

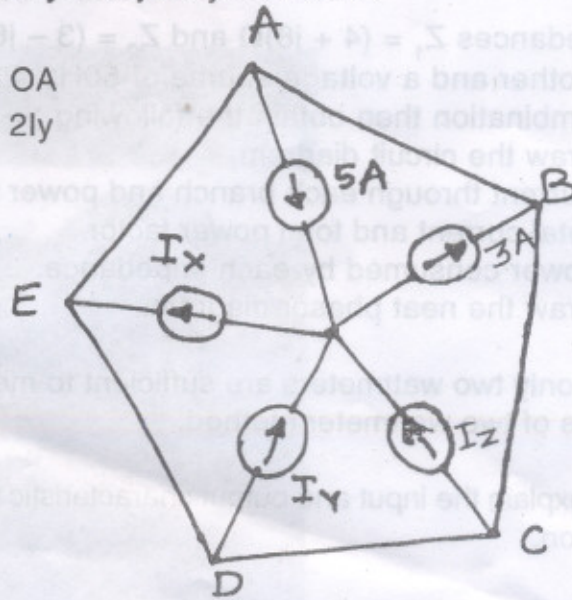
(3 Hours)

[ Total Marks : 100

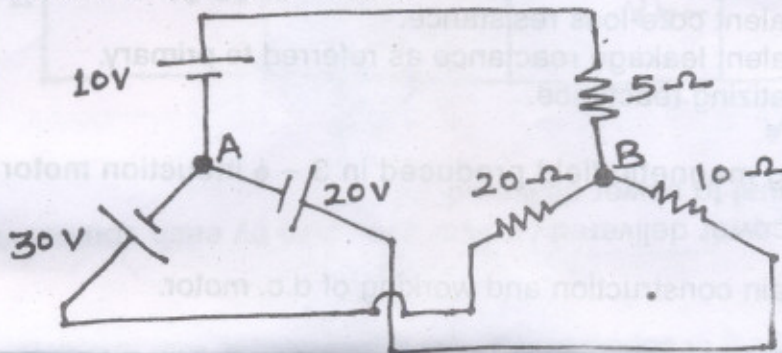
- N.B.:** (1) Question No. 1 is **compulsory** and solve any **four** from remaining **six** questions.  
 (2) **In all** attempt **five** questions.  
 (3) **Figures** to the **right** indicate **full** marks.  
 (4) All resistances are in ohms, if unit not mentioned.  
 (5) Assume data if **necessary** and justify the **same**.

1. (a) Find :—

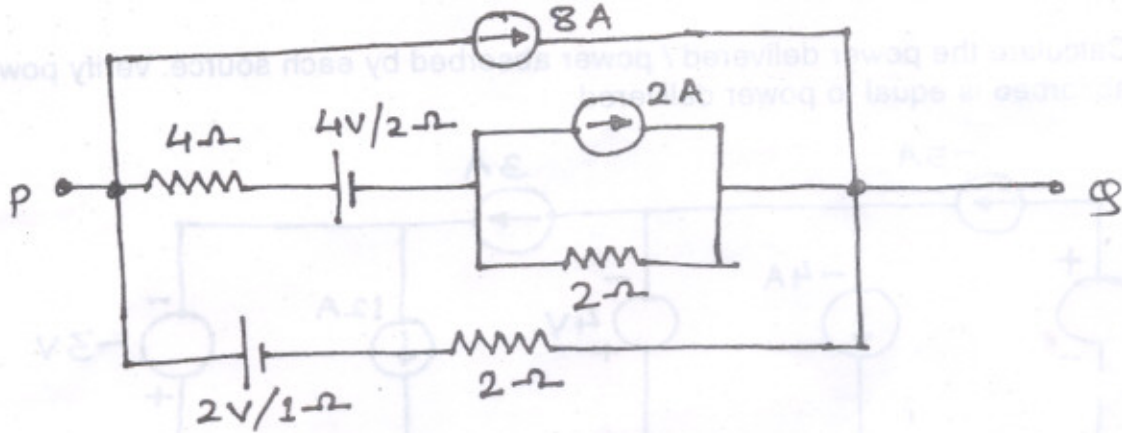
- (i)  $I_x$  if  $I_Y = 2A$  and  $I_Z = 0A$
- (ii)  $I_Y$  if  $I_x = 2A$  and  $I_Z = 2I_Y$
- (iii)  $I_Z$  if  $I_x = I_Y = I_Z$



- (b) A resistance of  $10\Omega$  is connected in series with two resistances each of  $15\Omega$  arranged in parallel. What resistance must be shunted across this parallel combination, so that the total current taken shall be 1.5 Amp. with 20 Volts applied? 4
  - (c) Determine the RMS value of semi-circular current wave which has a maximum value of 'a'. 4
  - (d) Explain the Quality Factor in case of series resonance. 4
  - (e) Derive the relation between power in Delta and Star system. 4
2. (a) Using NORTON's th<sup>m</sup>, find the current which would flow in a  $25\Omega$  resistance connected between points 'A' and 'B'. 10



(c) Find the maximum power delivered across P-Q.



[ TURN OVER

3. (a) A 120V, 60W metal filament lamp is to be operated on 220V, 50Hz supply mains. **10**  
 Calculate what value of  
 (i) Non-Inductive resistance  
 (ii) Pure-Inductance  
 Would be required in order that lamp is run on correct voltage. Which method is preferable and why ?
- (b) If two impedances  $Z_1 = (4 + j8)\Omega$  and  $Z_2 = (3 - j6)\Omega$  are connected in parallel **10**  
 with each other and a voltage source of 50Hz, 230Volts is applied across the parallel combination then obtain the following :—  
 (i) Draw the circuit diagram.  
 (ii) Current through each branch and power factor of each branch.  
 (iii) Total current and total power factor.  
 (iv) Power consumed by each impedance.  
 (v) Draw the neat phasor diagram.
4. (a) Show that only two wattmeters are sufficient to measure 3 –  $\phi$  power. Also state **10**  
 advantages of two wattmeter method.
- (b) Draw and explain the input and output characteristic for a transistor common emitter **6**  
 configuration.
- (c) Explain slip in 3-phase induction motors. **4**
5. (a) A 15 KVA, 2200/110 V transformer has  $R_1 = 1.75\Omega$ ,  $R_2 = 0.0045\Omega$ . The leakage **10**  
 reactances are  $X_1 = 2.6\Omega$  and  $X_2 = 0.0075\Omega$ . Calculate :—  
 (i) Equivalent resistance referred to primary and secondary.  
 (ii) Equivalent reactance referred to primary and secondary.  
 (iii) Equivalent impedance referred to primary and secondary.  
 (iv) Total copper loss.
- (b) Explain transformer tests to find the following parameters of transformer :— **10**  
 (i) Equivalent resistance as referred to primary.  
 (ii) Equivalent core-loss resistance.  
 (iii) Equivalent leakage reactance as referred to primary.  
 (iv) Magnetizing reactance.
6. (a) How is rotating magnetic field produced in 3 –  $\phi$  induction motor ? (Explain **10**  
 graphically).
- (b) Draw and explain construction and working of d.c. motor. **10**
7. (a) Explain the working of capacitor filter using waveforms, with reference to full wave **10**  
 rectifier.