21819

3 Hours / 100 Marks   Seat No.

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

(2) Answer each next main Question on a new page.

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

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

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

Marks

1. **Attempt any TEN of the following:**   **20**

   a) Draw a single line diagram of A.C supply system.

   b) Classify transmission line according to length of the line.

   c) State long form of:

   (i) AAC

   (ii) ACSR

   d) State four properties of conducting materials.

   e) Define regulation of transmission line and write formula.

   f) State any two applications of HVDC transmission system.

   g) State the function of following layer in construction of a cable:

   (i) Armouring

   (ii) Metallic sheathing

   h) Why radical system is used for short distances?

i) What is meant by Ferranti effect of transmission line conductor?

j) State the application of suspension types and pin type insulators.

k) State why three phase four wire system is preferred for secondary distribution system.

l) State any two application of HVDC transmission system.

2. Attempt any FOUR of the following: 16

a) Compare overhead line and underground cable (any four points).

b) With the help of neat diagram, explain the concept of transposition of conductors.

c) State any four applications where HVDC transmission is used through cable only and not by overhead line.

d) State the requirements of a distribution system.

e) A three phase overhead transmission line is being supported by 3 disc insulators. The potentials across top unit and middle units are 8 kV and 11 kV respectively.
Calculate:
(i) Line voltage
(ii) String efficiency

f) Compare outdoor and indoor substation.

3. Attempt any FOUR of the following: 16

a) Under which conditions Ferranti effect occurs. State any four conditions? What is Ferranti effect?

b) State any four factors which affects corona. State two points how corona effect can be reduced.

c) State generalized constants A, B, C, D of formula for nominal 'T' network.

d) Draw a neat layout of Grid distribution scheme. State two advantages of it.

e) Draw a typical layout diagram of 11 kV distribution substation.

f) A single phase 11 kV with a length of 15 km is to transmit 500 kVA. The inductive reactance of the line is 0.5 Ω/km and resistance is 0.3 Ω/km. Calculate the efficiency and regulation of the line for 0.8 lagging p.f. Draw vector diagram.

Marks

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

a) Draw a neat labeled diagram of an underground cable to show different parts.

b) What is skin effect? On which factors does skin effect depend?

c) A single phase overhead transmission line draws 1100 kW at 33 kV 0.8 p.f. logging. The total resistance and inductive reactance at the line are 10 Ω and 15 Ω respectively. Determine the sending end voltage and sending end p.f.

d) Study the Fig. No. 1 and answer following questions:
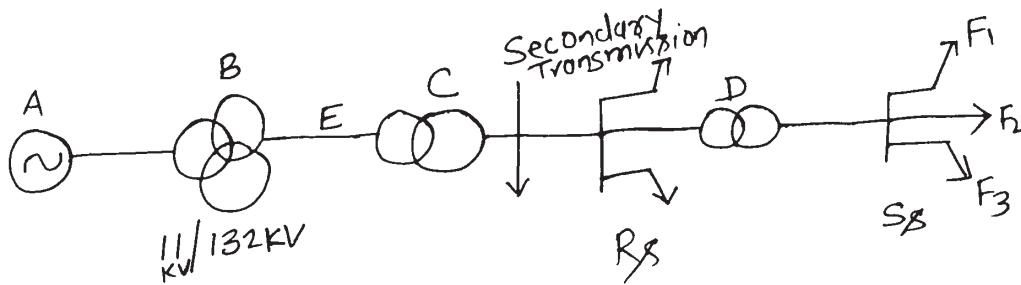
Fig. No. 1

(i) Which part is shown by 'A'?

(ii) State the meaning of symbol shown at 'B' point.

(iii) State the voltage rating of equipment at point 'D'.

(iv) Which part is shown by 'E'?

e) State and explain any one method for improving string efficiency.

f) Write down the functions of following elements of a substation:

(i) CB

(ii) Relays

(iii) Lightning arrester

(iv) Isolators

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

a) State the effect of lag, lead and unity power factor on regulation of transmission line with phasor diagram.

b) A single phase AC distributors of 900 m length has total impedance of (0.02 + 0.04 j) ohm and is fed from one end at 250 V. If it is loaded as in Fig. No 2. Calculate the voltage drop and voltage at far end.
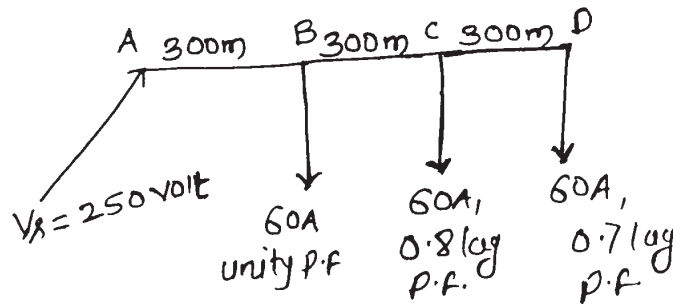

Fig. No. 2

c) Write down any four properties of line support.

d) Draw nominal 'π'network. Draw its phasor diagram

e) State difference between feeder and distributor on any four points.

f) State the factors to be considered while deciding location of site for substations.

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

a) Draw a neat sketch of double circuit RCC pole.

b) Draw diagram of end condenser method. Also draw phasor diagram.

c) Compare HVDC transmission with EHVAC transmission.

d) Draw ring main system and give its advantages.

e) Describe the effect of load p.f on performance of transmission line.

f) A single line 11 kV short transmission line delivers 1000 kW power at 0.8 p.f. lagging total resistance and inductive resistance and inductive reactance of the line are 5 Ω and 5.6 Ω.

Determine:

(1) Sending end voltage.

(2) Percentage regulation of transmission line.