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M.Tech
PSPE201

**2nd Semester Back Examination 2017-18
HVDC & FACTS DEVICES**

**BRANCH : POWER AND ENERGY ENGG,
POWER ENGG AND ENERGY SYSTEMS**

Time : 3 Hours

Max Marks : 70

Q.CODE : C877

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Answer all parts of a question at a place.

- Q1 Answer the following questions : (2 x 10)**
- a) What is commutating emf?
 - b) What is overlap angle (μ)?
 - c) What is back to back DC link?
 - d) Give the of converter characteristics for constant α .
 - e) Draw the equivalent circuit of a Bridge rectifier.
 - f) Why bipolar link is more commonly used?
 - g) How can disturbances due to harmonics be eliminated in a converter?
 - h) What are different categories of FACTS controllers?
 - i) Give the basic circuit arrangement of TSSC.
 - j) What is Sub-synchronous oscillation?
- Q2 Compare AC and DC Transmission based on following factor (5 + 5)**
- (a) Economics of transmission
 - (b) Technical performances
- Q3 a) Compare the insulation level of a bipolar DC system with 3-phase ac system for same power transmission and equal losses. (5)**
- b) What are different types of AC filters used for harmonic elimination in HVDC Transmission? (5)**
- Q4 a) Derive the complete equivalent circuit of HVDC link. (5)**
- b) Derive the equation for inverter. (5)**
- Q5 a) What are the different sources of harmonics in HVDC system? (5)**
- b) What are different types of AC filters used for harmonic elimination in HVDC links? Explain. (5)**
- Q6 a) Give the operating principle of TSSC. (5)**
- b) Explain the operating control scheme for GCSC. (5)**
- Q7 Explain the operation of UPFC. How real and reactive power can be controlled by UPFC ? (10)**
- Q8 Write short notes on any TWO : (5 x 2)**
- a) Converter characteristics
 - b) Power reversal in a DC links
 - c) MTDC
 - d) SVC