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Reg. No. : .....

Name : .....

Seventh Semester B.Tech. Degree Examination, November 2015
(2008 Scheme)
08.702 : POWER SYSTEM ENGINEERING – III (E)

Time : 3 Hours Max. Marks : 100

Instructions : *Answer **all** questions from Part **A** and **any one** question from **each** Module of Part **B**.*

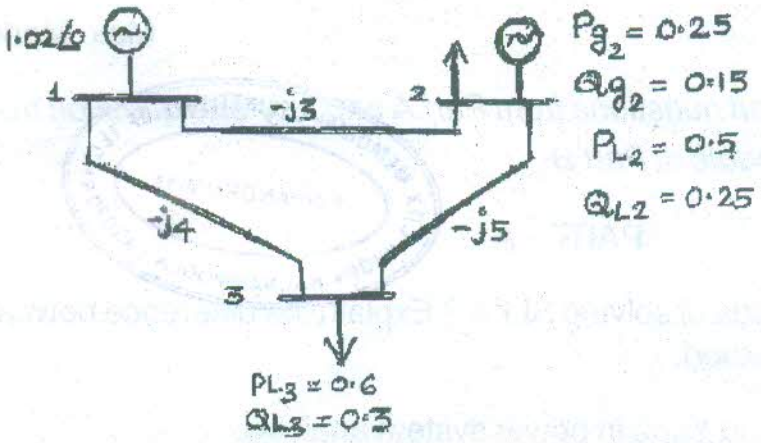
PART – A

1. What are the different methods of solving SLFA ? Explain the difference between Gauss and Gauss-Seidel method.
2. Distinguish between Z_{BUS} and Y_{BUS} in power system analysis.
3. What are the assumptions in FDLFA ? What are the demerits of FDLFA ?
4. Differentiate between Economic dispatch problems and unit commitment problem.
5. What are the needs for reactive power compensation in power system ?
6. What are the benefits obtained from FACTS technology ?
7. Derive the expression for swing equation. What is the use of swing equation ?
8. Explain different terms associated with electric tractors.
9. What are the challenges and solutions associated with over voltages in power system ?
10. What are forked lines ? Obtain reflection and refraction coefficient of forked line from its equivalent circuit. **(10×4=40 Marks)**

PART – B

Module – I

11. a) Single line diagram of a 3 bus system is shown in figure. All parameters are in p.u. Compute the voltage magnitude and angle at the end of first iteration using Gauss-Seidel Method with an acceleration factor $\alpha = 1.5$. **10**



b) Derive Jacobian elements in polar form. **10**

OR

12. a) A 2 bus system consist of two power plants connected by a transmission line. The cost curve characteristics of the two plants are

$C_1 = 0.01\ P_1^2 + 18\ P_1 + 20$ Rs./hr

$C_2 = 0.03\ P_2^2 + 33\ P_2 + 40$ Rs./hr

When a power of 120 MW is transmitted from plant 1 to load (near to plant 2), a loss of 16.425 MW is ocurred. Determine the optimal scheduling of plants and load demand if cost of received power is Rs. 26/MWhr **15**

b) Explain various constraints in unit commitment problem. **5**

Module – II

13. a) What is meant by AGC ? What are the components in AGC ? Explain with the help of net sketch. **10**

b) Explain how reactive power is controlled in power system using synchronous compensators, reactors and static VAR compensators. **10**

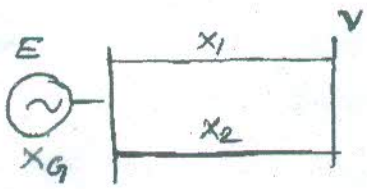
OR

14. a) Explain the principle and operation of STATCOM with neat sketch. **10**

b) A balanced 3ϕ fault occurs at the middle of line 2 when the power transfer is 1.5 p.u. Here E = 1.2; V = 1; $X_1 = X_2 = 0.4$ p.u., $X_G = 0.2$

i) Determine whether the system is stable for a sustained fault.

ii) The fault is cleared at $\delta = 60°$ is the system is stable ? If so find maximum rotor slip. **10**



Module – III

15. a) A train runs at an average speed of 50 Kmph between station situated at 2.5 Km apart. The train accelerates at 2 Kmphps and retards at 3 Kmphps. Find its maximum speed. Draw the speed time curve for the run and calculate the distance travelled by it before brakes are applied. **10**

b) Explain different configurations of HVDC systems. **6**

c) Write a short note on HVDC development in India. **4**

OR

16. a) Derive the expression for reflection and refraction coefficients when travelling wave is subjected to line termination with a cable of impedance Z Ω. **6**

b) A transmission line having surge impedance 400 Ω is terminated by two cable having Z = 50 Ω each. When this line is subjected to lightning stroke of 100 KV, find reflected and refracted values of voltage and current. **6**

c) Explain the operation of following surge arresters with the help of neat sketch.

i) Rod gap

ii) Non-linear surge arresters **8**