Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

V SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, DEC 2015 / JAN 2016

SUBJECT: GENERATION, TRANSMISSION & DISTRIBUTION [ELE 307]

REVISED CREDIT SYSTEM

Time: 3 Hours 04 January 2016 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.
- Use of graph sheet is allowed

1A. Describe in detail the fuel and ash handling system in a coal fired power plant. (05)

1B. The weekly discharge of a typical hydroelectric plant is as under :

Day	Sun	Mon	Tue	Wed	Thurs	Fri	Sat
Discharge(m^3/sec)	500	520	850	800	875	900	546

The plant has an effective head of 15 m and an overall efficiency of 85%. Draw the Hydrograph, Flow duration curve and Mass curve. Also find the average daily discharge and estimate the reservoir capacity and installed capacity of proposed plant, if the plant operates on 40% load factor. (05)

2A. With a neat sketch, explain the working principle of a Pressurized water reactor (PWR). (03)

2B. Compare the two types of diesel engines used in a diesel power plant. (03)

2C. Explain the following i) cavitation and ii) water hammer (04)

3A. Compute the inductance and capacitance of a 3 phase transmission line which is transposed. The distance between the conductors (from center to center) is $D_{13}=2D_{12}=2D_{23}=10$ m. Each conductor is made up of 3 equal strands (delta arrangement) and the diameter of each strand is 0.5 cm. (04)

3B. Derive the sending end quantities of a long transmission line in terms of receiving end quantities considering distributed line parameters. (03)

3C. A short, 3-phase, 132 kV line is delivering 25 MW at rated voltage and 0.85 pf lagging. The line loss is 5% of received power. If the line impedance is 0.9+j1 Ω/ph/km, determine i) the length of the line and ii) % voltage regulation. (04)

4A. A 3-phase overhead line has resistance/ph and reactance/ph of 5Ω and 25Ω respectively. The load at the receiving end is 15MW, 33kV and 0.8 pf lagging. Find the capacity of compensation equipment needed to deliver the load with a sending end voltage of 33kV. Also calculate the extra load of 0.8 pf lag which can be delivered with the compensating equipment (of capacity as calculated above) installed, if the receiving end voltage is permitted to drop to 28 kV. Use analytical method. (06)

4B. An overhead transmission line is connected between two towers of equal height with a span of 300 m. The conductor has a diameter of 2 cm, ultimate stress of 1910 kg/cm^2 with a factor of safety of 4 and weighs 0.8 kg/m. The towers are in hilly area with a uniform slope of 1 in 20 and the clearance of the line from the ground midway between the towers is 24m. Calculate the height of the tower. (04)

5A. What is corona? Explain critical disruptive voltage. Discuss the factors affecting corona. List the advantages and disadvantages of corona. (05)

5B. Explain capacitance grading of overhead insulators. A string of eight suspension insulator is to be graded to obtain uniform distribution of voltage across the string. If the pin to earth capacitance is equal to 0.1C and the mutual capacitance of the top disc is C, find the mutual capacitance of each unit in terms of C. (05)

6A. Compare overhead lines with underground cables. What are the desirable properties of UG cables? Derive the insulation resistance of a single core underground cable. (06)

6B. A 66 kV, 3-phase system uses a single-core cable of conductor diameter 2 cm and lead sheath of diameter 5.3 cm. Two intersheaths of diameters 3.1 cm and 4.2 cm are introduced between the core and lead sheath. If the maximum stress in the layers is the same, find the voltages on the intersheaths. Derive the formula used. (04)