M.E. ELECTRICAL ENGINEERING FIRST YEAR SECOND SEMESTER EXAMINATION 2017
M. E. POWER ENGINEERING FIRST YEAR SECOND SEMESTER EXAMINATION, 2017

POWER ELECTRONICS APPLICATION IN EHV TRANSMISSION

Time: Three hours   Full Marks: 100

Answer **any ten** questions.
Figures in the margin indicate full marks

1.(a)   With a schematic diagram describe the function of an IPFC in an EHV power transmission system.   (6)

(b)   Which one of these among SVC and a STATCOM provides better control in EHV AC transmission? Justify your answer.   (4)

2.   Develop a mathematical model to include a HVDC link in load flow analysis when rectifier is on CIA control and inverter is on CC control. State the assumptions made.   (10)

3.   Discuss the operating principles of a TSC-TCR SVC and a STATCOM with proper schematic diagram.   (5+5)

4.   What is SVS? With a schematic diagram explain the principle of operation of SVS. What will happen if the DC energy supply of SVS is made to be zero?   (10)

5.   How does a phase shifter improve (i) steady state stability limit and (ii) maximum power transfer capability of a transmission line? Use suitable phasor diagram and P-δ diagram whenever necessary.   (10)

6.   Derive the expressions for active and reactive power both at sending end and receiving end of a lossless transmission line in terms of midpoint voltage and load angle.   (10)

7.   What do you understand by series compensation? Discus how does it improve the performance of power transmission system? Derive the expression of reactive power supplied by a conventional series capacitor in terms of load angle, supply voltage, system reactance and degree of compensation.   (10)

8.   Discuss ideal steady state V-I characteristics of HVDC converters at the two ends of a HVDC link. Explain how practical steady state V-I characteristics may be different from their theoretical counterpart.   (10)

9.   How transmission line and induction motor are modelled for harmonic analysis of power system?   (10)

10.   What are the problems due to harmonics generated in EHV AC transmission system? Discuss about two harmonic sources in power system.   (10)

11. Write a brief algorithm for harmonic analysis in power system.   (10)

12. Draw equivalent circuit diagram of a UPFC connected between two buses of a power   (10)
     system. Derive active and reactive power equations of the series converter of the UPFC.

13. Derive a power flow model for STATCOM.   (10)

14. What are meant by SIL and electrical length of a transmission line? Establish the   (10)
     relationship between reactance, SIL and electrical length of a transmission line