Name		•	duction moto		Due: Fri ,	, 3/15 bx
Solve the following problem 1. 7-7. A 208-V. four-pole its equivalent circuit co	e, 60-Hz, Y-connected, v	arting on p.348.			p.	
no oquivalent ollouit oc		4 $R_1 = 0.22$	20·Ω	$R_2 := 0.1$	27·Ω	
	1		30·Ω	$X_2 = 0.4$	30·Ω	$X_{\mathbf{M}} := 15 \cdot \Omega$
		P _{mech} :=	300⋅W	$P_{\text{misc}} = 0$)·W	P _{core} := 200·W
For a slip of 0.05, find a) The line current	T					
	To get the book answers (which are the answers that I gave you), Do not include P_{core} in your calculation of the line current. Assume there is no $R_{\rm C}$ in the equivalent circuit.					
	,			Carac		
b) The stator copper lo	osses					
c) The air-gap P $_{AG}$						
d) The news convert	ad from algoriant to a	haniaal farm				
a) The power converte	ed from electrical to med	manicai torm				
e) The induced torque	$^{\tau}$ ind					

Use P_{core} here. Lump it in with the mechanical losses, P_{misc} and P_{mech} . Read the last 2 paragraphs on p.302.

- g) The overall machine efficiency
- h) The motor speed in revolutions per minute and radians per second
- 2. 7-8. For the motor in Problem 7-7,
 - a) what is the slip at the pullout torque? Find V_{Th} and Z_{Th} as part of your solution, you will need them again in problem 3, which you may want to read before finding these by hand.

b) What is the pullout torque of this motor?

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- 3. 7-9 Use Matlab, a spreadsheet, or the program or method of your choice to:
 - a) Calculate and plot the torque-speed characteristic of the motor in Problem 7-7.
 - b) Calculate and plot the converted power versus speed curve of the motor in Problem 7-7.

Attach Plots as separate pages

4. 7-10. For the motor of Problem 7-7, how much additional resistance (referred to the stator circuit) would it be necessary to add to the rotor circuit to make the maximum torque occur at starting conditions (when the shaft is not moving)? Plot the torque-speed characteristic of this motor with the additional resistance inserted.

5. 7-11 (partial) If the motor in Problem 7-7 is to be operated on a 50-Hz power system, what must he done to its supply voltage? Why?

b) 1180·W

Answers 1. a) 42.3·A/_ - 25.7·deg

g) 83.2·% h) 1710·rpm 179· $\frac{\text{rad}}{\text{sec}}$

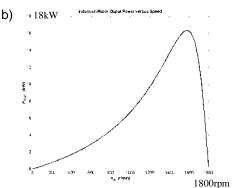
- 2. a) 14.5·%
- b) 100·N·m
- 4. $0.749 \cdot \Omega$ more Plot looks like R₅ plot on Fig 7-31, peaking at about 100Nm
- 5. Decrease applied voltage to 5/6th of value at 60Hz.
 Otherwise core will saturate.

3. a) In 100Nm Induction Monor Torque-Bookd Characterists:

c) 12.54·kW

d) 11.92·kW

1800rpm



e) 66.5·N·m

f) 63.8·N·m

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