**RENCANA PEMBELAJARAN SEMESTER (RPS)**

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| **PROGRAM STUDI**  | **:** | **TEKNIK ELEKTRO** |
| **MATAKULIAH** | **:** | **KESTABILAN SISTEM TENAGA LISTRIK** |
| **KODE MATAKULIAH** | **:** | **EE8223** |
| **SKS**  | **:** | **2 SKS** |
| **SEMESTER**  | **:** | **8** |
| **MATAKULIAH PRASYARAT** | **:** | **ANALISA SISTEM TENAGA LISTRIK** |
| **DOSEN PENGAMPU** | **:** |  |
| **CAPAIAN PEMBELAJARAN** | **:** | **Mampu memahami, merancang dan mengaplikasikan konsep  dasar power system** |

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| **Pertemuan Ke**  | **Kemampuan Akhir yang direncanakan**  | **INDIKATOR** | **MATERI POKOK** | **Bentuk pembelajaran (metode dan pengalaman belajar)**  | **PENILAIAN** | **Referensi**  |
| **Jenis**  | **Kriteria**  | **Bobot**  |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | Mampu menunjukan sikap bertanggung jawab atas pekerjaanya | * Bertanggung jawab
* Mematuhi tata tertip perkuliahan
 | * Tata tertib kelas
* Tahapan pembelajaran
 |  | Penilaian sikap |  | **5%** | 1,2, dan 3 |
| 2 | Konsep dasar dan devinisi stabilitas sistem tenaga listrik*Basic Concepts and definitions of Power System Stability*  | * Mahasiswa mampu memahami konsep dasar stabilitas sistem tenaga listrik
 | * Konsep dan definisi stabilitas sistem tenaga listrik
* *Rotor angle stability*
* *Small-disturbance or small-signal angle stability*
* *Large-disturbance or transient angle stability*
 | Ceramah, Demonstrasi,diskusi | Tes tulis |  | **5%** | 1,2, dan 3 |
| 3 | * Mahasiswa mamapu menjelaskan konsep stabilitas tegangan dan stabilitas frequensi
 | * *Voltage stability*
* *Frequency stability*
 | demonstrasi | Tes tulis |  | **2%** | 1,2, dan 3 |
| 4 | *Analysis of Power System Stability by Classical Methods* | * Mahasiswa mamapu menganalisa stabilitas sistem tenaga listrik dengan model classic
* Mahasiswa mamapu menganalisa ganggunan stabilitas kecil dengan sistem SMIB
 | * *Classical Model*
* *Small-Disturbance Stability Analysis of SMIB system*
 | demonstrasi | Tes tulis |  | **3%** | 1,2, dan 3 |
| 5 | * Mahasiswa mampu memaparkan stabilitas transien
* Mahasiswa mampu menyebutkan kekurangan model clasic generator sinkron
 | * *Large-Disturbance Stability or Transient Stability*
* *Disadvantages of Classical Model Representation Of Synchronous Generators*
 | demonstrasi | Tes tulis |  | **5%** | 1,2, dan 3 |
| 6 | *Modelling of a Synchronous Machine* | * Mahasiswa mampu menjelaskan dinamika mesin sinkron
* Mampu memeasang parameter mesin sinkron
* Memamparkan efek saturasi pada model mesin sinkron
 | * *Representation of Synchronous Machine Dynamics*
* *Synchronous Machine Dynamics in Synchronous Reference Frame*
* *Synchronous Machine Parameters*
* *Effect of Saturation on Synchronous Machine Modelling*
 | Studi kasus | Penilain unjuk kerja |  | **5%** | 1,2, dan 3 |
| 7 | *Modelling of Exciter, Turbine and Load* | * Mampu Memodelkan turbin pada matlab
 | * *Exciter*
* *Model of Turbine*
 | demonstrasi | Penilain unjuk kerja |  | **5%** | 1,2, dan 3 |
| 8 | * Mahasiswa mampu memodelkan motor induksi pada matlab
 | * *Load Representation*
* *Static load representation*
* *Model of synchronous motor*
* *Model of induction motor*
 | demonstrasi | Penilain unjuk kerjaDan Unjuk kerja |  | **5%** | 1,2, dan 3 |
| 9 | *Representation of Synchronous Machine for Stability Studies* | * Mahasiswa mampu menjelaskan perbedaan kurva kondisi steady state dan saat terjadi gangguan
 | * *Steady State Condition*
* *Multi-Machine System Representation*
* *A special case of impedance loading*
* *Initial conditions*
* *Sub-transient Model with Stator and Network Transients Neglected*
 | Studi kasus | Penilaian proyek |  | **10%** | 1,2, dan 3 |
| 10 |  | * Mahasiswa mampu memaparkan *Transient or Two-Axis Model , Flux Decay or One-Axis Model*

