M.Tech. Electrical Power System CBCS Pattern Semester-I

PEPS12 - Application of Power Electronics in Power System

P. Pages : 2 **GUG/W/23/10970**

Time : Three Hours * 6 0 5 6 * Max. Marks : 70

Notes :
1. All questions carry equal marks.
2. Answer **any five** questions as per internal given choice.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.
6. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

1. a) Why there is a need of interconnection in electrical power system and what are the problems with interconnection. **7**

b) Explain how FACTS and HVDC can be used as complementary techniques. **7**

OR

2. a) Give an account on problems related to power system transmission. How the problems can be addressed by FACTS technology? **7**

b) Explain the analysis of transient stability using Modified Euler's Method. **7**

3. a) Explain the working principle of SSSC for two machine system with phasor diagram. **7**

b) Explain the operation of TSC-TCR type static var generator giving its: **7**
i) Circuit diagram ii) V-I characteristics
iii) VAR output characteristics iv) Loss characteristics.

OR

4. a) A thyristor controlled inductor used in a static VAR compensation circuit in a 11kV, 50Hz ac network has inductance of 5H. Find the range of adjustable VAR using this inductor. **7**

b) Why transient free switching of TSC in needed? How it is achieved? **7**

5. a) Discuss the role of voltage source converter in STATCOM for reactive power control. **7**

b) Draw the diagram showing implementation of UPQC by back to back voltage sourced converter in transmission line. **7**

OR

6. a) What are the main objectives of series compensation? **7**

b) Explain the basic configuration of DVR. State the main design factors influencing the rating. **7**

7. a) Describe Analysis of 3-phase, 6 pulse, converter, with grid control overlap angle. (Given that overlap angle is less than equal to 45 degrees) **7**

b) Explain the implementation of UPFC by two back-to-back voltage sourced converters. **7**

OR

8. a) Explain the limitations of constant 'β' control of inverter operation when there is a sudden either symmetrical or asymmetrical reduction in system voltage. **7**

b) Prove that the power delivered by mono-polar DC system is one and half times that of a single phase AC system, presuming that the AC line and DC line are employing the same conductors and insulators. **7**

9. a) Briefly explain the power handling capabilities of HVDC lines. **7**

b) Find the value of average DC voltage for overlap angle $(\mu) > 60^{o}$ of HVDC converters. **7**

OR

10. a) Explain in detail following firing angle control- **7**
i) Individual phase control
ii) Equidistant pulse control

b) Prove that the power delivered by mono-polar DC system is one and half times that of a single phase AC system, presuming that the AC line and DC line are employing the same conductors and insulators. **7**

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