Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: EE306

Course Name: POWER SYSTEM ANALYSIS

Max. Marks: 100 Duration: 3 Hours

PART A

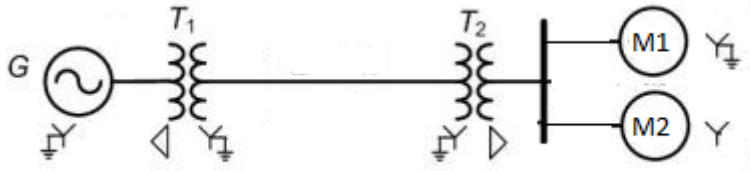
Answer all questions, each carries5 marks. Marks

1	Define the term per unit quantity. Enumerate Merits and Demerits of P.U	(5)
2	What is the significance of current limiting reactors in power system? Where are they located? Give examples.	(5)
3	How slack bus differs from other buses in a power system? What is the significance of slack bus in load flow analysis?	(5)
4	What is AVR? What are the functions?	(5)
5	Derive condition for economic load dispatch neglecting losses.	(5)
6	Define penalty factors and loss coefficients in economic operation of power system.	(5)
7	Explain the terms 1) steady state stability 2) dynamic stability 3) transient stability	(5)
8	Write all methods to improve steady state stability limit of power system	(5)

PART B

Answer any two full questions, each carries10 marks.

9	A 300 MVA, 20kV three phase generator has a subtransient reactance of 20%. The generator supplies two synchronous motors over a 64km transmission line having transformers at both ends as shown on the single line diagram. The ratings of the motors are:M1-200MVA, 13.2kV, X"=20%; M2- 100MVA, 13.2kV, X"=20%. The ratings of transformers are T1-350MVA, 230/20 kV, X=10%; T2- composed of 3 single phase transformers each rated 127/ 13.2kV,100MVA, X=10%. Series reactance of the transmission line is 0.5 ohm/km. Draw the reactance diagram with all reactances marked in p.u. Select the generator ratings as base values.	(10)



10 a) Draw the zero sequence networks of star-delta and delta-delta transformers (5)

b) Draw and explain the oscillogram of short circuit current when an unloaded alternator is subjected to a 3-phase fault (5)

11 Derive the expression for fault current and draw the interconnection of sequence networks for the following faults on the terminals of an unloaded generator. (10)

(a) single Line to Ground fault

(b) Line to Line fault

PART C

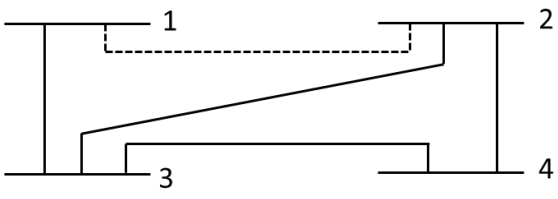
Answer any two full questions, each carries10 marks.

12 (10)

The figure shows the SLD of a simple four bus system. The table gives the line impedance identified by the buses on which these terminate. The shunt admittance at all the buses is assumed to be negligible.

a) Find Y_{BUS}, assuming that the line shown dotted is not connected.

b) What modifications need to be carried out in Y_{BUS} if the line shown dotted is connected



Line, Bus to Bus	R pu	X pu
1-2	0.05	0.15
1-3	0.10	0.30
2-3	0.15	0.45
2-4	0.10	0.30
3-4	0.05	0.15

13 a) Compare between Gauss-Seidal method and Newton-Raphson method, in load flow studies. (5)

b) With neat diagram explain the working of a turbine speed governing system. (5)

14 Derive the generator load model and draw the complete block diagram of a single area system (10)

PART D

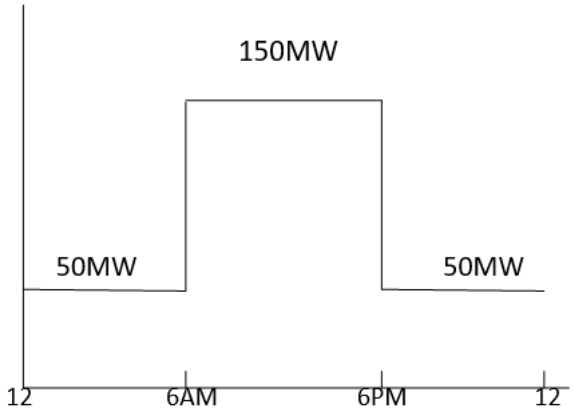
Answer any two full questions, each carries 10 marks.

15 Assume that the fuel input Btu/hr for units 1 and 2 are given by (10)

$$F_1 = (8P_1 + 0.024P_1^2 + 80)10^6$$

$$F_2 = (6P_2 + 0.04P_2^2 + 120)10^6$$

The maximum and minimum loads on the units are 100MW and 10MW respectively. Determine the minimum cost of generation when the following load is supplied. The cost of fuel is Rs`2/million Btu.



16 a) What is the significance of spinning reserve constraint in unit commitment problem? Explain with example. (5)

b) Explain the equal area criterion to determine the stability of a power system (5)

17 a) Derive the swing equation. (5)

b) A 2 pole 50 Hz, 11kV turbo generator has a rating of 60 MW at 0.85 p.f lagging. Its rotor has a moment of inertia of 8800 kg-m^2. Calculate its inertia constant in MJ/MVA and its angular momentum in MJ-s/elect. Degree. (5)

****