



Reg. No. :

Name :

**Fourth Semester B.Tech. Degree Examination, May 2015
(2013 Scheme)**

13.406 : POWER GENERATION, TRANSMISSION AND DISTRIBUTION (E)

Time : 3 Hours

Max. Marks : 100

Instructions : Answer *all* questions in Part A and *one full* question from *each* Module in Part B.

PART – A

Each question carries **2** marks **each**.

1. What are the advantages and disadvantages of a hydroelectric power station ?
2. Why is distributed generation preferred world wide ?
3. What is the difference between bundling and stranding of conductors ?
4. Why do we classify transmission lines based on length ?
5. Define Kelvin's law for conductors.
6. How do you find out the presence of Corona ?
7. Do we still need DC distribution systems ? Why ?
8. What are the qualities (essentially required) for a tariff ?
9. Overhead lines and underground cables are used for transmission and distribution. True or false ? Why ?
10. What is an ACSR conductor ?



(10x2=20 Marks)

PART – B

Each question carries **20** marks **each**.

Module – I

11. a) With a neat block diagram, explain the operation of a thermal power plant. **10**
- b) Explain the principle of operation of a fuel cell. **10**



12. The data of loads at a substation is given.

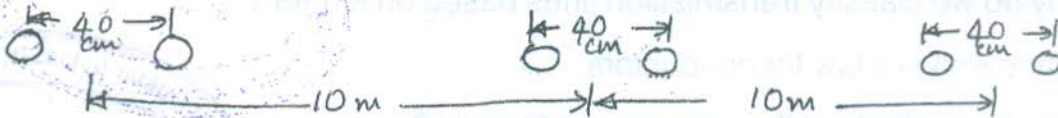
| | 6 am -10 am | 10 am - 5 pm | 5 pm - 11 pm | 11 pm - 6 am |
|-------------------|-------------|--------------|--------------|--------------|
| Domestic | 105 kW | 30 kW | 175 kW | 65 kW |
| Commercial | 20 kW | 150 kW | 300 kW | 80 kW |
| Industrial | 200 kW | 300 kW | 50 kW | 500 kW |

- Draw the load curve of each group of consumers separately. 6
- Draw the load duration curve of Industrial consumer and commercial consumers. 4
- What is the diversity factor of the substation ? Compute this by drawing the total load curve. 10

Module – II

13. A 400 KV, 3 phase bundled conductor line with two sub conductors per phase has the horizontal configuration as shown in figure. The radius of each sub conductors is 1.4 cm.

- Find the inductance/phase/km and
- Compute the inductance when there is only one conductor per phase having



What is the inference from the inductance values obtained ? 20

- Derive the ABCD constants of a medium transmission line, when represented by a Nominal π . Draw the vector diagram for the same system, when the current at the receiving end is lagging by 0.8 pf. 14
- Derive the equation for voltage regulation and transmission efficiency. 6

Module – III

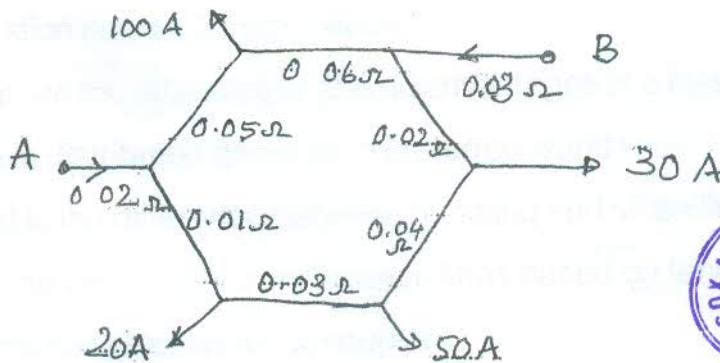
- An overhead line has a span of 122 m, the diameter of the conductor is 1.15 cm. Calculate the sag at mid span when the conductors have an ice coating 0.96 cm thick and the wind pressure is 382 N/m² of the projected area. The weight of the conductor is 5.83 N/m, ice weighs 8920 N/m³ and the permissible tension is 3.56×10^4 N. 10
- What are the capacitances existing in underground cables ? How do we measure these values ? How can they be represented with equivalent circuits ? 10



16. a) A suspension string has 3 units of insulators. Each unit can withstand a maximum voltage of 11KV. The capacitance of each junction and the metal work is 20% of the capacitance of each disc. Find
- a) Maximum line voltage for which the string can be used and
 - b) The string efficiency. 10
- b) What is term grading with respect to cables and insulators ? How is it achieved ? 10

Module – IV

17. a) Find the currents supplied at points A and B of the ring main distributor shown in the figure. All loads are at unity pf. Assume.
- a) $V_A = V_B$
 - b) $V_B = V_A + 5V$



- b) What is the difference between radial and ring main systems ? What are their advantages and disadvantages in distribution of power ? 10
18. a) A consumer is charged at the rate of ₹ 75/annum/KVA of maximum demand plus a flat rate per kWh. The phase advancing plant can be purchased at the rate of ₹ 70 / kVA. The rate of interest and depreciation on the capital is 12.5%. Find the most economical pf to which it can be improved. 12
- b) What will be the difference, if the power factor is improved, using a synchronous condenser ? What should be the rate of energy per kWh, to improve the pf to the same value using the synchronous condenser ? 8