

Power System Operation and Control (315336)

MSBTE Diploma · K-Scheme · Model Question Paper — Set A

Time: 3 Hours**Max. Marks: 70****Instructions:**

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Use of Non-programmable Electronic Pocket Calculator is permissible.
7. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following:**10**

- a) Define per unit value. Write the expression for base impedance.
- b) Define impedance diagram and reactance diagram.
- c) State any two effects of low frequency on consumers.
- d) List any four FACTS controllers.
- e) Define: i) Steady state stability ii) Stability limit.
- f) Mention any four components of the automatic load frequency control (ALFC) loop.
- g) State any two environmental factors that affect load forecasting.

Q.2 Attempt any THREE of the following:**12**

- a) Draw the structure of a typical power system using a single line diagram and explain it.
- b) Explain the relation between real power balance and frequency of the power system.
- c) Draw the block diagram of automatic generation control (AGC) for a generating unit and explain it.
- d) Differentiate between small disturbance and large disturbance in a power system. (Any four points)

Q.3 Attempt any THREE of the following:**12**

- a) Define per unit impedance. A 25 MVA, 11 kV generator has a reactance of 0.2 pu on its own rating. Find its per unit reactance on a base of 100 MVA, 12 kV.
- b) Compare shunt compensation and series compensation of a transmission line. (Any four points)
- c) Explain the need of load forecasting in power system operation.
- d) State the types of load dispatch centres in India with their locations.

Q.4 Attempt any THREE of the following:

12

- Draw a labelled schematic diagram of automatic voltage control (AVC) of an alternator and explain its working.
- State the adverse effects of instability of a power system.
- Explain the impact of variation in voltage on consumers and supply agencies.
- With a neat diagram, explain the working principle of STATCOM.
- List the functions of the National Load Despatch Centre (NLDC).

Q.5 Attempt any TWO of the following:

12

- Derive the relation between voltage and reactive power flow in a simple two-bus system. A load of 0.8 pu active and 0.4 pu reactive power is supplied at 1.0 pu voltage through a line of reactance 0.25 pu (R neglected). Find the sending-end voltage.
- Describe the working of the turbine speed governing system for turbo-generator speed control with a labelled schematic diagram.
- Describe any six methods of improving the transient stability of a power system.

Q.6 Attempt any TWO of the following:

12

- Draw the per unit reactance diagram of the power system shown below. Choose 100 MVA and 13.8 kV in the generator circuit as base.

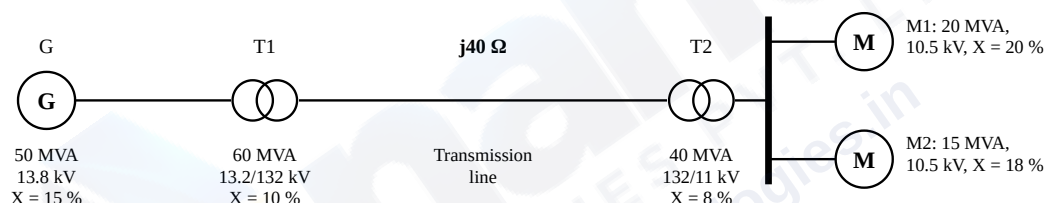


Fig. for Q.6 (a)

- Explain steady state stability with the help of power angle diagram. A generator with EMF 1.2 pu is connected to an infinite bus of 1.0 pu through a total reactance of 0.5 pu and delivers 1.2 pu power. Find $P_{\max}$, the load angle and the steady state stability margin.
- Explain the need of a load dispatch centre. Describe the role of SCADA in a load dispatch centre with a block diagram.

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in