BIDANG PENDIDKAN DAN PENGAJARAN

BERITA ACARA PERKULIAHAN

KULIAH ONLINE/OFF LINE

(LEARNING)

PERIODE SEMESTER GANJIL 2023-2024

MATA KULIAH

PENGGUNAAN MESIN LISTRIK

LAMPIRAN BERITA ACARA PERKULIAHAN

1. ***SK DEKAN FTI SEMESTER GANJIL 2023-2024***
2. ***PRESENSI KEHADIRAN DOSEN DAN MATERI AJAR***
3. ***NILAI KOMULATIF : KEHADIRAN,TUGAS,UTS DAN UAS***
4. ***CONTOH HAND OUT MATERI AJAR***

PROGRAM STUDI TEKNIK ELEKTROFAKULTAS

TEKNOLOGI INDUSTRI

INSTITUT SAINS DAN TEKNOLOGI NASIONAL
2023/2024

YAYASAN PERGURUAN CIKINI
INSTITUT SAINS DAN TEKNOLOGI NASIONAL
Jl. Moh. Kahfi II, Bhumi Srengseng Indah, Jagakarsa, Jakarta Selatan 12640
Telp. 021-7270090 (hunting), Fax. 021-7866955, hp: 081291030024
Email : humas@istn.ac.id Website : www.istn.ac.id

SURAT PENUGASAN TENAGA PENDIDIK

Nomor : 282 / 03.1 – G / IX / 2023

SEMESTER ***GANJIL***, TAHUN AKADEMIK 2023 / 2024

N a m a	: **Sugianto,Ir,MT**	Status Pegawai	: Edukatif Tetap / Tidak Tetap
NIK	: **186489**	Program Studi	: Teknik Elektro
Jabatan Akademik	: **Lektor**		

Bidang	Perincian Kegiatan	Tempat	Jam/ Minggu	Kinerja (sks)	Keterangan
I PENDIDIKAN Dan PENGAJARAN	**MENGAJAR DI KELAS (KULIAH / RESPONSI DAN LABORATORIUM)**				
	1.Penggunaan Mesin Listrik (A)			2	Senin,13.00-14.40
	2.Teknologi Sistem Tenaga Listrik (Kls A)			2	Senin,08.00-09.40
	3.Trasformator(Kls A)			2	Selasa, 10.00-11.40
	4.Penggunaan Mesin Listrik (Kls K)			2	Selasa,19.00-20.40
	5.Teknologi Sistem Tenaga Listrik (Kls K)			2	Sabtu, 10.00 - 11.40
	6.Transformator (Klas K)			2	Sabtu, 08.00-09.40
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	13.				,
	14.				,
	15.				,
	16.				,
	17. Membimbing Skripsi / Tugas Akhir			1	
	18. Menguji Skripsi / Tugas Akhir			1	
II PENELITIAN	1. Penelitian Ilmiah				
	2. Penulisan Karya Ilmiah			1	
	3. Penulisan Diktat Kuliah				
	4. Menerjemahkan Buku				
	5. Pembuatan Rancangan Teknologi				
	6. Pembuatan Rancangan & Karya Pertunjukan				
III PENGABDIAN DAN MASYARAKAT	1. Menduduki Jabatan di Pemerintahan				
	2. Pengembangan Hasil Pendidikan Dan Penelitian				
	3. Memberikan Penyuluhan/Pelatihan/Ceramah pada masyarakat			1	
	4. Memberikan Pelayanan Kepada Masyarakat Umum				
	5. Menulis Karya Pengabdian Pada Masyarakat yang tidak dipublikasikan				
	6. Komersial / Kesepakatan				
IV UNSUR-UNSUR PENUNJANG	1. Jabatan Struktural				
	2. Penasehat Akademik				
	3. Berperan serta aktif dalam pertemuah ilmiah / seminar				
	4. Pengembangan program kuliah / Kelompok Ilmu Elektro				
	5. Menjadi anggota panitia / Badan pada suatu Perguruan Tinggi				
	6. Menjadi anggota Badan Lembaga Pemerintah				
	7. Menjadi Anggota Organisasi Profesi				
	8. Mewakili PT / Lembaga Pemerintah duduk dalam Panitia antar Lembaga				
	9. Menjadi Anggota Delegasi Nasional ke Parlemen – Parlemen Internasional				
	Jumlah Total			16	

