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Total No. of Printed Pages: 1

Total No. of Questions: [11]

**M. Tech. EE (Power System) (Semester-2<sup>nd</sup>)**  
**POWER SYSTEM DYNAMICS & STABILITY**  
**Subject Code: MELES2202**  
**Paper ID: 22191311**

**Time: 03 Hours**

**Maximum Marks: 60**

**Instruction for candidates:**

1. Section A is compulsory. It carries 16 marks. It consists of 4 questions of 4 marks each.
2. Section B consist of 4 questions of 8 marks each. The student has to attempt any 3 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

**Section – A**

**(4 marks each)**

- Q1. Describe how a synchronous machine's equivalent circuit representation works.
- Q2. How do dynamic load models differ from static load models, and why are they important in power system studies?
- Q3. What factors contribute to voltage instability, and how is it assessed?
- Q4. Explain the need of an Automatic Voltage Regulator (AVR) in a power system.

**Section – B**

**(8 marks each)**

- Q5. Describe Park's transformation and its purpose in the context of synchronous machine modelling. Draw a phasor diagram for a synchronous machine.
- Q6. Enlighten the dynamics of synchronous machines in terms of electromechanical transients. What are the main variables affecting synchronous machines' dynamic behaviour?
- Q7. Explain the concept of state-space representation for dynamic systems. What are the advantages of state-space representation for system stability analysis?
- Q8. Describe the classical model used to represent a generator in a single machine infinite bus system. What are the key parameters and assumptions of this model?

**Section – C**

**(10 marks each)**

- Q9. Write the steady-state characteristics of an induction motor. What parameters influence the performance of an induction motor under steady-state conditions?
- Q10. Discuss the strategies and methods for preventing voltage collapse. How can operators and control systems proactively address voltage stability issues?
- Q11. With the help of suitable flow diagram, describe an overview of the fundamentals of Automatic Generation Control. How does AGC contribute to maintaining the balance between generation and load?