Electrical, Electronics and Telecommunication Engineering Department, UET, Lahore
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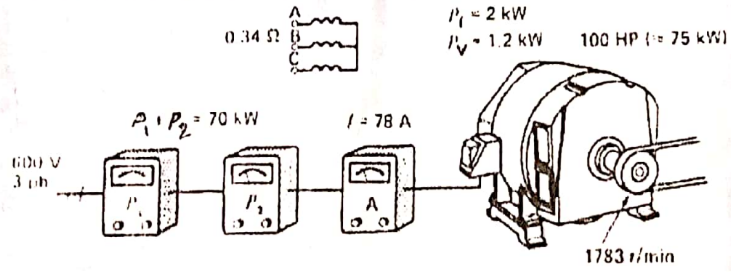
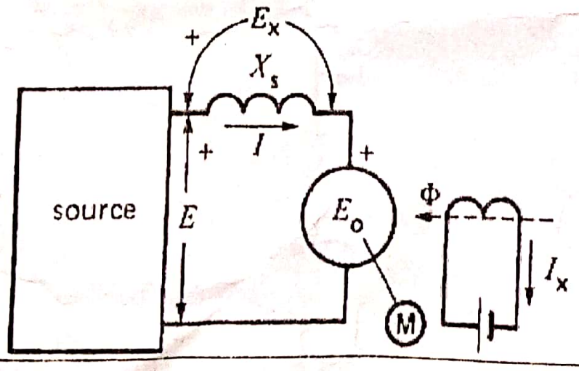
EE250 Electrical Machinery

Final Term Examination (SPRING 2021, Session 2019)

- Start solution of every new question on a new page.
- All the related parts of a question must be solved together.
- No typo in the paper, understanding the question is part of examination.

Time Allowed: 90 Minutes
Total Marks: 40

Q.1(a)	Draw only active power flow diagrams of 3 phase induction motor when it operates: (i) As a Brake (ii) As a Motor	08	CLO3
(b)	A 3-phase **induction** motor having a synchronous speed of 1200rpm draws 80KW from a 3-phase feeder. The copper losses and iron losses in stator amount to be 4kW and 1kW respectively. The wind age and friction losses amount to be 2kW. If the motor runs at 1152 rpm then find: (i) Active power transmitted to rotor (ii) slip and I^2R losses (P_{jr}) on Rotor (iii) Mechanical Power developed (iv) Mechanical power delivered to load and (v) efficiency.	06	
(c)	A 3-phase **induction** motor having a nominal rating of 100 hp (~75 kW) and a synchronous speed of 1800 rpm is connected to a 600 V source as shown in figure. The two-wattmeter method shows a total power consumption of 70 kW, and an ammeter indicates a line current of 78 A. If rotor speed of motor is 1763 rpm, stator iron losses = 2 kW and windage and friction losses=1.2 kW. Note that resistance between two stator terminals is 0.34 Ω, then find (i) power supplied to the rotor (ii) rotor I^2R losses (iii) mechanical power supplied to the load in hp (iv) efficiency (v) torque developed at 1763 rpm 	06	
Q.2(a)	Describe the condition under which reluctance torque drops to zero in Synchronous Motors. Also, draw relationship curve between reluctance torque and torque angle.	08	CLO4
(b)	A synchronous motor as shown in figure has the following parameters, per phase: E=2.4 Kv, Eo=3 kV, Xs=2Ω, I=900 A 	06	

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	Draw the phasor diagram and determine: i. Torque angle δ ii. Active power. per phase iii. Power factor of the motor iv. Reactive power absorbed (or delivered), per phase	
(c)	A resistance split-phase motor is rated at 1/4 hp (187 W), 1725 r/min, 115 V, 60 Hz. When the rotor is locked, a test at reduced voltage on the main and auxiliary windings yields the following results:	06

	main winding	auxiliary winding
applied voltage	$E = 23$ V	$E = 23$ V
current	$I_s = 4$ A	$I_a = 1.5$ A
active power	$P_s = 60$ W	$P_a = 30$ W

Calculate:
i. The phase angle between Ia and Is
ii. The locked-rotor current drawn from the line at 115 V

Good Luck