Time: 1.5 hrs   F.M.: 20

Answer any five questions

Q. No. 1 is Compulsory

Q1. Select the correct one (**Answer any four**):   [4 × 1=4]

i) Which of the following is correct relationship between active power (P), reactive power (Q) and apparent power (S) ?   [CO2]

   a) $S = P * Q$ b) $S = P / Q$ c) $S = P + Q$ d) $S^2 = P^2 + Q^2$

ii) On which principle transformer works upon ?

                                                                                   [CO4]

   b) Electromagnetic mutual induction   b) Seebeck Effect

   c) Thermal Effect   d) Ohm's Law

iii) In the case of series RLC circuit, at resonance   [CO2]

   a) Current is minimum , Impedance is maximum
   b) Current is maximum , Impedance is minimum
   c) Current is maximum , Impedance is maximum
   d) Current is minimum , Impedance is minimum

iv) The expression for total power output of a star connected system in terms of phase voltage and current in given by: [CO3]

   a) $3V_p I_p \cos\Phi$ b) $\sqrt{3}\, V_p I_p \cos\Phi$ c) $\frac{1}{3} V_p I_p \cos\Phi$ d) $\frac{1}{\sqrt{3}} V_p I_p \cos\Phi$

v) In delta connected system, the current flowing through the line is   [CO3]

   a) Greater than the phase current   b) Equal to the phase current

   c) Lesser than the phase current   d) None of these

vi) In an RL series circuit $R = 10\,\Omega$, $X_L = 17.32\,\Omega$. The phase angle between inductor voltage and supply current is   [CO2]

   a) $45°$ b) $30°$ c) $60°$ d) None of these

Q2. Compare between series and parallel resonance circuits in terms of impedance, current, power factor and resonant frequency.
[4] [CO2]

Q3. An ac current source = 5 sin(wt) A is connected across given network. Find current through all the branches in the network. Also find the power factor across AB, BC, DE, EF, AC and DF.
[4] [CO2]
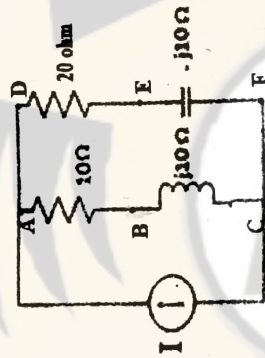
Q4. A delta –connected balanced 3-phase load is supplied from a 3- phase 400 V supply. The line current is 20 A and the power taken by the load is 10,000 W. Determine
[4][CO3]

i) Impedance in each branch
ii) Line current, power factor and power consumed if the same load is connected in star.

Q5. (i) Derive emf equation of a single phase transformer and show that emf induced per turn in primary equal to is equal to emf induced per turn in secondary.
[2] [CO4]

(ii) Draw exact equivalent circuit of a single phase transformer and label it
[2] [CO4].

OR

(ii)Draw the no load phasor diagram of a single phase transformer explaining each of it's components.
[2] [CO4]

Q6. A 25KVA loss-less transformer has 500 turns on the primary side and 40 turns on the secondary side. The primary is connected to 3000V, 50 Hz mains. Determine

(i) primary and secondary currents at full load
(ii) the secondary emf and
(iii) the maximum flux in the core. No load current can be neglected.
[4][CO4]

Q7 Given below are the results conducted on a 50KVA, 2200/220 V single phase transformer.

Open circuit (L.V. side) test: 405W, 5A, 220V
Short circuit (H.V. side) test: 805 W, 20.2A, 95 V

Calculate the parameters of the equivalent circuit referred to H.V. side.
[4][CO4]