

Registration No. :

--	--	--	--	--	--	--	--	--	--

Total number of printed pages – 3

B. Tech
BENG 1102 (Old)

Second Semester (Back) Examination – 2013

BASIC ELECTRICAL ENGINEERING

BRANCH : ALL

QUESTION CODE : B485

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.*

1. Answer the following questions : 2 × 10
- State Norton's theorem.
 - A resistor of 5Ω is connected across a potential difference of 50 V. Calculate the power dissipated and energy transferred to heat in 2 minutes.
 - A resistor of 25Ω in series with a $0.5 \mu\text{F}$ capacitor is connected across 250 V, 60 Hz. Find the current through the capacitor.
 - What is the time required for the capacitor voltage in a series RC circuit having $R = 3 \text{ M}\Omega$ and $C = 10 \mu\text{F}$, to reach 63.2% of its steady state value ?
 - Explain the term 'Permeability' and 'coercivity'.
 - Why laminated core is used in a transformer ?
 - What is the value of starting torque in case of a single phase induction motor ?
 - Write down the expression for emf per turn induced in the windings of a single phase two winding transformer. Also define each term associated with it.
 - What do you understand by transients in DC circuit ?
 - What is back emf in a DC motor ? Explain.

P.T.O.

2. (a) Explain the following terms with reference to AC single phase power : 5
- (i) Active Power
 - (ii) Reactive Power
 - (iii) Apparent Power.
- (b) Using star delta transformation, find the current drawn from the 20 V battery shown in Fig. 1. 5

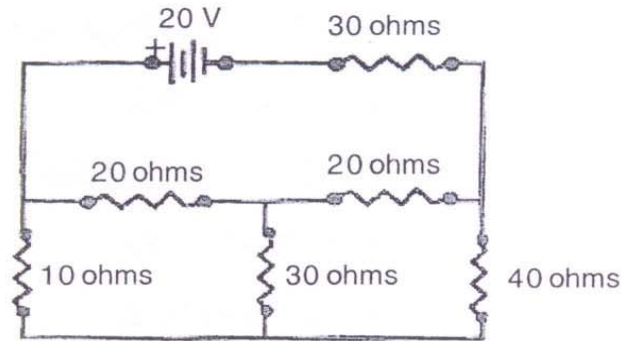


Figure 1

3. (a) State and explain Thevenin's theorem by giving a suitable example. 5
- (b) Determine the current through the 40 ohm resistor of the network shown in Fig. 2 using Superposition Theorem. 5

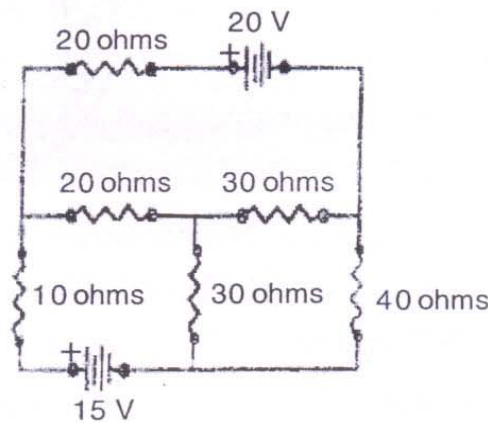
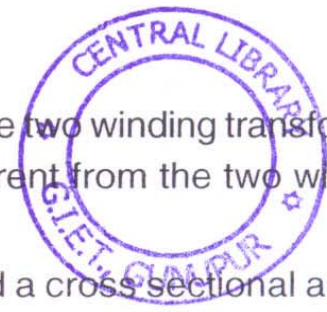


Figure 2

4. (a) Explain the Principle of operation of single phase two winding transformer. Also explain how the auto transformer is different from the two winding transformer? 5
- (b) An iron ring has a mean diameter of 40 cm and a cross sectional area of 5 cm^2 . It is wound with a coil of 1500 turns. An air gap of 2 mm width is cut



in the ring. Determine the current required in the coil to produce a flux of 0.45 m-wb in the air gap. If the relative permeability of iron is 900 ? Neglect leakage and fringing (Assume $\mu_0 = 4\pi \times 10^{-7}$ H/m). 5

5. (a) Explain how the operating speed of a DC shunt motor can be changed by varying the field flux. What is the limitation of this method ? 5
- (b) The voltage applied to a circuit is $V = 230 \sin (wt + 30^\circ)$ and the current through the circuit is $i = 10 \sin (wt - 30^\circ)$. Determine the parameter of the circuit, power consumed in the circuit and also the power factor of the circuit. 5
6. (a) Explain the principle of operation of a three phase induction motor. 5
- (b) A circuit consist of a resistor of 15Ω in series with an inductor of 0.25 H. If the frequency of supply is 50 Hz, calculate the conductance and susceptance of the circuit. 5
7. (a) Explain the principle of operation of a PMMC type instrument by drawing a neat diagram ? Also write down its advantages and disadvantages. 5
- (b) A PMMC instrument gives a reading of 25 mA when the potential difference across its terminal is 75 V. Calculate : 5
- (i) The shunt resistance for a full scale deflection corresponding to 150 A.
- (ii) The series resistance for a full scale reading with 600 V.
8. (a) Explain the transmission of electrical energy from a thermal power plant to a domestic consumer. 5
- (b) Explain the principle of power generation in a nuclear power plant with the help of block diagram. 5