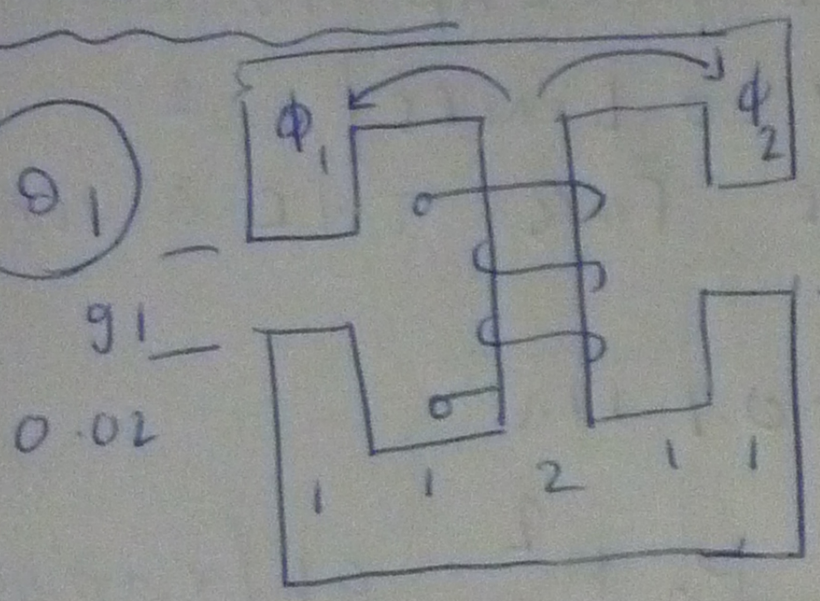
Bachelor of APPLied Engineering (Electrical)

BAE406 Electro mechanics

Test

ANSWER ALL EACH 10MARKS Total 100marks

Q1



N = 1000 TURNS

I = 0.2A

FIND FLUX DENSITY

Q2 CORE LOSS = 46.5W, MAXIMUM INDUCED VOLTAGE 275V. VI = 575 V.A

FIND POWER FACTOR . CORE LOSS CURRENT I_c AND MAGNETIZING CURRENT = I_m

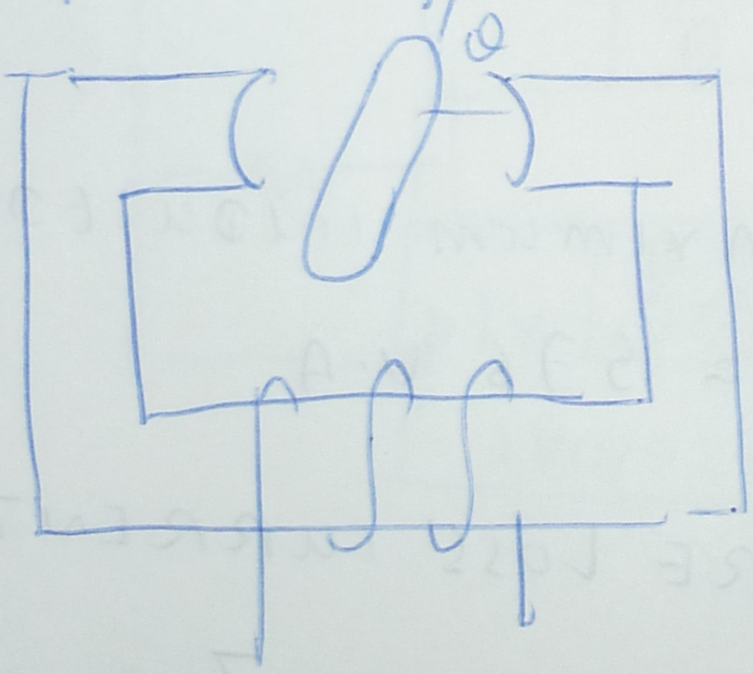
Q3 WITH THE INSTRUMENTS LOCATED IN THE HIGH VOLTAGE SIDE. THE LOW VOLTAGE SIDE SHORT CIRCUITED. THE SHORT CIRCUIT READING FOR 50KVA 2400/240V TRANSFORMER ARE 48V 20.8 A AND 617 WATT . AN OPEN CIRCUIT TEST WITH LOW VOLTAGE SIDE ENERGIZED GIVE 240V 5.41 A, 186 W READING . DETERMINE EFFICIENCY & VOLTAGE REGULATION AT PF 0.8 LAG.

Q4 THE MAGNETIC CIRCUIT SHOWN IN GIVEN FIGURE IS MADE OF CAST STEEL. THE ROTOR IS FREE TO TURN ABOUT A VERTICAL AXIS (2)

(a) ~~DRIVE~~ DERIVE AN EXPRESSION IN MKS RATIONALISED UNIT FOR THE TORQUE ACTING ON THE ROTOR.

