h) The type of single-phase induction motor having the highest power factorat full load is
(A) shaded pole type (B) split-phase type
(C) capacitor-start type (D) capacitor-run type

i) It is desired to measure parameters of 230 V/115 V, 2 kVA, single-phase transformer. The following wattmeters are available in alaboratory:
*W*1 : 250 V, 10 A, Low Power Factor *W*2 : 250 V, 5 A, Low Power Factor
*W*3 : 150 V, 10 A, High Power Factor *W*4 : 150 V, 5 A, High Power Factor

The Wattmeters used in open circuit test and short circuit test of the transformer will respectively be
(A) *W*1 and *W*2 (B) *W*2 and *W*4 (C) *W*1 and *W*4 (D) *W*2 and *W*3

j) The direction of rotation of a 3-phase induction motor is clockwise when itis supplied with 3-phase sinusoidal voltage having phase sequence A-B-C.For counter clockwise rotation of the motor, the phase sequence of the powersupply should be
(A) B-C-A (B) C-A-B(C) A-C-B (D) B-C-A or C-A-B

Q2 Answer the following questions: **(2 x 10)**

a) Why the voltage regulation of a transformer is zero or negative for leading power factor load?

b) A single phase transformer has a hysteresis and eddy current loss of 150W and 100W respectively when supplied from 250V, 50Hz. What will be the corresponding losses when supplied from 220V, 30Hz?

c) Draw the phasor diagram of a transformer supplying power at full load 0.8 leading power factor.

d) A 3-phase I.M. has slots/pole/phase=5. If the coil span=13 slots, determine the winding factor.

e) Explain the advantage of using tertiary winding in 3 phase transformer?

f) Three single phase transformer connected in Dd0, delivering full load, if one of the transformer is taken out of operation, find the % overloading of each transformer?

g) Explain why an induction motor at no load operates at a very low power factor?

h) Why you need a starter to start a poly phase induction motor?

i) Draw the torque slip characteristics of a single phase Induction motor?

j) Explain how the speed of a single phase induction motor can be controlled?

Part – B (Answer any four questions)

Q3 a) A 5KVA, 2200/220 V, single phase transformer has the following parameters R_1=3.4Ω, R_2=0.028 Ω, X_1=7.2 Ω and X_2=0.06 Ω. Determine a) the input current and power factor, b) Terminal voltage when a load of 4+j5 Ω is connected (c) Equivalent circuit refer to both side. **(10)**

b) Derive the expression for voltage regulation for a single phase transformer. **(5)**