

12. (a) (i) Deriving emf equation of the transformer and show that the voltage induced in a Transformer per turn is the same whether it is primary or secondary. (8)
- (ii) Develop equivalent circuit of 1-phase two winding transformer and hence obtain the total equivalent parameters referred to primary. (8)

Or

- (b) A 220/440 V single-phase transformer has the following test results:

OC test: 220 V, 1A, 70 W on LV side

SC test : 20 V, 12 A, 100 W on HV side.

Obtain and draw the equivalent circuit parameters of the Transformer referred to LV side.

13. (a) (i) Describe briefly with necessary diagrams the constructional details of 3-phase squirrel cage induction motor. (8)
- (ii) State the different methods of speed control of 3-phase induction motor and discuss any one method in brief. (8)

Or

- (b) (i) Explain the step by step procedure for estimating the efficiency of 3-phase induction motor using equivalent circuit when the speed of operation is specified. (10)
- (ii) Explain briefly why the plain single phase induction motor is not self starting. (6)

14. (a) A 3.3 kV alternator gave the following test results:

Field current (A)	16	25	37.5	50	70
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OC voltage (kV)	1.55	2.45	3.3	3.75	4.15
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A field current of 18 A is found to cause the full-load current to flow through the winding during short-circuit test. Predetermine the full-load voltage regulation at 0.8 power factor lagging by MMF method. Neglect winding resistance.

Or

- (b) With neat sketches, explain the Full-step operation of variable reluctance stepper motors.
15. (a) (i) Draw a single line diagram of a typical ac power supply scheme. Mark the various components and state their significance. (10)
- (ii) Discuss the advantages and disadvantages of dc transmission over ac transmission. (6)

Or

- (b) (i) Describe the various parts of a high voltage single-core cable with a neat diagram. (6)
- (ii) Draw the typical layout of 33 kV/11 kv substation showing all the protective devices. Assume there are 2 incoming feeders and 4 out going feeders (10)