Total No. of Questions : 10]

SEAT No. :

P3293

[Total No. of Pages : 3

[5353]-166

T.E. (ELECTRICAL) (Semester - II)

POWER SYSTEM - II

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary'***

Q1) a) A 3 ph overhead transmission line has a total series impedance per phase of $200 \angle 80^\circ \Omega$ and total shunt admittance of $0.0013 \angle 90^\circ$ mho/ph. The line delivers a total load of 80 MW at 0.8 p.f. lag and 220kV between lines.

Determine the ABCD constants and sending end line voltage **[6]**

b) Explain different types of HVDC Links. **[4]**

OR

Q2) a) Explain the term compensation and list different methods of compensation? **[4]**

b) A three phase 132kV overhead line delivers a load of 50 MVA at 132 KV, and 0.8 p.f. lagging at its receiving end . The constants of the transmission line are: $A = D = 0.98 \angle 3^\circ$, $B = 1\,10 \angle 75^\circ \Omega$, **[6]**

Determine:

i) Sending end voltage and power angle.

ii) sending end active and reactive power

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Q3) a) Explain the concept of disruptive critical voltage. Also explain visual critical voltage of corona **[5]**

b) Explain the constant ignition angle control method in detail **[5]**

OR

Q4) a) Prove that reactive power is proportional to voltage drop. **[4]**

b) Determine the

i) Critical disruptive voltage

ii) Visual critical voltage

iii) corona loss under foul weather condition for a 3Φ line 160km long, conductor diameter 1.036cm, 2.44m delta spacing, air temperature 26.67ºC, corresponding to an appropriate barometric pressure of 73.15cm, operating voltage 110KV at 50 Hz. Assume irregularity factor = 0.85. Assume Mv = 0.72. Disruptive voltage under foul weather = 0.8 x Fair weather value.

[6]

Q5) a) Explain the single line diagram, Impedance diagram and reactance diagram of a power system. **[8]**

b) Explain formation of Y - Bus using Bus Incidence matrix. **[8]**

OR

Q6) a) Derive static load flow equations for n bus system. **[8]**

b) Three generators are rated as follows: **[8]**

Generator 1: 100MVA, 33 KV, reactance = 10%

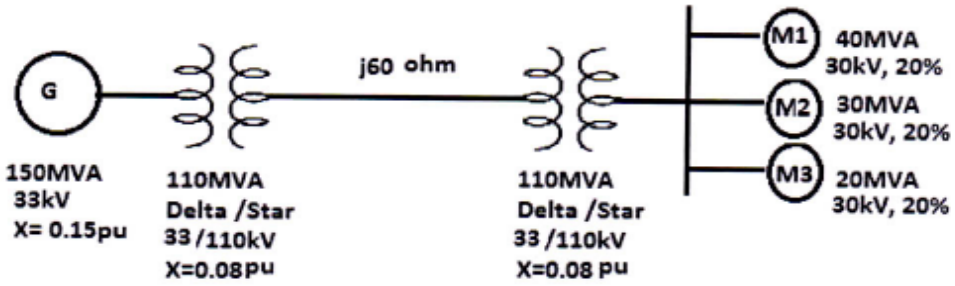
Generator 2: 150MVA, 32 KV, reactance = 8%

Generator 3: 110MVA, 30 KV, reactance = 12%

Choosing 200MVA & 35 KV as base quantities, compute per unit reactances of three generators referred to these base quantities. Draw reactance diagram and mark per unit reactances. The three generators are connected to common bus bars.

Q7) a) Write a short note on selection of circuit breaker. **[8]**

b) A 150MVA, 33kV, three phase generator has a reactance of 15%. The generator is connected to three, motors through transmission line and transformers as shown in the fig. Motors have rated input of 40 MVA, 30MVA, 20MVA at 30kV with 20% reactance each. If a three phase short circuit fault occurs at generator terminals. Find the fault current & fault MVA. **[8]**



OR

Q8) a) Explain in detail the sub-transient, transient and steady states of unloaded alternator under symmetrical fault condition. **[8]**

b) A 3Φ, 5 MVA, 6.6 KV alternator with a reactance of 8% is connected to a feeder of series impedance (0.12 + j0.48) Ω / phase/km. The transformer is rated at 3MVA, 6.6KV/33KV& has a reactance of 5%. Determine the fault current supplied by the generator operating under no-load condition. Symmetrical fault occurs at a point 15 km along the feeder. **[8]**

Q9) a) Derive the expression for fault current in case of L-L-G fault through a fault impedance of Z_f in terms of sequence. Draw the sequence network for this type of fault. **[9]**

b) A 3 phase, 37.5 MVA, 33 kV alternator having $X_1 = 0.18$ pu, $X_2 = 0.12$ pu and $X_0 = 0.1$ pu based on its rating is connected to a 33kV overhead line having $X_1 = 6.3$ Ω/ph, $X_2 = 6.3$ Ω/ph. and $X_0 = 12.6$ Ω/ph A single line to ground fault occur at remote end of the line. The alternator neutral is solidly grounded. Calculate fault current & Fault MVA. **[9]**

OR

*Q10)*a) Draw zero sequence diagrams for all types of combinations of transformers. **[9]**

b) For the three phase transmission line with self impedances Z_s and mutual impedance Z_M, show that $Z_1 = Z_2 = Z_s - Z_M$ and $Z_0 = Z_s + 2\,Z_M$ **[9]**