Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent Institution of MAHE, Manipal)

V SEMESTER B.TECH. (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE UP EXAMINATIONS, DECEMBER 2018

SUBJECT: GENERATION, TRANSMISSION AND DISTRIBUTION [ELE 3104]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 28.December.2018** **Max. Marks: 50**

Instructions to students:

- Answer **ALL** the questions.
- Use of ordinary graph sheet is allowed.
- Missing data may be suitably assumed.

1A. List out the functions of the following:

(a) Surge tank

(b) Reheater

(c) Condenser

(d) Control rod ***(04)***

1B. The data for a weekly flow at a particular site for 12 weeks is as given below:

Week	1	2	3	4	5	6	7	8	9	10	11	12
Flow (m^3/s)	6,000	4,000	5,400	2,000	1,500	1,000	1,200	4,500	8,000	4,000	3,000	2,000

Draw a mass curve to find the size of the reservoir and the possible rate of flow available after the reservoir has been built. ***(04)***

1C. Explain the factors that affect run off. ***(02)***

2A. With a neat sketch, describe the working principle of a pressurized water reactor. ***(04)***

2B. The total inductance of a single-phase system is 2.5 mH/km. The go & return conductors are made up of 4 strands and the radius of each strand is 0.5 cm. Calculate the geometric mean distance between the conductors. ***(03)***

2C. Write short technical note on:

(a) Transposition of conductors

(b) Skin effect

(c) Proximity effect ***(03)***

3A. A three phase 50 Hz transmission line is 130 km long. The resistance per phase is 0.036 Ω per km and the inductance per phase is 0.8 mH per km. The shunt capacitance is 0.0112 μF per km. The receiving end load is 270 MVA with 0.8 power factor lagging at 325 kV. Use the medium π model to find voltage, power and voltage regulation. ***(04)***

3B. A 275 kV three phase line has the line parameters A = 0.93∠1.5°, B = 115∠77°. The receiving end voltage is 275 kV. Analytically determine

(a) Sending end voltage required if a load of 240 MW at 0.8 lagging pf is being delivered at the receiving end.

(b) The maximum power that can be delivered if the sending end voltage is held at 295 kV.

(c) The additional MVA that has to be provided at the receiving end when delivering 420 MVA at 0.8 lagging power factor with the supply voltage maintained at 295 kV. ***(03)***

3C. An overhead line weighing 0.7 kg/m is supported from two towers at heights of 25 m and 75 m above water level at river crossing. The horizontal distance between the towers is 250 m. The required clearance between the conductor and the water mid-way between the towers is 45 m and both the towers are on the same side of point of maximum sag. Find the stringing tension in the conductor. ***(03)***

4A. A certain 3-phase equilateral transmission line has total corona loss of 53 kW at 106 kV and a loss of 98 kW at 110.9 kV. What is the disruptive critical voltage between the lines? What is the corona loss at 113 kV? ***(03)***

4B. Why are insulators used with overhead lines? Discuss the desirable properties of insulators. ***(03)***

4C. The self-capacitance of each unit in a string of three suspension insulators is C. The shunting capacitance of the connecting metal work of each insulator to earth is 0·15 C while for line, it is 0·1 C. Calculate:

(a) The voltage across each insulator as a percentage of the line voltage to earth.

(b) String efficiency. ***(04)***

5A. Show that maximum stress in a single-core cable is $\frac{2V}{d \log_e (D/d)}$, where V is the operating voltage, d and D are the conductor and sheath diameter. ***(03)***

5B. A single core cable has a conductor diameter of 2 cm and consists of three insulating materials, A, B and C, of permittivities 5, 4 and 2 and permissible stresses of 50, 40 and 30 kV/cm respectively. If the line is designed for 110 kV, find the minimum internal sheath radius of the cable. ***(04)***

5C. The capacitances of a 3-phase belted cable are 12.6 μF between the three cores bunched together and the lead sheath and 7.4 μF between one core and the other two connected to sheath. Find the charging current drawn by the cable when connected to 66 kV, 50 Hz supply. ***(03)***