Kepada yang bersangkutan akan diberikan gaji / honorarium sesuai dengan peraturan penggajian yang berlaku di Institut Sains Dan Teknologi Nasional
Penugasan ini berlaku dari tanggal **25 September 2023** sampai dengan tanggal **31 Maret 2024**

Jakarta, 3 Oktober 2023
Dekan,

(Dr. Mufirah Cahya F.T.S.Si.,M.Si.)

Tembusan :
1. Direktur Akademik – ISTN
2. Direktur Non Akademik – ISTN
3. Ka. Biro Sumber Daya Manusia – ISTN
4. Kepala Program Studi Fak. ....
5. Arsip

BERITA ACARA PERKULIAHAN
(PRESENTASI KEHADIRAN DOSEN)
SEMESTER GANJIL TAHUN AKADEMIK 2023/2024
PROGRAM STUDI TEKNIK ELEKTRO S.1 ISTN

Mata Kuliah	: **PENGUNAAN MESIN LISTRIK**	Semester	: 5
Dosen	: 1. Dr. Ir. H. Abdul Multi, M.T 2. Ir. Sugianto, MT	SKS	: 2
Hari	: **Senin**	Kelas	: **A**
Jam	: **13:00-14:40**	Ruang	:

No.	HARI/TANGGAL	MATERI KULIAH	JML MHS HADIR	TANDA TANGAN DOSEN
1.	Senin / 25-09-2023	- INTRODUCTION/PREFACE - Lecture material - References/books	2	
2.	Senin 02/10/2023	JENIS-JENIS MESIN LISTRIK Mesin Listrik Stattis dan Mesin Listrik Dinamis	2	
3.	Senin 09/10/2023	Rangkaian Ekivalen Motor DC : - Separately Excited (Berpengutan Terpisah) - Shunt - Compound	2	
4.	Senin 16/10/2023	DC Motor Starter Circuit	2	
5.	Senin 23/10/2023	Contoh-contoh soal	2	
6.	Senin 30/10/2023	Sistem Ward LeonardFile	2	
7.	Senin 06/11/2023	Starter Dan Pengaturan Kecepatan Motor Induksi	2	
8.	Senin 13/11/2023	UJIAN TENGAH SEMESTER	2	

BERITA ACARA PERKULIAHAN
(PRESENTASI KEHADIRAN DOSEN)
SEMESTER GANJIL TAHUN AKADEMIK 2023/2024
PROGRAM STUDI TEKNIK ELEKTRO S.1 ISTN

Mata Kuliah	:	**PENGUNAAN MESIN LISTRIK**	Semester	:	5
Dosen	:	Dr. Ir. H. Abdul Multi, M.T	SKS	:	2
Hari	:	**Senin**	Kelas	:	**A**
Jam	:	**13:00-14:40**	Ruang	:	

