Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **B.Tech**
PCEL4401

7th Semester Regular / Back Examination 2016-17
POWER SYSTEM OPERATION AND CONTROL
BRANCH: EE
Time: 3 Hours
Max Marks: 70
Q.CODE: Y342

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) What is per unit system?
b) What is single line diagram in power system?
c) What is the role of Hydraulic amplifier in load frequency control model?
d) State and explain the load flow problem briefly.
e) Justify that, the load flow equations can be termed as static load flow equations.
f) What are the constraints of economic load dispatch problem?
g) What is meant by unit commitment?
h) What is the importance of transition cost?
i) Why the Jacobian Matrix of a large power system is sparse?
j) State swing equation of a generator.

Q2 **a)** Explain the modeling of load frequency scheme of a single generator system? **(5)**

b) Two generators rated with 221MW and 429MW are operating in Parallel. The droop characteristics of their governors are 4.15% and 5.35% respectively from no-load to full load. The speed changers are so set that the generators operate at 50 Hz sharing the full load of 650MW in the ratio of their ratings. If the load reduces to 550 MW, what will be the load shared by each generator? Also find out the system frequency under this condition. **(5)**

Q3 **a)** Explain Load flow problem in details. **(3)**

b) Derive load flow equations of a 3-bus, 2-generator system. Also find out the elements of the Jacobian matrix of the given system. **(7)**

Q4 **a)** Derive the solution of the economic load dispatch problem of a 2-generator system without considering the transmission loss. **(4)**

b) A power system consisting of two generators of capacity 210MW each supplies a total load of 310 MW at a certain time. The respective incremental fuel cost of Generator-1 and Generator-2 are: **(6)**

$$\frac{dC_1}{dP_{G1}} = 0.125P_{G1} + 18.9$$

$$\frac{dC_2}{dP_{G2}} = 0.131P_{G2} + 12$$

Where, powers P_G in MW and costs C in Rs/hr. Determine (i) the most economical division of load between the generators and (ii) the saving in Rs/day thereby obtained compared to equal load sharing between the machines.

Q5 **a)** Derive the swing equation of a single generator system. **(5)**

b) A 50 Hz, 4 pole turbo generator of rating 20 MVA, 13.2 kV has an inertia constant of 9 kW-sec/kVA. Find the kinetic energy stored in the rotor at synchronous speed. Find the acceleration, if the input less the rotational loss is 26,800 hp and the electric ower developed is 16 MW equal at 115 kW. **(5)**

Q6 **a)** Explain the utility of a transformer connected in the transmission line with off-nominal taps. **(5)**

b) Explain the Gauss elimination method of solving problems consisting of the sparse matrix. **(5)**

Q7 **a)** Derive the solution for a unit commitment problem. **(5)**

b) Explain the dynamic response characteristics of a multi machine system. **(5)**

Q8 **Write short answer on any TWO:** **(5 x 2)**

a) Newton-Raphson's Method for the load flow study

b) ALFC modeling of a two area system

c) Equal area criterion for power system stability analysis