Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent Institution of MAHE, Manipal)

V SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)
MAKE UP EXAMINATIONS, DECEMBER 2017
SUBJECT: GENERATION, TRANSMISSION & DISTRIBUTION [ELE 3104]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 27 December 2017** **Max. Marks: 50**

Instructions to Candidates:

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

1A. With neat diagrams, discuss Radial and Ring Main distribution systems. ***(02)***

1B. With a neat layout, explain the working of a coal fired steam power plant. ***(04)***

1C. The data for a weekly flow at a particular site is given below for 12 weeks. Draw the flow duration curve and find the size of the reservoir and the possible rate of available flow after the reservoir has been built with the help of mass curve.

Week	1	2	3	4	5	6	7	8	9	10	11	12
Flow in m^3/s	6000	4000	5400	2000	1500	1000	1200	4500	8000	4000	3000	2000

(04)

2A. List the merits and demerits of Diesel power plant. ***(02)***

2B. Mention the purpose of the following with respect to a nuclear power plant: i) Moderator ii) Control rods iii) Coolant and iv) Reflector ***(03)***

2C. A 300 km, 132 kV, 3-phase overhead line has a total series impedance of (52 + j 200) ohms per phase and a total shunt admittance of $j1.5 \times 10^{-3}$ siemens per phase. The line is supplying 40 MVA at 0.8 pf lagging at 132 kV. Find ABCD constants and hence compute sending end voltage, current, power factor and line efficiency. Use nominal T equations. ***(05)***

3A. Derive an expression of the capacitance per phase of a 3-phase line with equilateral spacing. ***(03)***

3B. A 3-phase overhead line has $A = D = 0.9 \lfloor 1^0$ and $B = 140 \lfloor 84^0$ ohm. It is operating with sending voltage of 240 kV and receiving end voltage of 220 kV. Using receiving end circle diagram, find (a) maximum power which can be received at the receiving end (b) rating of synchronous phase modifier and angle **δ** at the receiving end if load at the receiving end is 80 MW at 0.8 pf lagging. ***(05)***

3C. Write short notes on (i) effect of bundled conductors on transmission line parameters (ii) loadability of transmission lines ***(02)***

4A. A 3-phase 100 km, 50 Hz overhead line delivering 20 MW at p.f. of 0.8 lagging and 66 kV to a balanced load. The conductors are of copper, each having 1.5 cm diameter, spaced equilaterally 2 meters between centres. (a) Find line parameters, (b) Find charging current and charging MVA. Resistivity of copper is $\mathbf{1.73 \times 10^{-6}}$ ohm-cm. ***(04)***

4B. An overhead line is erected on level support. The horizontal span is 200m. The conductor area is 0.9 cm^2 and maximum stress is 7000 kg/cm^2. The thickness of ice coating is 10mm with density of ice=920kg/m^3. The line is also subjected to a wind pressure of 35kg/m^2 of projected area. Take factor of safety=2. Calculate the maximum sag. ***(04)***

4C. What are the desirable properties of an overhead insulator? ***(02)***

5A. A string of four suspension insulators is connected across a 3-phase, 220kV line. The self-capacitance of each unit is 5 times pin to earth capacitance. Calculate the potential difference between each unit and the string efficiency. ***(03)***

5B. Explain the following: i) Corona ii) Disruptive critical voltage and iii) Corona loss. ***(03)***

5C. With a neat sketch, explain the construction of single core underground cable. Also discuss the merits and demerits of rubber. ***(04)***