(b) THE MAXIMUM FLUX DENSITY IN THE OVER LAPPING PORTION OF THE AIRGAP IS LIMITED TO APPROXIMATELY 130 KILO LINES/IN2 COMPUTE MAXIMUM TORQUE FOR THE GIVEN DIMENSIONS

$r_1 = 1$ IN, $R = 1$ IN, $g = 0.1$ IN



$W_{ag} = \mu_0 H_{ag}^2 \, g h (r_1 + 0.5g)\theta$

Q5 WHEN THE ROTOR OF A RELUCTANCE MOTOR IS IN THE DIRECT AXIS POSITION, THE INDUCTANCE OF EXCITING WINDING IS $L_d = 1$ H WHEN THE ROTOR IS IN THE QUADRATURE AXIS POSITION, THE INDUCTANCE IS $L_q = 0.5$ H. THE EXCITING WINDING HAS $N = 1000$ TURNS. DETERMINE THE MAXIMUM TORQUE THAT THE MOTOR CAN DEVELOP WITH 115 V AT 50 HZ APPLIED TO IT'S EXCITING WINDING $\delta = 45^\circ$

Q6 a-a, b-b ARE STATOR WINDINGS AND ff IS ROTOR WINDING. $M_{af} = m \cos\theta_c$

a-a AND b-b ARE TWO IDENTICAL WINDINGS

FIND (a) T INTERM of ω_0

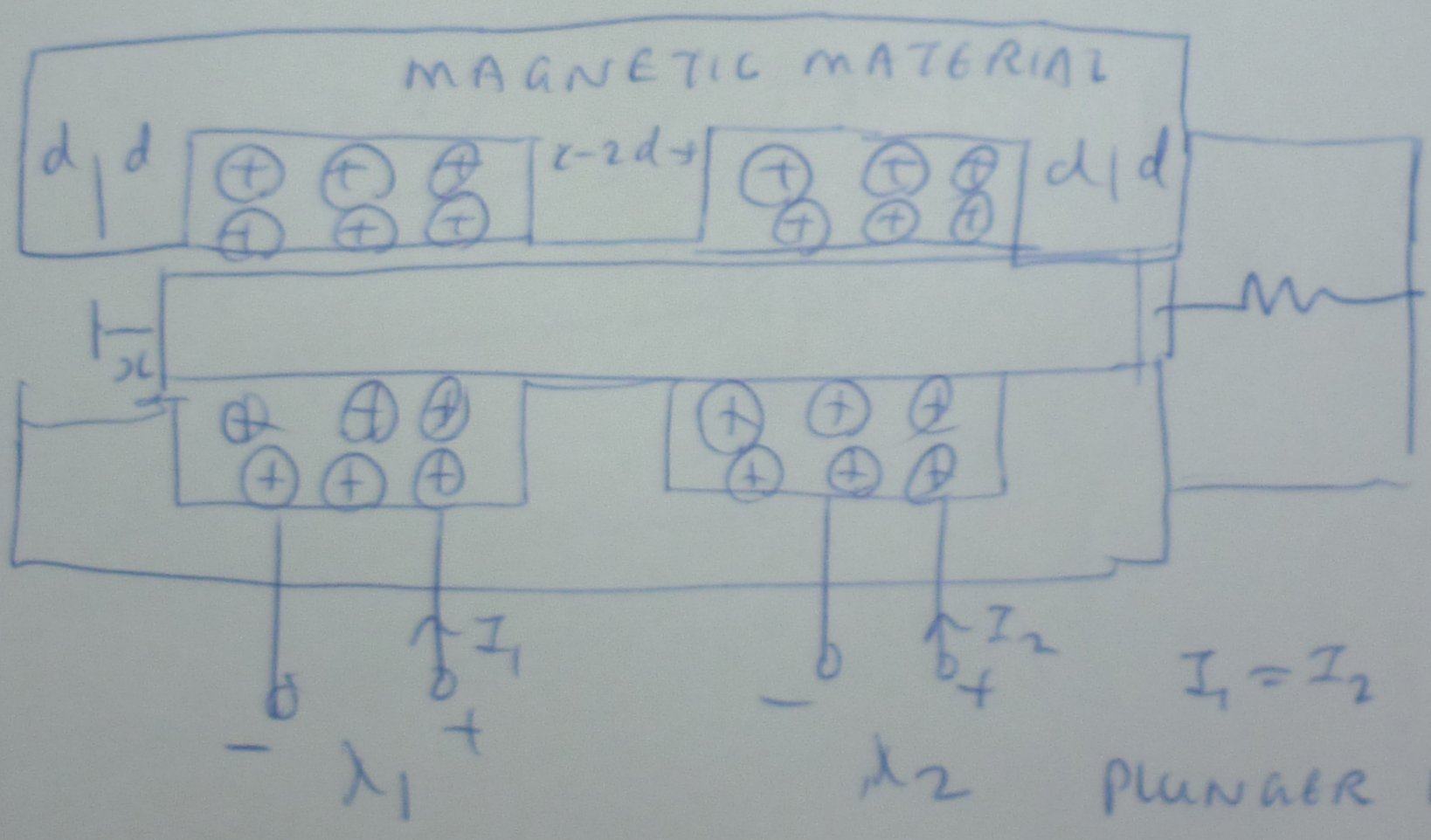
(b) $I_a = 5A$, $I_b = 5A$, $I_f = 10A$

IF $I_f = I_{dc}$, $\theta = \omega t - \delta$, DESCRIBE TIME NATURE OF T (c) FIND INSTANTANEOUS STATOR VOLTAGE. $I_a = \sqrt{2}\cos\omega t$, $I_b = \sqrt{2}\sin\omega t$

SELF INDUCTANCE OF STATOR RESISTANCE: L_{ff}

STATOR RESISTANCE = R_a

Q7



$I_1 = I_2$

PLUNGER IS CENTERED HORIZONTALLY

DERIVE THE CURRENT EQUATIONS.

Q8 EXPLAIN MECHANICAL DAMPER.

Q9 EXPLAIN ROTATING MACHINERY

Q10 EXPLAIN MACHINE BALANCING