

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)**

**CLASS: MTECH  
BRANCH: ET**

**SEMESTER : II  
SESSION : SP/19**

**SUBJECT: EE597 POWER GENERATION, TRANSMISSION AND DISTRIBUTION  
TIME: 3.00 Hrs.**

**FULL MARKS: 50**

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
- 

- Q.1(a) Explain the two-axis model of the synchronous machine with amortisseur windings. [5]  
Q.1(b) Explain the stator voltage equation in dq0 coordinates. [5]
- Q.2(a) Describe in detail the working of a speed governing system for steam turbine with block diagram representation. [5]  
Q.2(b) What is power system stabilizer and why it is used? Discuss the role of power system stabilizers for the enhancement of small signal stability. [5]
- Q.3(a) A single circuit 50 Hz, 3-phase transmission line has the following parameters per km:  $R=1$  ohm,  $L= 1.5$  mH and  $C= 0.01$   $\mu$ F. The voltage at the receiving end is 132 kV. If the line is open at the receiving end, find the rms value and phase angle of the following: [5]  
(i) The incident and reflected voltages to neutral at 150 km from the receiving end.  
(ii) The incident and reflected voltages to neutral at 500 km from the receiving end.  
(iii) The reflected voltage to neutral at the receiving end.
- Q.3(b) Derive for a medium length line the sending end voltage and current relations in terms of receiving end voltage and current and the parameters of the line for Nominal T and  $\pi$  configurations with phasor diagrams and also obtain the voltage regulation for both configurations. [5]
- Q.4(a) A feeder with reactance of 0.2 pu has the sending end voltage of 1.2 pu. If reactive VAR demanded by the load is 0.3 pu and the difference in load angle between the sending and receiving end is 30 degrees, then what will be the approximate voltage drop in the feeder in pu. [5]  
Q.4(b) Draw the schematic diagram of a typical HVDC converter station with 2 six pulse converter units and explain the function of each component in detail. [5]
- Q.5(a) With relevant figures and waveforms, explain the operation of Graetz bridge circuit. Derive the expression for average DC output voltage of the converter without overlap. Assume converter firing angle as ' $\alpha$ '. Also obtain the expression for RMS AC current. [5]  
Q.5(b) Write Short notes on [5]  
(i) Substation and feeder circuit design consideration (ii) Distribution Automation

:22/04/2019 M: