**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 kerja  Dan 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