Paper Code: REE-101	**Roll No.**

B.TECH.
FIRST SEMESTER EXAMINATION, 2016-17
BASIC ELECTRICAL ENGINEERING

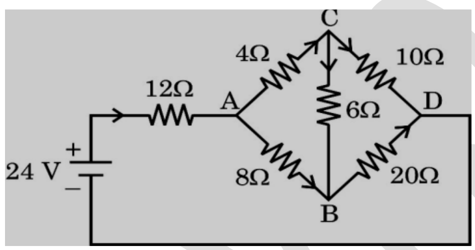
[Time: 3 Hrs.] [Max Marks: 70]

Note: Attempt ***ALL*** questions. Assume suitable data, if required. All question carry equal marks.

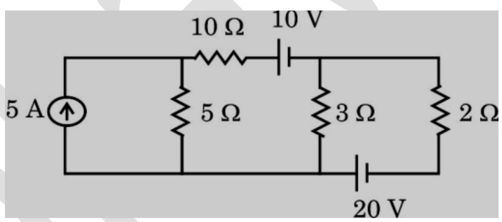
1. Answer any four parts of the following:- **(3.5x4=14)**

(a) Explain the following
- (i) Active and passive elements
- (ii) Voltage and current source
- (iii) Unilateral and bilateral elements

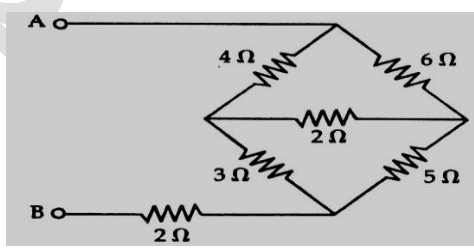
(b) Using Nodal analysis, find V_{cd} for the circuit Shown below in figure.



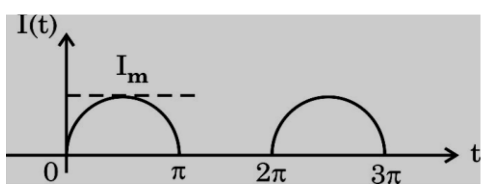
(c) Find the current in, and voltage across, the 2Ω resistance in the following figure by using mesh analysis.



(d) Find the resistance between A B of the circuit shown in Figure. use Y–Δ (star delta) transformation.



(e) Find Average value, RMS value and form factor of given half wave rectified alternating current.



(f) Explain the concept of phasor.

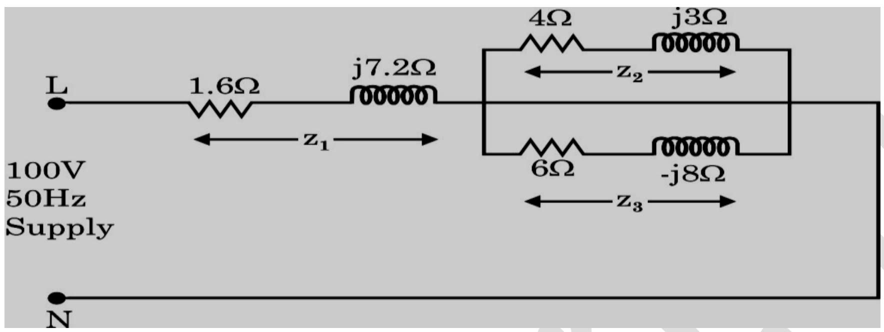
2. Answer any two parts of the following: - **(7x2=14)**

(a) Derive expression for Resonance Frequency in a parallel resonant circuit. Also derive the formula for quality factor.

(b) Define Maximum power transfer theorem. Also derive the condition for maximum power transfer.

(c) The following figure shows a series parallel circuit find.

- (i) Admittance of each parallel branch
- (ii) Total circuit impedance
- (iii) Supply current and power factor
- (iv) Total power supplied by the source



3. Answer any two parts of the following: - **(7x2=14)**

(a) Derive line & phase voltage & current relations for 3-phase star & delta connected system.

A 3-phase voltage source has a phase voltage of 120 V and supplies star connected load having impedance 36 + j 48 Ω per phase. Calculate: The line voltage, the line current, The power factor, The total 3-phase power supplied to the load.

(b) Derive the expression for the 3 phase; Power & Power Factor; using 2 Wattmeter methods.

(c) State necessity & advantage of 3-phase system. Describe working principle of moving iron type Instrument.

4. Answer any two parts of the following: - **(7x2=14)**

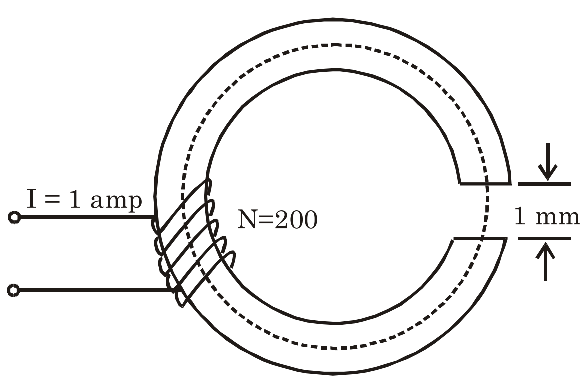
(a) Give the Analogy between Electric & Magnetic circuits

. An Iron ring is made up of three parts :

$l_1 = 10\ cm\ , A_1 = 5\,cm^2\ , l_2 = 8\,cm\ , A_2 = 3\,cm^2\ , l_3 = 6\,cm\ , A_3 = 2.5\,cm^2\ ,$

It is wound with coil of 250 turns. Calculate current required to produce flux of 0.4 mWb. Where $\mu_1 = 2670 \quad \mu_2 = 1050 \quad \mu_3 = 600$

(b) An iron ring of mean length 50 cm and relative permeability 300 has an air gap of 1 mm. If the ring is provided with a winding of 200 turns and a current of 1 Amp. is allowed to flow through, find the flux density across the air gap.



(c) A 30*KVA*, 2000/200*V*, single phase, 50 *Hz* transformer has a primary resistance of 3.5 ohms and reactance of 4.5 ohms. The secondary resistance and reactance are 0.015 ohms and 0.02 ohms respectively.
Find (i) Equivalent resistance, reactance and impedance referred to the primary side (ii) Total copper loss in the transformer

5. Answer any four parts of the following: - **(3.5x4=14)**

(a) Derive EMF equation of D.C Generator
(b) Explain the working principle of DC Shunt motor.
(c) Define slip in 3-Phase Induction Motor. What is its value at starting and at the synchronous speed?
(d) A 3-phase, 4-pole induction motor is supplied from 3-phase, 50Hz ac supply. Calculate:
(i) The synchronous speed
(ii) The rotor speed when slip is 4%
(iii) The rotor frequency when rotor runs at 600 r.p.m.
(e) Briefly discuss the principle of operation of alternator. Draw V curve for synchronous motor.

(f) Why single phase Induction motor is not self-starting? Explain any one method of starting.