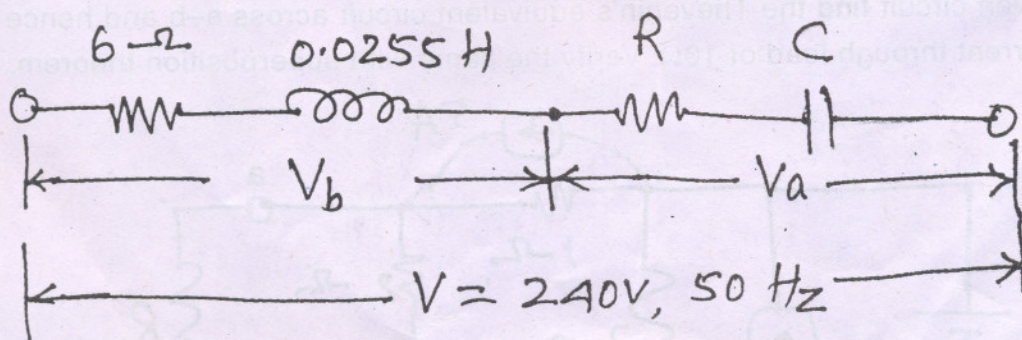


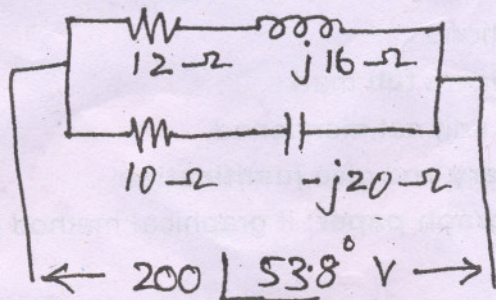
- N. B. :** (1) Question No. 1 is **compulsory** and solve any **four** from remaining **six** questions. In all attempt **five** questions.
- (2) Figures to the **right** indicate **full** marks.
- (3) **All** resistors in ohms, if unit not mentioned.
- (4) Assume data if **necessary** and give **justification**.
- (5) Solve your problem in **graph paper**, if graphical method given.

1. (a) A dc arc has voltage/current relation expressed by $V = 44 + (30/I)$. It is connected in series with a resistor across a 100 volts supply. If the voltage across the arc and the resistor are equal. Find the ohmic value of the resistor. **3**
- (b) Show the average power absorbed by capacitor is zero. **3**
- (c) Show the algebraic sum of all potential difference in delta network is zero. (show graphically). **3**
- (d) What is the transformation ratio of an ideal transformer ? **2**
- (e) Full wave Rectifier is more efficient (Rectification) than Halfwave Rectifier, Justify. **3**
- (f) Find the B-E junction's dynamic resistance by plotting the input characteristics of CE configuration of BJT. **3**
- (g) Single phase motor is not self-starting. Justify. **3**
2. (a) An Aluminium wire 10m long and 2mm in diameter is connected in parallel to a copper wire 6m long. A total current of 2A is passed through the combination and it is found that current through the Aluminium wire is 1.25A. Calculate the diameter of copper wire. Specific resistance of copper is $1.6 \times 10^{-6} \Omega \text{ cm}$. and that of Aluminium is $2.6 \times 10^{-6} \Omega \text{ cm}$. **10**
- (b) A leaky capacitor $Z_c = 74.5 \text{ ohm}$ is in series with a coil $Z_L = 40 \text{ ohm}$ and a resistor $R = 56 \text{ ohms}$. When a voltage $V = 200 \text{ volts}$ is applied, $I = 2.5\text{A}$ and the p.d. across R and Z_L combined is 194V. Find the loss in the capacitor. **10**
3. (a) Three non-inductive resistances each of 100Ω are connected in star to 3-phase 440 V supply. Three ideal equal choke coils are also connected in delta to the same supply, the reactance of one coil being equal to 100Ω . Calculate (i) line current (ii) power factor of the system. **8**
- (b) Find the value of R and C so that $V_b = 3V_a$ and V_b and V_a are in quadrature. Find also the phase relation between V and V_b ; V_a & I. Draw phasor diagram. **8**



- (c) Show and explain construction and characteristics of Zener diode. **4**

4. (a) For given circuit determine KVA, KVAR and KW in each branch and the power factor of the whole circuit. 8



- (b) Show the emf equation of dc generator. 4
- (c) Analyse the performance parameters, d.c. power; a.c. power; rectification efficiency; ripple factor and TUF of bridge FWR. 8
5. (a) Explain the construction, characteristics and working of CE configuration of BJT, amplifier. 8
- (b) Two wattmeters connected to measure the power input to 3- ϕ circuit, indicate 2500W and 500W respectively. Find the power factor of the circuit. 8
- (i) When both readings are positive and
- (ii) When later reading is obtained after reversing the connection to the current coil of one Instrument.
- (c) Explain the production of rotating magnetic field by graphical approach. 4
6. (a) A resistor and a capacitor are in series with variable inductor (pure). When the circuit is connected to 220V, 50Hz supply the maximum current obtainable by varying the inductance is 0.314A, The voltage across capacitance is then 800V. Find the circuit constants. 8
- (b) A transformer has its maximum efficiency of 98% at 15KVA at UPF. During the day it is loaded as follows :— 8
- | | | | |
|--------|---|-------|-------------|
| 12 hrs | : | 2 kW | at 0.5 p.f. |
| 6 hrs | : | 12 kW | at 0.8 p.f. |
| 6 hrs | : | 18 kW | at 0.9 p.f. |
- Find all day efficiency.
- (c) Explain the double field revolving theory of single phase induction motor. 4
7. (a) Calculate the (a) Full load efficiency at 0.8 p.f. (lag) (b) Terminal voltage when supplying full load at 0.8 p.f. (lag) for an input voltage of 500V. The result of O.C. and S.C. test on 5KVA, 500/250V, 50Hz, 1- ϕ transformer are as follows : 8
- | | | | | |
|------|---|-------|-----|-------|
| O.C. | : | 500V, | 1A, | 50W |
| S.C. | : | 15 V, | 6A, | 21.6W |
- (b) For given circuit find the Thevenin's equivalent circuit across a-b and hence find the current through load of 10 Ω . Verify the same with superposition theorem. 12

