Code No: 128BR **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, May - 2019
FUNDAMENTALS OF HVDC AND FACTS DEVICES
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART –A

(25 Marks)

1.a) What are the factors to be considered for planning HVDC transmission. [2]
b) What are the limitations of EHVAC transmission? [3]
c) Write short note on starting of DC link. [2]
d) Distinguish between characteristic harmonics and non- Characteristic harmonics. [3]
e) Mention the performance criteria for selection of harmonic filter. [2]
f) List the different assumptions that are considered for derivation of equations representing the AC/DC Converter. [3]
g) What is FACTS Controller and Write different basic types of FACTS controllers? [2]
h) Explain flow of power in meshed system. [3]
i) Give the block diagram for a basic UPFC control scheme. [2]
j) What are the objectives of series compensation? [3]

PART –B

(50 Marks)

2.a) Explain the technological development of modern trends in dc transmission.
b) Explain the major components of HVDC transmission in converter station unit. [5+5]

OR

3.a) Compare AC & DC transmission systems and Explain the application of DC transmission systems.
b) Draw the schematic circuit diagram of a 6 pulse gratez circuit and explain its principle of operation. [5+5]

4.a) Explain the converter control characteristics in HVDC system.
b) Explain the relative merits and demerits of constant current and constant voltage operation of an HVDC Link. [5+5]

OR

5.a) Explain the individual characteristics of a rectifier and an inverter with sketches.
b) Discuss in detail the principle of DC Link control. [5+5]

6.a) Write a short note on the following:
i) Harmonic distortion
ii) Sources of reactive power.

b) What are the different types of filters used on the AC side of an HVDC system? How are they located and arranged. [5+5]

OR

7.a) Explain briefly Modeling of DC/AC converters.

b) Explain the sequential method of DC power flow. Draw the necessary flow chart. [5+5]

8.a) Explain reactive power requirements in steady state.

b) Write the objectives of shunt compensation. [5+5]

OR

9.a) Using a general schematic diagram, explain the three basic modes of SVC control in detail.

b) Explain the principle of operation of STATCOM. Show that the steady state stability margin can be enhanced. [5+5]

10.a) Explain with a neat sketch and waveforms the SSSC type of series controller.

b) Explain how the independent real and reactive power control is done by using UPFC.[5+5]

OR

11.a) Explain in detail about the Basic Thyristor – controlled series capacitor scheme.

b) Explain the principle of variable impedance type static series compensator. [5+5]

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