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15162

3 Hours / 100 Marks

Seat No.

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- 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) State the necessity of transmission of electricity.
 - b) State voltage's at different levels from generation to distribution
 - (i) Generation voltage
 - (ii) Primary transmission voltage
 - (iii) Secondary transmission voltage
 - (iv) Primary distribution voltage
 - c) State any four components of transmission line.
 - d) State the long form of
 - (i) AAC
 - (ii) AAAC

P.T.O.

- e) State the effect of line parameters on performance of transmission line.
- f) State desirable properties of cable (any four points).
- g) State any two HVDC transmission line in India.
- h) State maximum HVDC transmission voltage in India.
- i) Draw vector diagram at leading p.f. in transmission line? State its effect on regulation.
- j) State four requirements of a distribution system.
- k) Why radial distribution system used for short distance.
- l) State the classification of substation according to method of construction.

2. Attempt any FOUR of the following:

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- a) State any four applications where HVDC transmission is used through cable only and not by overhead line.
- b) State two chemical and two thermal properties of insulating materials. List any four insulating materials used for manufacturing of transmission and distribution insulators.
- c) State any four factors on which skin effect depends. What is the effect on transmission efficiency and voltage regulation due to skin effect.
- d) State any four factors on which proximity effect depends. State two points how proximity effect can be reduced?
- e) Derive formula for voltage regulation in case of short transmission line.
- f) State the equation A, B, C and D constants for short transmission line.

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) Compare EHVAC and HVDC transmission line on given points
 - (i) Number of conductors for double circuit
 - (ii) Capital cost of sub-station
 - (iii) Skin effect
 - (iv) Proximity effect
 - (v) Ferranti effect
 - (vi) Corona loss
 - (vii) Copper loss
 - (viii) String efficiency
- d) Draw layout of Homopolar HVDC transmission line mention polarity of overhead conductor.
- e) Write sequence of operation of isolator and circuit breaker while opening and closing.
- f) State the function of equipments used in substation
 - (i) Earth switch
 - (ii) Relay
 - (iii) Lighting Arrester
 - (iv) Auxiliary transformer

4. Attempt any FOUR of the following:

- a) Compare Pin type and suspension insulators on given points
 - (i) Position of insulator on cross arm
 - (ii) Position of conductor on insulator
 - (iii) Reaction on cross arm
 - (iv) Possibility of flash over due to large birds
 - (v) Maintenance/Replacement cost
 - (vi) Maximum voltage level
 - (vii) Effect on height of supporting structure
 - (viii) Life
- b) State four advantages of ACSR conductor. State four trade names of ACSR conductor.
- c) A single phase 11kV short transmission line delivers 1000 kW power at 0.8 P.F. lagging total resistance and inductive reactance of the line are 5 ohm and 5.6 ohm. Determine:
 - (i) Sending end voltage
 - (ii) Percentage regulation of transmission line
- d) State two reasons the transposition of conductor. Draw figure of transposition of conductor.
- e) Draw layout of 33/11 kV sub-station and label it.
- f) Compare indoor and outdoor substation on given points
 - (i) Capital cost
 - (ii) Time required for completion
 - (iii) Availability of natural light
 - (iv) Space required

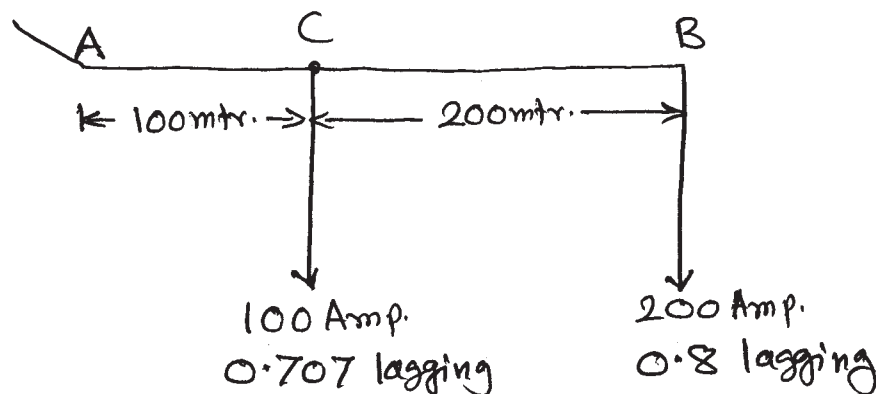
5. Attempt any FOUR of the following:**16**

- a) State the four methods of laying of cable. State precaution while laying of underground cable in the situation:
- Minimum clearance between cable and water pipe line when running in parallel.
 - Minimum clearance between cable and gas/petroleum oil pipe line when running in parallel
 - If cable is laid through pipe what should be diameter of pipe
 - When more than one cable is to be laid in the same trench, what should be minimum spacing between two cables.
- b) Give the classification of cables
- According with voltage levels
 - According to numbers of core
- c) A overhead three phase transmission line delivers 5000 kW at 22 kV at 0.8 lagging P.F. The resistance and reactance per phase is 4 ohm and 6 ohm respectively. Determine
- sending end voltage
 - percentage regulation of transmission line
- d) While calculating performance of medium transmission line, what assumptions are made in case of
- Naming 'T' method
 - Nominal ' π ' method
- e) Draw layout of grid or interconnected distribution system. State two advantages and two applications of this system.
- f) Classify distribution system
- According to nature of current
 - According to method of construction
 - According to scheme of connection

6. Attempt any FOUR of the following:

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- a) State any eight requirements or properties of the line supports used in transmission and distribution.
- b) State any four factors to be considered while selecting type of line support.
- c) Derive the expression for voltage distribution along a string of three suspension insulators.
- d) Compare on any four points feeder and distributor in case of transmission and distribution.
- e) Draw typical A.C. distribution system showing primary distribution system, distribution transformer and secondary distribution system.
- f) A single phase distribution AB 300 mtr. long is fed from end A and is loaded as shown in Figure No.1. The total resistance and reactance of distributors is 0.2 ohm/km. and reactance 0.1 ohm/km. Calculate total voltage drop in distributor.

Fig. No. 1