Roll No.												

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

SUMMER TERM/ MAKE UP ENDTERM EXAMINATION

Semester: Summer Term 2019
Course Code: EEE 215
Course Name: Power System Analysis
Program & Sem: BTech & VI Sem (2015 Batch)

Date: 23 July 2019
Time: 2 Hours
Max Marks: 80
Weightage: 40%

Instructions:

(i) *Read the question properly and answer accordingly.*
(ii) *Question paper consists of 3 parts.*
(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **five** marks. (4Qx5M=20)

1. Define the terms reliability, security, stability, adequacy and voltage collapse in the context of power system.
2. With the help of symmetrical components derive a relation between fault current and sequence impedances when a L-G fault occurs in a system with fault impedance
3. Draw the connection of sequence networks for a L-L-G fault with fault impedance Z_f
4. Derive the inertia constant for multi-machine system swinging coherently

Part B

Answer **all** the Questions. **Each** question carries **ten** marks. (4Qx10M=40)

5. A 50 Hz four pole turbogenerator rated 100 MVA, 11 kV has an inertia constant of 8.0 MJ/MVA Compute a) stored energy in the rotor at synchronous speed
   b) If the mechanical input is raised suddenly to 80 MW for an electrical load of 50 MW, find rotor acceleration, neglecting mechanical and electrical losses.

6. A generator operating at 50 Hz delivers 1 pu power to an infinite bus through a transmission circuit in which resistance is ignored. A fault takes place reducing the maximum power transferrable to 0.5 pu whereas before the fault, this power was 2 pu and after the clearance of the fault, it is 1.5 pu. By the use of equal area criterion, determine the critical clearing angle.

7. A synchronous generator of reactance 1.20 pu is connected to an infinite bus bar (IVI) = 1.0 pu) through transformers and a line of total reactance of 0.60 pu. The generator no load voltage is 1.20 pu and its inertia constant is H=4 MW-s/MVA. The resistance and machine damping may be assumed negligible. The system frequency is 50 Hz. Calculate the frequency of natural oscillations if the generator is loaded to (i) 50% and (ii) 80% of its maximum power limit

8. Two 11 kV, 20 MVA, three phase, star connected generators is operating in parallel. The positive, negative and zero sequence reactances of each being respectively, j0.18, j0.15 and j0.10 pu. The star point of one of the generators is isolated and that of the other is earthed through a 2 Ohms resistor. A single line to ground fault occurs at the terminals of one of the generators. Estimate i) the fault current ii) current in grounding resistor iii) the voltage across grounding resistor.

Part C

Answer **both** the Questions. **Each** question carries **ten** marks. (2Qx10M=20)

9. Compute the steady state power limit of a system consisting of a generator equivalent Reactance 0.50 pu connected to an infinite bus through a series reactance of 1.0 pu. The Terminal voltage of the generator is held at 1.20 pu and the voltage of the infinite bus is 1.0pu.

10. Write short notes on a) Rotor angle stability b) voltage stability c) frequency stability