No.	TANGGAL	MATERI KULIAH	JML MHS HADIR	TANDA TANGAN DOSEN
9.	Senin, 20-11-2023	Aplikasi motor dc pada kendaraan motor, mobil dan peralatan lainnya, untuk pengaturan kecepatan dan starting motor.	2	
10.	Senin, 27-11-2023	Motor stater dc sebagai proteksi untuk equipment, overload, dan pengontrolan pada kecepatan motor	2	
11.	Senin, **04**-12-2023	Menentukan arus starting motor dan tegangan induksi.	2	
12.	Senin, **11**-12-2023	Menentukan sleep motor, menghitung kecepatan syncron motor, karakteristik curva generator, motor terhadap kecepatan.	2	
13.	Senin, 18-12-2023	Diagram aliran daya dan penjelasn daya2, torsi induksi dan torsi beban.	2	
14.	Senin, 25-12-2023	Cara membalik putaran motor slip, menghitung effisiensi dan sistem operasi motor induksi	2	
15.	Senin, 08-01-2024	Contoh2 soal dan kisi-kisi ujian akhir semester	2	
16.	Senin, 15-01-2024	Ujian Akhir Semester (UAS) semester genjil 2023-2024	2	

Jakarta, Januari 2024

DOSEN PENGAJAR

(Dr. Ir. H. Abdul Multi, M.T)/ (Sugianto Ir.MT)

DAFTAR NILAI

SEMESTER GANJIL REGULER TAHUN 2023/2024

Program Studi : Teknik Elektro S1
Matakuliah : Penggunaan Mesin Listrik
Kelas / Peserta : A
Perkuliahan : Kampus ISTN Bumi Srengseng Indah
Dosen : Dr. Ir. H. Abdul Multi, MT

No	NIM	N A M A	ABSEN	TUGAS	UTS	UAS	MODEL	PRESENTASI	NA	HURUF
			10%	**15%**	**35%**	**40%**	**0%**	**0%**		
1	19220001	**Muhammad Isra Maulana**	100	80	60	70	0	0	71	**B**
2	19220004	**Abdullah Khoirurafifil Umam**	100	65	56	67	0	0	66.15	**B-**

Rekapitulasi Nilai							
A	0	B+	0	C+	0	D+	0
A-	0	B	1	C	0	D	0
		B-	1	C-	0	E	0

Jakarta,25 January 2024

Dosen Pengajar

Dr. Ir. H. Abdul Multi, MT **Sugianto,Ir.MT**

Security ID 121a28c1fea3530808c64a1f492552e4

The Concept of Rotor Slip

The voltage induced in a rotor bar of an induction motor depends on the speed of the rotor *relative to the magnetic fields*. Since the behavior of an induction motor depends on the rotor's voltage and current, it is often more logical to talk about this relative speed. Two terms are commonly used to define the relative motion of the rotor and the magnetic fields. One is *slip speed*, defined as the difference between synchronous speed and rotor speed:

$$n_{slip} = n_{sync} - n_m \tag{7–2}$$

where n_{slip} = slip speed of the machine
n_{sync} = speed of the magnetic fields
n_m = mechanical shaft speed of motor

The other term used to describe the relative motion is *slip*, which is the relative speed expressed on a per-unit or a percentage basis. That is, slip is defined as

$$s = \frac{n_{slip}}{n_{sync}} (\times 100\%) \tag{7–3}$$

$$s = \frac{n_{sync} - n_m}{n_{sync}} (\times 100\%) \tag{7–4}$$

This equation can also be expressed in terms of angular velocity ω (radians per second) as

$$s = \frac{\omega_{sync} - \omega_m}{\omega_{sync}} (\times 100\%) \qquad (7\text{–}5)$$

Notice that if the rotor turns at synchronous speed, $s = 0$, while if the rotor is stationary, $s = 1$. All normal motor speeds fall somewhere between those two limits.

It is possible to express the mechanical speed of the rotor shaft in terms of synchronous speed and slip. Solving Equations (7–4) and (7–5) for mechanical speed yields

$$n_m = (1 - s) n_{sync} \qquad (7\text{–}6)$$

or

$$\omega_m = (1 - s) \omega_{sync} \qquad (7\text{–}7)$$

These equations are useful in the derivation of induction motor torque and power relationships.

The Electrical Frequency on the Rotor

An induction motor works by inducing voltages and currents in the rotor of the machine, and for that reason it has sometimes been called a *rotating transformer*. Like a transformer, the primary (stator) induces a voltage in the secondary (rotor),

but *unlike* a transformer, the secondary frequency is not necessarily the same as the primary frequency.

