Hall Ticket No | | | | | | | | | | | Question Paper Code: AEEB49

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal-500043, Hyderabad

B.Tech VII SEMESTER END EXAMINATIONS (REGULAR/SUPPLEMENTARY) - DECEMBER 2022

Regulation: R18

POWER QUALITY AND FACTS

Time: 3 Hours **(ELECTRICAL AND ELECTRONICS ENGINEERING)** **Max Marks: 70**

Answer FIVE Questions choosing ONE question from each module
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Describe the power quality issues, transients, harmonics and surge with reference to respective waveforms and causes for it. [BL: Understand| CO: 1|Marks: 7]

   (b) Mention the major problems associated with harmonics? Explain how the harmonics are generated in the transmission systems? [BL: Understand| CO: 1|Marks: 7]

2. (a) Summarize the terms over voltage, under voltage in power system and mention the causes for their occurrence. [BL: Understand| CO: 1|Marks: 7]

   (b) Write the most common power quality problems. Draw and explain the block diagram of advanced power quality monitoring systems. [BL: Understand| CO: 1|Marks: 7]

MODULE – II

3. (a) Describe harmonics and unbalance mitigation in distribution systems using DSTATCOM. [BL: Understand| CO: 2|Marks: 7]

   (b) Explain about time domain algorithms in unified power quality conditioner (UPQC). List the applications of UPQC. [BL: Understand| CO: 2|Marks: 7]

4. (a) Categorize any four types of sag mitigation devices. Elucidate the generalized instantaneous power theory in shunt active power filter (SAPF). [BL: Understand| CO: 2|Marks: 7]

   (b) What is the important role of a dynamic voltage restorer (DVR)? Explain about DVR and draw its schematic diagram. [BL: Understand| CO: 2|Marks: 7]

MODULE – III

5. (a) How the power transfer capability of a transmission line be improved by using series compensation? Compare modern shunt compensator and series compensator in detail. [BL: Understand| CO: 3|Marks: 7]

   (b) Demonstrate the reactive power compensation at the sending, midpoint and receiving ends of the transmission lines. [BL: Understand| CO: 3|Marks: 7]

6. (a) Write about FACTS controller. Describe the principles of conventional reactive power compensators. [BL: Understand| CO: 3|Marks: 7]

(b) Explain how shunt compensation can be achieved with ideal midpoint reactive compensators. What is the effect of multi point segmentation on line performance?

[BL: Understand| CO: 3|Marks: 7]

MODULE – IV

7. (a) Illustrate the operating control schemes of thyristor switched series capacitors (TCSC) with neat diagrams. [BL: Understand| CO: 4|Marks: 7]

   (b) Discuss in detail about the role of static var compensator (SVC) in enhancing the steady state power limit and power system damping. [BL: Understand| CO: 4|Marks: 7]

8. (a) Demonstrate the modes of operation and applications of static synchronous series compensator (SSSC). [BL: Understand| CO: 4|Marks: 7]

   (b) Elucidate the functional requirements of reactive shunt compensator to meet the objectives. [BL: Understand| CO: 4|Marks: 7]

MODULE – V

9. (a) Describe how power swing damping in single machine infinite bus system using TCSC is simulated? [BL: Understand| CO: 5|Marks: 7]

   (b) Infer the power quality improvement and flicker mitigation in transmission lines with FACTS devices. [BL: Understand| CO: 5|Marks: 7]

10. (a) How can the stability of a system be improved? Outline the operation of thyristor controlled series capacitor with neat diagram. [BL: Understand| CO: 5|Marks: 7]

    (b) Draw the functional model of STATCOM. Demonstrate the operating modes of STATCOM using transmission lines. [BL: Understand| CO: 5|Marks: 7]