Reg. No. : | | | | | | | | | | |

Question Paper Code: 45303

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fifth Semester

Electrical and Electronics Engineering

14UEE503 - POWER SYSTEM ANALYSIS

(Regulation 2014)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. What will be the per unit impedance of a synchronous motor having a rating of 100 kVA, 13.2 kV and having a reactance of 75 Ω / ph?

   (a) 0.043 pu (b) 0.057 pu (c) 0.036 pu (d) 0.298 pu

2. The value of diversity factor is

   (a) 0 (b) 1 (c) less than 1 (d) greater than 1

3. What is the value of acceleration factor used in the GS method?

   (a) 2.3 – 2.7 (b) 1.6 – 2.0 (c) 1.2 – 1.5 (d) 2.4 – 2.9

4. Gauss Seidal iterative method can be used to solve a set of

   (a) linear differential equation only
   (b) linear and non linear algebraic equations
   (c) linear and non linear differential equations
   (d) linear algebraic equation only

5. If the P.U value of synchronous impedance is 2, what is short circuit ratio?

   (a) 0.05 (b) 0.5 (c) 2 (d) 0.02

6. What is the value of negative sequence impedance?

(a) 1 (b) Z
(c) Same as positive sequence (d) ∞

7. On which among the following factors does the magnitude of the fault current depend?

(a) Total impedance upto the fault (b) Voltage at the fault point
(c) Both (a) and (b) (d) None of these

8. Which among these is the most severe fault?

(a) Single line to ground fault (b) Double line to ground fault
(c) Line to line fault (d) Symmetrical fault

9. Kinetic energy of 800 *MJ* stored in the rotor at synchronous speed. What is the inertia constant for a 50 *Hz* four pole turbo generator rated at 100*MVA*, 11 *kV*

(a) 2 *MJ / MVA* (b) 8 *MJ / MVA*
(c) 88 *MJ / MVA* (d) 6 *MJ / MVA*

10. Critical clearing time of fault in a power system is related to

(a) transient stability (b) reactive power
(c) S.C. current (d) voltage limit

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Draw the reactance diagram for the power system shown in figure 1.

Take 100 *MVA*, 220 *kV* in 50 *Ohm* line as base value.

Generator : 40 *MVA*, 25 *kV*, *X''*= 20 %
Motor : 50 *MVA*, 11 *kV*, *X''*=30%
T (star /star) : 40 *MVA*, 33/220 *kV*, *X*= 15%
(delta / star) : 30 *MVA*, 11/220 *kV*, *X*= 15 % (8)

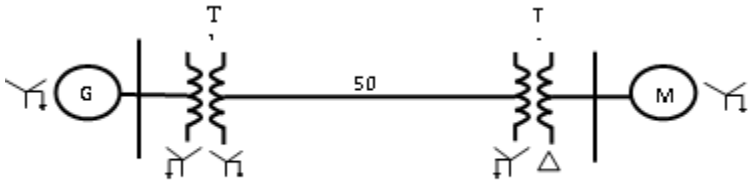

Figure 1

12. Explain the algorithm of Gauss Seidal method for the load flow problem with a neat flow chart and relevant equations. (8)

13. A 11 *kV*, 100 *MVA* alternator having a sub-transient reactance of 0.25 *pu* is supplying to a 50 *MVA* motor having a sub-transient reactance of 0.2 *pu* through a transmission line. The line reactance is 0.05 *pu* on a base of 100 *MVA*. The motor is drawing 40 *MW* at 0.8 *p.f.* leading with a terminal voltage of 10.95 *kV* when a 3-phase fault occurs at the generator terminals. Calculate the total current in generator and motor under fault conditions. (8)

14. Draw the sequence network connection for LL fault at any point in a power system . From that obtain an expression for the fault current. (8)

15. Derive the swing equation of a single machine connected to an infinite bus system and explain the steps of solution by Runge-kutta method. (8)