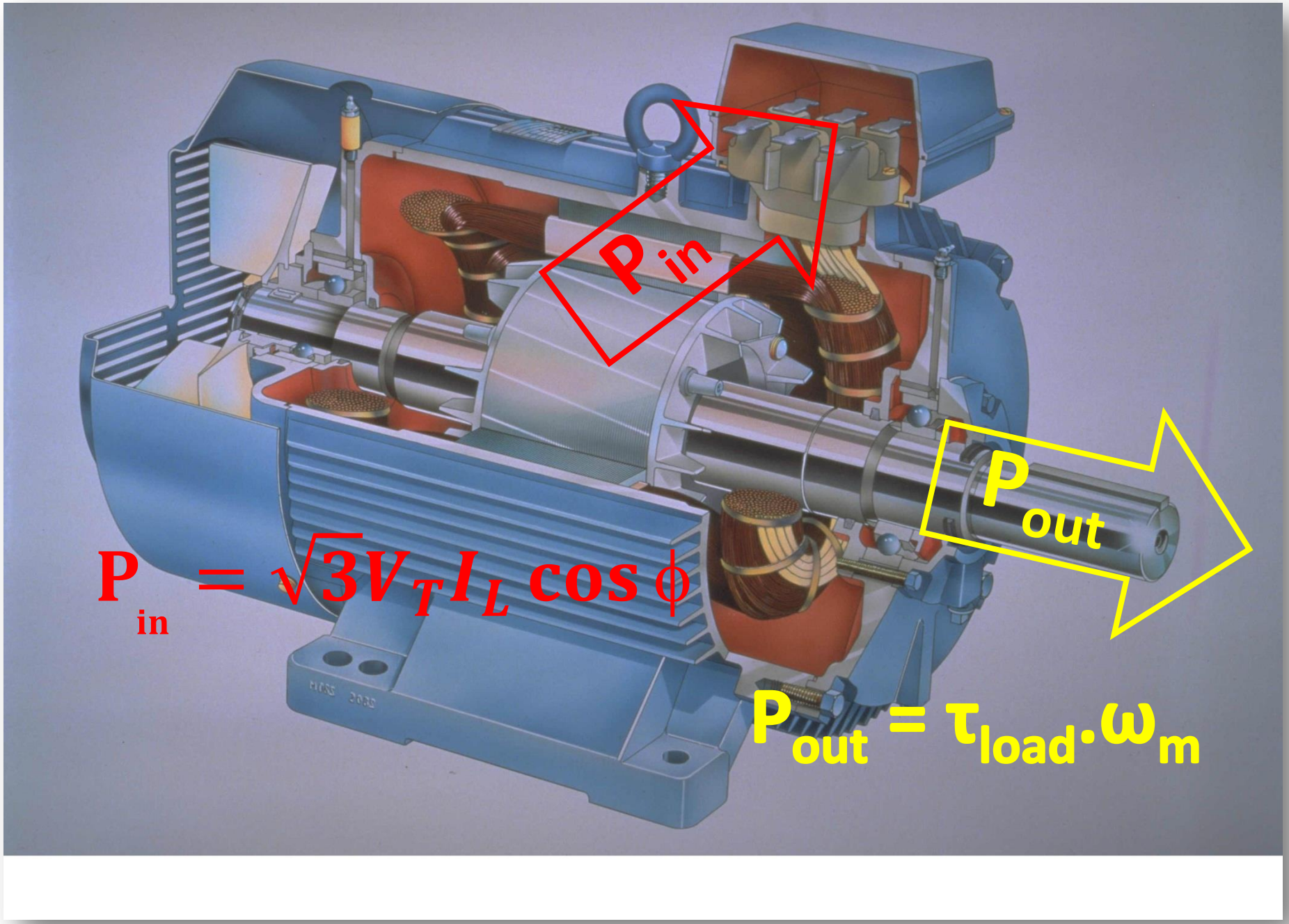
If the rotor of a motor is locked so that it cannot move, then the rotor will have the same frequency as the stator. On the other hand, if the rotor turns at synchronous speed, the frequency on the rotor will be zero. What will the rotor frequency be for any arbitrary rate of rotor rotation?

