Model Question Paper-I with effect from 2018-19

USN | | | | | | | | | | | **15EE71**

Seventh Semester B.E.(CBCS) Examination
Power System Analysis 2

(Core subject, E&EE)

Time: 3 Hrs Max.Marks: 80

Note: Answer any FIVE full questions, choosing at least ONE question from each module.

Module-1

1. (a) Define following terms with an example oriented graph, tree & co-tree. **(06 Marks)**

(b) .Determine the bus admittance matrix using the singular transformations for the Sample power system with the line data shown in table below. 0 as reference **(05 Marks)**

Line No.	1	2	3	4	5
Bus-code p-q	0 -1	1 -2	2 -3	3 - 0	2 - 0
Impedance pu)	0.8	0.5	0.4	0.5	0.25

(c) Derive the algorithm for formation of Ybus by assuming mutually coupling between transmission lines **(5 Marks)**

OR

2. (a) What is load flow analysis? What are different types of buses considered during power system load flow? Discuss significance of slack bus in load flow studies. **(06 Marks)**

(b) In the power system shown in fig line 1-2 has the series impedance of 0.04+j0.12 pu with negligible line charging. The generation and load data is given in the table.

Bus No.	Type	Generation (pu)		Load (pu)	
		Real	Reactive	Real	Reactive
1	Slack	-	-	-	-
2	PV	0.3	-	0.6	0.2

Fig (2b)

The slack bus voltage is 1+j0.The voltage magnitude at bus is to be maintained at 1.05 pu and the generator at this bus has Q-Generation limits between 0 and 0.5pu.With 1+j0 pu initial voltages at bus 2.determine its voltage at the end of first iteration ,using the gauss seidel load flow model **(06 Marks)**

c) What is primitive Network ? Explain its significance **(04 Marks)**

Module-2

3. **(a)** Compare Gauss Seidel and Newton -Raphson method of load flow analysis **(04Marks)**

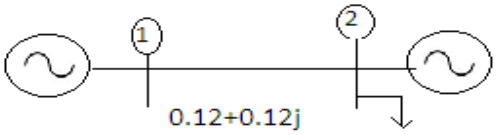
(b) Draw flow chart of load flow analysis using Newton –Raphson's method in polar co-ordinate. **(7marks)**

(c) Explain any two method of voltage control in power system **(05Marks)**

OR

4. **(a)**Deduce fast decoupled load flow model clearly stating all the assumptions made. **(08 Marks)**

(b) In a two bus system shown in fig Q4(b).The bus1 is slack bus with V=1 pu and bus 2is a load bus with P=100MW,Q=50MVAr.The line impedance is (0.12+0.12j)pu on a bus of 100MVA.Using Newton Raphson load flow method compute $|V_2|$ and δ_2 upto one iteration



Module-3

5. **(a)** Write down the transmission loss formula .Obtain the losses co-efficient formula for a system consisting of two Generating plants for Supplying several loads through a transmission line network **(08 Marks)**

(b) Briefly explain the two state generator model.With usual notatation derive the expression for availability and unavalibility in terms of failure and repair rate. **(08 Marks)**

OR

6. **(a)** State unit commitment problem .In brief explain dynamic programming method. **(06 Marks)**

(b) .Incremental fuel cost in rupees per MWh for the plant consisting of two units are

$$\frac{dC_1}{PG_1} = 0.20PG_1 + 40.0 \qquad \frac{dC_2}{PG_2} = 0.25PG_2 + 30.0$$

Assume both units are operating at all the times ,and total load varies room 40 MW to 250 MW and the maximum and minimum loads on each unit are to be 125 and 20 MW respectively .How will the load shared between two units as the system load varies the full range? What are the corresponding values of the plant incremental costs?Also find the saving of fuel of cost in r/hr for the optimal scheduling of a total load of 130MW as compared to equal distribution of the same load between the two points **(10 Marks)**

Module-4

7. (a) Explain the problem formulation and solution procedure of optimal scheduling for hydrothermal plants **(09 Marks)**

(b) Define reliability.brifiely explain the modes of failure in power system reliability. **(07 Marks)**

OR

8. (a) Obtain an expression for i)steady state reliability R& Q ii)General reliability index R(t) **(06 Marks)**

(b) Define energy management system & Explain the three major function that are carried out in an energy control center of power system security **(06 Marks)**

(c) In brief explain indirect approach of contingency analysis **(04 Marks)**

Module-5

9. (a) Explain the point by point method of solving the swing equation **(08 Marks)**

(b) Obtain the generalized algorithmic expression for bus impedance matrix elements when a link is added to the partial network. Also discuss the special cases **(08 Marks)**

OR

10. (a) For the network graph shown in fig (b) , determine $[Z_{BUS}]$, with node 1 as reference, using building algorithim.Neglect mutual coupling. Self impedance of elements are marked on the diagram .Add elements in the order specified.

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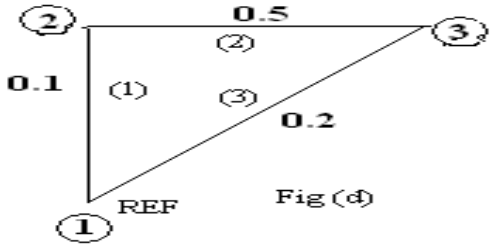

Fig (d)

(08 Marks)

(**b)**Illustrate clearly the steps involved solving swing equation using Runge -Kutta method for transient analysis **(08 Marks)**

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Consider three bus system .each of three lines has series impedance of 0.02+0.08j pu and a total shunt impedance of 0.02jpu.The specified quantities at the buses are tabulated below

Bus	Real Load Demand	Reactive Load demand	Real power generation P_G	Reactive power generation Q_G	Volatage specification
1	2	1	-	-	V1=1.04+j0
2	0	0	0.5	1	1+j0
3	1.5	0.6	0	?	V3=1.04