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Instructions –   (1) All Questions are *Compulsory.*

           (2) Illustrate your answers with neat sketches wherever necessary.

           (3) Figures to the right indicate full marks.

           (4) Assume suitable data, if necessary.

           (5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1.   **Attempt any <u>TEN</u> of the following:**   **20**

   a) What do you understand by primary and secondary distribution?

   b) Classify transmission system according to voltage level.

   c) What do you mean by ACSR and AAAC conductors?

   d) State the function of following layer in construction of underground cable.

      (i) Metallic sheathing

      (ii) Armouring

   e) What is meant by Ferranti effect?

   f) Define:

      (i) Distruptive critical voltage and

      (ii) Visual critical voltage related to corona.

   g) How are the transmission lines classified as per the distance?

Marks

h) Draw equivalent circuit diagram of nominal 'π' representation of medium transmission line.

i) State any two routes of HVDC transmission line network in India.

j) Distinguish between a feeder and a distributor.

k) Draw the neat diagram of radial distribution scheme.

l) Draw the symbol of

    (i) Lightning Arrester

    (ii) Horn gap fuse

    (iii) Circuit Breaker

    (iv) Current transformer

    in substation.

2.   **Attempt any <u>FOUR</u> of the following:**   **16**

a) List four advantages of using high voltage for transmission lines.

b) Write any four desirable properties of transmission line conductor.

c) Compare overhead and underground lines on basis of flexibility, maintenance, safety and cost.

d) State specific voltage level and material used for

    (i) RCC pole

    (ii) Steel tower

e) Discuss any two methods of improving string efficiency.

f) A 3 - ph overhead line is being supported by three disc insulators. The potential across line unit is 17.5 KV. Assume that shunt capacitance between each insulator and each metal work of tower to be $1/10^{th}$ of capacitance of insulator. Calculate

(i) Line voltage

(ii) String efficiency

3. **Attempt any <u>FOUR</u> of the following:** 16

a) Study Figure No. 1 and answer following questions:

(i) Name the part shown by 'A'.

(ii) State the type of transformer at 'B'.

(iii) Write the specification of equipment at 'C'.

(iv) State meaning of F_1, F_2, F_3 at point SS.
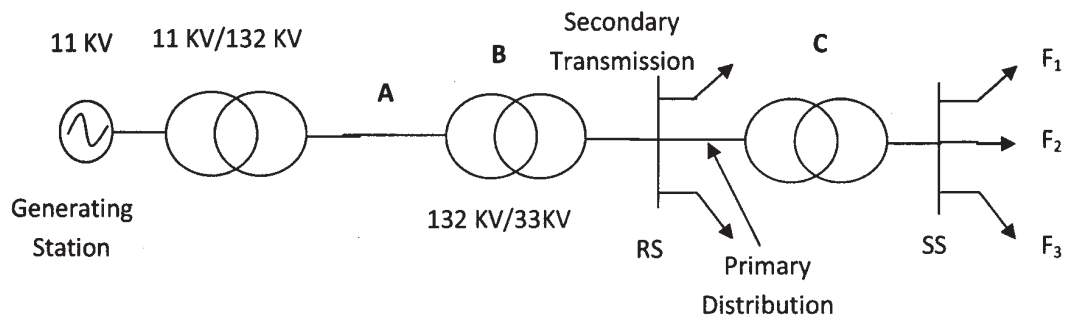

<u>Fig. No. 1</u>

b) State any four desirable properties of insulating material of transmission line insulators.

c) Suggest with reasons the type of insulators used for following voltage levels of transmission and distribution system.

(i) 11 KV Distributors

(ii) 132 KV Feeder

(iii) 400 KV Tower

(iv) 33 KV Distributor

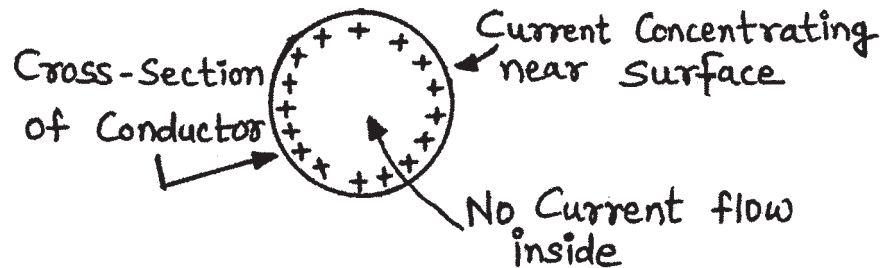d) Identify the effect shown in Figure No. 2. Also state factors affecting the effect.

Fig. No. 2

e) Discuss any two methods of reducing corona.

f) State the effect of unity power factor efficiency and regulation of transmission line.

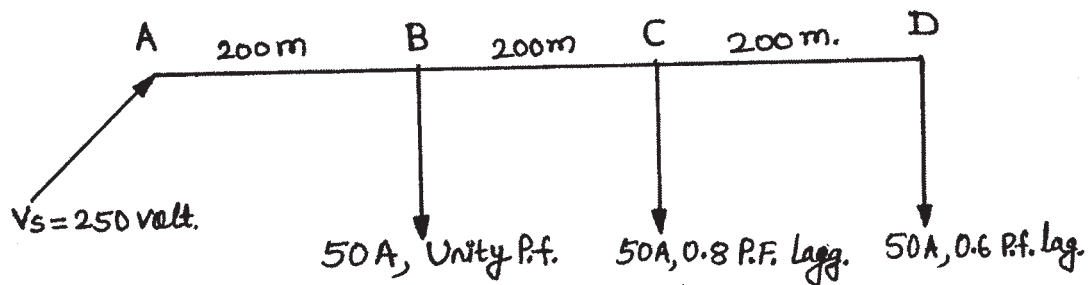**4.** **Attempt any FOUR of the following:** **16**

a) Show the transposition of conductors of transmission line by a sketch. Also state necessity of it.

b) Draw the equivalent circuit and phasor diagram of short transmission line.

c) An overhead 3 - phase transmission line delivers 5 MW at 22 KV at 0.8 lagging power factor. The resistance and reactance of each conductor is 4 Ω and 6 Ω respectively. Determine sending end voltage and percentage regulation.

d) State two advantages and two disadvantages of HVDC transmission.

e) Compare EHVAC and HVDC transmission line on basis of voltage level, amount of power delivered, transmission cost and interference effect.

f) List any four basic components present in distribution system. Also state function each.

Marks

5. **Attempt any FOUR of the following:** **16**

a) Draw the connection diagram Grid distribution system and write any two disadvantages of the system.

b) Draw the layout of ring distribution scheme and write any two advantages of the same.

c) Draw a single line diagram for 11 KV / 400 V distribution substation.

d) A single phase AC distributor of 600 m length has total impedance of (0.02 + j 0.04) ohm and is fed from one end at 250 V. If it is loaded as in Figure No. 3. Calculate the voltage drop and voltage at far end.

Fig. No. 3

e) List two advantages and two disadvantages of indoor substation.

f) Give classification of substation on basis of

(i) Service requirement

(ii) Construction

Marks

6. **Attempt any FOUR of the following:** 16

a) "Power factor affects the transmission efficiency and regulation". Justify.

b) State the factors considered for designing feeders and distributors.

c) Suggest suitable type of substation for following applications with suitable reasons.

   (i) Metropolitan city

   (ii) Hill station

d) Write equations for sending end voltage and efficiency for medium transmission line with End condenser method and also draw the phasor diagram.

e) Draw circuit diagram and vector diagram of Nominal T network of medium transmission line.

f) Draw diagram of underground cable showing all the parts.

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