 | * *Transient or Two-Axis Model*
* *Flux Decay or One-Axis Model*
* *Classical or Constant Flux Linkage Model*
 | Demonstrasi  | Penilaian proyek |  | **10%** | 1,2, dan 3 |
| 11 | *Small-Signal Stability Analysis* | * Mahasiswa mampu menjelaskan *Fundamental Concepts of Stability of a Dynamic System*
* Mahasiswa mampu memahami *Stability of Homogenous or Unforced System*
 | * *Fundamental Concepts of Stability of a Dynamic System*
* *Eigen Properties*
* *Stability of Homogenous or Unforced System*
 | demonstrasi | Penilaian proyek |  | **5%** | 1,2, dan 3 |
| 12 | * Mahasiswa mampu menerapkan *Algorithm to Find Eigen Values and Eigen Vectors*
* Mahasiswa mampu emnganailisa *Small-Signal Stability of Single Machine Connected to*
 | * Algorithm to Find Eigen Values and Eigen Vectors
* Linearizing a Nonlinear System
* *Small-Signal Stability Analysis of Single Machine Connected to Infinite Bus*
 | diskusi | Penilain unjuk kerja |  | **5%** | 1,2, dan 3 |
| 13 | * Mahasiwa mampu menyebutkan macam-macam *Power System Stabilizer*
* Mahasiswa mampu memahami *Sub-Synchronous Resonance* dan *Torsional Oscillations*
 | * *Power System Stabilizer*
* *Small-Signal Stability Analysis of Multi-Machine System*
* *Sub-Synchronous Resonance*
* *Torsional Oscillations*
 | diskusi | Penilain unjuk kerja |  | **5%** | 1,2, dan 3 |
| 14 | *Transient Stability Analysis*  | * Mampu menuliskan kembali metode simultan pada stabilitas transien
 | * *Numerical Solution of Differential Algebraic Equations (DAE)*
* *Simultaneous (Implicit) Method*
* *Partitioned (Explicit) Method*
 | demonstrasi | Penilain unjuk kerja |  | **10%** | 1,2, dan 3 |
| 15 | * Mampu menganalisa ganguan tidak seimpang
* Mampu mesimulaiskan ganguan tidakj seimbang menggunakan software ETAP
* Memapu menganalisa stabilitas transien dengan *Direct Method*
 | * *Analysis of Unbalanced Faults*
* *Direct Method of Transient Stability Analysis*
* *Method of Improving Transient Stability*
 | demonstrasi | Penilain unjuk kerja |  | **10%** | 1,2, dan 3 |
| 16 | *Voltage Stability* | * Mahasiswa mamapu mesimulasikan stabilitas tegangan pada software ETAP
 | * *Basic Concepts of Voltage Stability*
* *Static Analysis*
* *Dynamic Analysis*
 | demonstrasi | Penilain unjuk kerja |  | **10%** | 1,2, dan 3 |
|  |  |  |  |  |  |  | **100%** |  |

**REFERENSI:**

[1] Kundur, P. (1993), “*Power System Stability and Control*”, McGraw-Hill, Inc,

New York.

[2] Machowsky, B., Burnby, (1997), “*Power system Dynamic and Stability*”, John

Willey and Sons, New York.

[3] Robandi, I. (2006), “*Desain Sistem Tenaga Modern*”, Penerbit ANDI,

Yogyakarta