Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2016 - JAN 2017

SUBJECT: GENERATION, TRANSMISSION & DISTRIBUTION [ELE 3104]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 03 January 2017** **MAX. MARKS: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. With a neat sketch, describe the working principle of a Fast Breeder Reactor. ***04***

1B. State clearly the function of condenser highlighting the importance of it. Discuss the types of condensers used in the thermal power plant. ***03***

1C. Discuss the different types of Diesel engines used in Diesel power plant and bring out the differences between them. ***03***

2A. The availability of discharge & head at a proposed site of hydro power plant is 340 m^3 /sec and 30m respectively. The turbine efficiency is 85%, the generator is directly connected to the turbine, the frequency of generator is 50 cycle/sec and number of poles used are 24. Find least no of machines required if a) A Francis with a specific speed of 300 is used b) A Kaplan turbine with a specific speed of 800 is used. ***04***

2B. With neat diagrams, explain the different types of distribution systems. ***03***

2C. Estimate the capacitance to neutral of a 50 kV, 50 Hz, 1-phase line 32 km long which consists of 0.5 cm diameter conductors with spacing 1.5 m apart. Also determine the charging current with the line open circuited. ***03***

3. The constants of a 3-phase line are $A=0.96\angle 1^0$ and $B=100\angle 80^0$ ohm/ph. Compute the following using analytical approach.

i. The line delivers 30MW at 110kV and 0.8pf lagging, find the sending end voltage and hence the regulation of the line.

ii. For a load of 50 MW at 0.8 p.f lag , 110 kV , find the reactive power supplied by the line and by the synchronous capacitor if the sending end voltage is 120 kV. Also determine the power factor of the line at the receiving end.

iii. Find the maximum power that can be transmitted if the sending end and receiving end voltage is equal to 110 kV and 120 kV.

iv. Find the power and pf of the load if the voltages at the two ends are 110 kV and having a phase difference of 20^0 ***10***

4A. A single phase medium transmission line 80 Km long has the following constants. Resistance/Km =0.3125 Ohms; Reactance per Km =1 ohms; Susceptance per Km = 17.5 x 10^{-6} S. Receiving-end voltage = 66 kV. Assume that the total capacitance is localized at the receiving-end alone; determine (i) the sending end voltage and (ii) the voltage regulation. The line is delivering 15 MW at 0.8 power factor lagging. ***03***

4B. Write a short note on (i) Transposition of Conductors (ii) Surge impedance loading ***02***

4C. What is sag? What are the factors affecting the sag? Derive the exact expression for sag. ***05***

5A. In a 3 phase, 33 kV overhead line there are three units in the string of suspension insulators. If the capacitance between each insulator pin and earth is 11 % of self-capacitance of each insulator, find (i) the distribution of voltage over three insulators (ii) string efficiency and (iii) In order to obtain uniform voltage distribution by using grading ring, what should be the value of capacitances to be introduced by grading ring? ***05***

5B. A particular 3 phase transmission line has total corona loss of 57 kW at 110 kV and corona loss of 99 kW at 114.8 kV. Calculate the critical disruptive voltage per phase and corona loss at 120 kV. ***02***

5C. A 3-phase, 10 kV, 50 Hz, 3-core, belted cable gave the following results on test for capacitance. (i)Capacitance between two conductors bunched with the sheath and the third conductor 0.4 μF/km. (ii) Capacitance between bunched conductors and sheath 0.625 μF/ km. Determine the capacitance (a) between any two cores (b) between any two bunched cores and the third core and (c) calculate the charging current per phase per km. ***03***