Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: VII (Electrical) Engineering

Regular / Remedial Examination Nov – Dec 2015

Subject Name: Interconnected Power System (2EE701)

Time: 3 Hours / As per Scheme **Total Marks: 70**

Instruction: 1 Attempt all questions
2 Figures to the right indicate full marks
3 Assume suitable data wherever necessary

SECTION-I

Q.1 (a) Classify and explain different types of buses in power system (6)
(b) Compare GS and NR method of load flow (6)

OR

Q.1 (a) State the assumptions made in approximate load flow analysis. Explain how SLFE's get modified when these assumptions are inserted in basic load flow equations (4)
(b) A certain power network consists of 3-bus system in which the line reactance is 0.001 pu per km and shunt susceptance is 0.0016 pu per km. The line lengths are given below (8)

Sr. No	From bus	To bus	Length (kms)
1	1	2	100
2	2	3	200
3	1	3	250

Assemble Y_{BUS} matrix of the network neglecting line resistance

Q.2 (a) Starting from the basic power flow equation, derive the values of Him, Jim, Hii and Jii used in Jacobian matrix (6)
(b) Explain heat rate curve and input output curve of a generating unit (5)

OR

Q.2 (a) Discuss the criteria for most economic dispatch when transmission losses are considered (6)
(b) The incremental fuel costs for two generating units 1 and 2 of a power plant are given by the following equations (5)

$$\frac{dF_1}{dP_1} = 0.07P_1 + 24 \text{ Rs/MWh}, \qquad \frac{dF_2}{dP_2} = 0.075P_2 + 22 \text{ Rs/MWh}$$

Determine (i) the economic loading of two units when the total load supplied by the power plants is 180 MW. (ii) The loss in fuel cost in Rs/hr if the load is equally shared by both the units

Q.3 (a) Derive the expression for B-loss coefficients. State the assumptions made (8)
(b) Define steady state, dynamic and transient stability (4)

SECTION-II

Q.4 (a) Starting from the first principles, derive the swing equation (7)
(b) A two pole, 50 Hz, 11 kV turbo-alternator has a rating of 100 MW, 0.85 lagging. The rotor has a moment of inertia of 10,000 kg-m^2. Calculate H and M (5)

OR

Q.4 (a) A generator is supplying power to an infinite bus through a single transmission line. A fault occurs near the generator end of the line which reduces the power transfer to zero. After some time the fault is cleared and original are regained. Derive the expression for critical clearing angle and critical clearing time. (7)

(b) A power deficient area receives 50 MW over a tie line from another area. The maximum steady state capacity of the line is 100 MW. Find the allowable sudden load that can be switched on without loss of stability (5)

Q.5 (a) Explain numerical solution of the swing equation. With the help of neat diagram explain how accelerating power and angular velocity are discretized (6)

(b) A synchronous generator feeds 1.0 pu power to an infinite bus through a double circuit transmission line. A fault occurs on one line which reduces the maximum power transfer to 0.5 pu, whereas before the fault, this power was 2.0 pu and after the clearance of fault is 1.5 pu. By the use of equal area criteria determine the critical clearing angle (5)

OR

Q.5 (a) With the help of a neat diagram explain turbine-speed governing system (6)

(b) Explain two area load frequency control (5)

Q.6 (a) With reference to power system security discuss four operating states of a power system. Support your answer with a suitable illustration (6)

(b) Explain contingency analysis procedure with the help of a flowchart (6)