At $n_m = 0$ r/min, the rotor frequency $f_r = f_e$, and the slip $s = 1$. At $n_m = n_{sync}$, the rotor frequency $f_r = 0$ Hz, and the slip $s = 0$. For any speed in between, the rotor frequency is directly proportional to the *difference* between the speed of the magnetic field n_{sync} and the speed of the rotor n_m. Since the slip of the rotor is defined as

$$s = \frac{n_{sync} - n_m}{n_{sync}} \qquad (7\text{–}4)$$

the rotor frequency can be expressed as

$$f_r = sf_e \qquad (7\text{–}8)$$


P_{in}
P_{out}
$P_{in} = \sqrt{3} V_T I_L \cos\phi$
$P_{out} = \tau_{load} \cdot \omega_m$

Several alternative forms of this expression exist that are sometimes useful. One of the more common expressions is derived by substituting Equation (7–4) for the slip into Equation (7–8) and then substituting for n_{sync} in the denominator of the expression:

$$f_r = sf_e$$

$$f_r = \frac{n_{sync} - n_m}{n_{sync}} f_e$$

But $n_{sync} = 120 f_e / P$ [from Equation (7–1)], so

$$n_{sync} = \frac{120 f_e}{P}$$

$$f_r = (n_{sync} - n_m) \frac{P}{120 f_e} f_e$$

Therefore,

$$f_r = \frac{P}{120} (n_{sync} - n_m) \qquad (7\text{–}9)$$

Example 7–1. A 208-V, 10-hp, four-pole, 60-Hz, Y-connected induction motor has a full-load slip of 5 percent.

(a) What is the synchronous speed of this motor?
(b) What is the rotor speed of this motor at the rated load?
(c) What is the rotor frequency of this motor at the rated load?
(d) What is the shaft torque of this motor at the rated load?

Solution

(a) The synchronous speed of this motor is

$$n_{\text{sync}} = \frac{120 f_e}{P} \qquad (7\text{–}1)$$

$$= \frac{120(60 \text{ Hz})}{4 \text{ poles}} = 1800 \text{ r/min}$$

(b) The rotor speed of the motor is given by

$$n_m = (1 - s)n_{sync} \tag{7–6}$$

$$= (1 - 0.95)(1800\ \text{r/min}) = 1710\ \text{r/min}$$

(c) The rotor frequency of this motor is given by

$$f_r = sf_e = (0.05)(60\ \text{Hz}) = 3\ \text{Hz} \tag{7–8}$$

Alternatively, the frequency can be found from Equation (7–9):

$$f_r = \frac{P}{120}(n_{sync} - n_m) \tag{7–9}$$

$$= \frac{4}{120}(1800\ \text{r/min} - 1710\ \text{r/min}) = 3\ \text{Hz}$$

$$P_{out} = 10\ hp$$

$$P_{out} = 10 \times 746\ W$$

$$P_{out} = 7460\ W$$

$$\omega_m = n_m \frac{2\pi}{60}$$

$$\omega_m = 1710. \frac{2\pi}{60}$$

$$= 179.07 \frac{rad}{det}$$

(d) The shaft load torque is given by

$$\tau_{load} = \frac{P_{out}}{\omega_m} = \frac{7460}{179,07} = 41.7\,N \cdot m$$

$$= \frac{(10\ hp)(746\ W/hp)}{(1710\ r/min)(2\pi\ rad/r)(1\ min/60\ s)} = 41.7\,N \cdot m$$