



SEM – 1-4(RC 07-08)

F.E. (Semester – I) Examination, May/June 2012

(Revised in 2007 – 08)

BASIC ELECTRICAL ENGINEERING

Duration : 3 Hours

Total Marks : 100

Instructions : 1) Answer 5 questions in **full** with atleast **one** question from **each** Module.

2) Missing data, if any, may be suitably **assumed**.

MODULE – I

1. a) Explain circuit, geometrical and energy view point of capacitor. 6
- b) Determine the currents in the unbalanced bridge circuit of fig Q. 1 (b) also determine the potential difference across BD and the resistance from B to D. 8

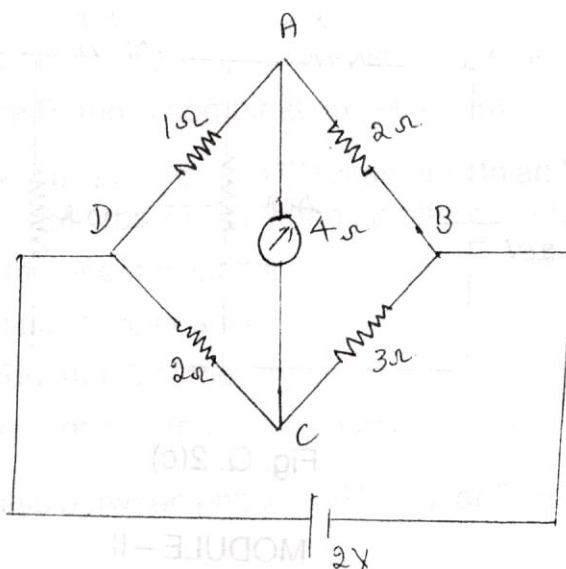


Fig Q. 1 (b)

- c) Derive expression for three inductances in series and parallel with neat diagram. 6

P.T.O.



2. a) State and derive the maximum power transfer theorem with neat circuit diagram. 6
b) Find current in the 15Ω resistor in the network shown in fig Q. 2. (b) by Thevenin's theorem. 8

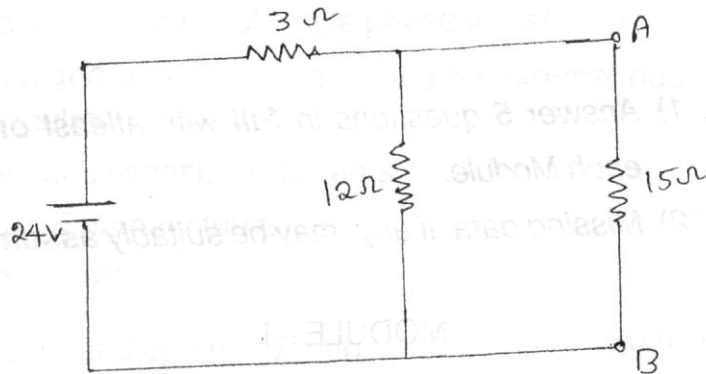


Fig. Q. 2(b)

- c) Apply Norton's theorem to calculate current flowing through 5Ω resistor of fig Q. 2(c). 6

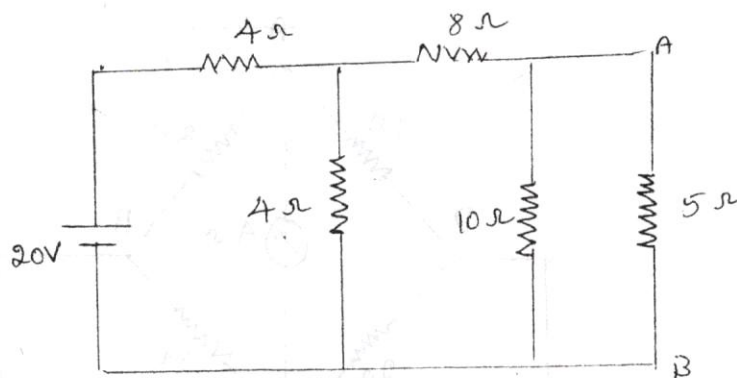


Fig. Q. 2(c)

MODULE - II

3. a) Explain the following :

- Magnetic flux density
- Reluctance
- Magnetic flux.



- b) State and explain Faraday's law of electromagnetic Induction with neat diagram. 6
- c) Define Mutual Inductance and derive expression for co-efficient of mutual inductance. 8
4. a) Derive an expression for total MMF induced in series circuit with an air gap. 6
- b) Derive an expression for equivalent inductance for two inductors connected in series when
- a) Cumulatively coupled 8
- b) Differentially coupled. 6
- c) Compare electric circuit with magnetic circuit. 6

MODULE – III

5. a) Define the following : 5
- i) Time period
- ii) RMS value
- iii) Frequency
- iv) Amplitude
- v) Cycle.
- b) 'A current $i = I_m \sin \omega t$ is flowing through R-C series circuit obtain an expression of voltage across the R and C combination in the form $v = V_{\max} \sin(\omega t - \phi)$. 7
- c) A sinusoidal source of $e(t) = 170 \sin 377 t$ is applied to an RL series circuit. It is found that the circuit absorbs 770 W when an effective current of 12A flows. 8
- i) Find the power factor of the circuit
- ii) Calculate the value of impedance
- iii) Calculate the inductance of the circuit
- iv) Find the frequency of the sinusoidal source.
6. a) Derive the relationship between phase and line quantities in star connected three phase system. 8
- b) Write a short note on unbalance 3-phase system. 4
- c) Explain with neat circuit diagram two wattmeter method of 3-phase measurement. Write expression for each wattmeter readings. 8



MODULE – IV

7. a) Define voltage regulation of transformer. Derive the expression for voltage regulation. 6
- b) Explain brief open-circuit and short circuit test on transformer. 6
- c) Explain the working principle of single phase transformer. 4
- d) A 200 kVA 1000/400 V, 50 Hz single phase transformer has 100 turns on the secondary. Calculate : 4
- i) The primary and secondary currents
- ii) The number of primary turns
- iii) The maximum value of flux.
8. a) With the help of neat diagram, explain the working of PMMC type of instrument. 8
- b) Write a short note on efficiency of transformer. 4
- c) Three coils each of having impedance of $20\angle 60^\circ$ are connected in star to supply of 400 V 3-phase, 50 Hz. Find the reading of each of the wattmeters connected to measure the input power. 8