Total No. of printed pages = 3

**SUBJECT CODE = ELE022103**

Roll No. of candidate | | | | | | | | | | |

**2017**

**End Semester B.Tech. Examination**

**1st Semester**

**BASIC ELECTRICAL ENGINEERING**

Full Marks- 70 Pass Marks- 21 Time- 3 hours

*The figures in the margin indicate full marks.*

## PART A

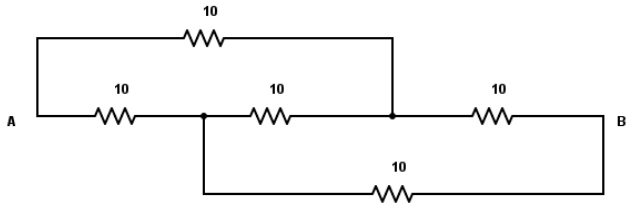
**Q.1. Answer all questions: (16x1=16)**

a) Explain short circuit and open circuit.
b) Define Linear and non-Linear circuits.
c) A 25W, 220V bulb and a 100W, 220V bulb are connected are joined in series with a supply of 220V. Which bulb will glow more brightly?
d) You are given three bulbs of 25W, 40W and 60W. Which one will have the lowest resistance?
e) Define Form factor and Peak factor.
f) Define Average and RMS value of an alternating quantity.
g) What are the different standard forms of representing an alternating voltage?
h) Draw the circuit diagram and phasor diagram for AC circuit containing pure inductance along with voltage and current equations.
i) Define Magnetomotive force and Reluctance.
j) Define Self-induced and Mutually-induced emf.
k) A magnetic circuit has mmf of 400 AT and a reluctance of $2X10^5$ AT/Wb. Calculate the magnetic flux.
l) In a Star and Delta connected system, what is the relation between the line voltage $V_L$ and phase voltage $V_{ph}$ and line current $I_L$ and phase current $I_{ph}$?
m) Write two principles of operation of electrical measuring instruments.
n) Name two type of instrument suitable for measuring only d.c instrument.
o) What is the difference between Fuse and MCB?
p) What is the function of Two-way switches?

## PART B

**Q.2. Answer all questions:** **(3.5x4=14)**

a) Why do we use Start/Delta and Delta/Star Transformation? Calculate the equivalent resistance between the terminals A and B of the following network. The values of resistances are in ohms.



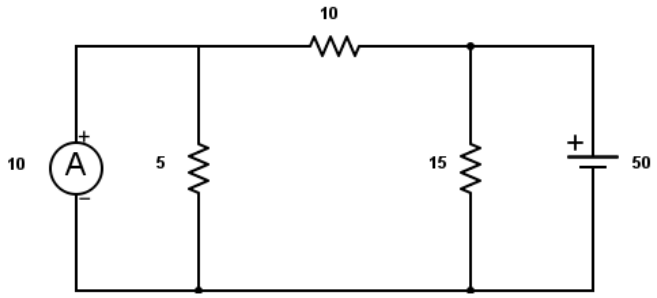

b) The equation of an alternating current i=42.42 sin 628t. Determine (i) its maximum value (ii) frequency (iii) rms value (iv) average value and (v) form factor.

c) Find the expression for lifting power of a magnet.
d) Explain the three torques required for an indicating instrument.

## PART C

**Q.3. Answer all questions:** **(10x4=40)**

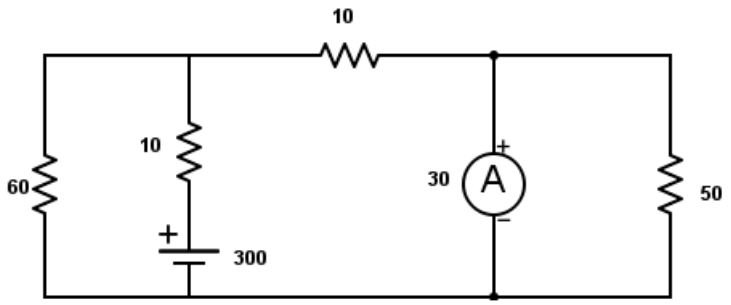
a) State Thevenin's and Norton's Theorem. Find the current through 10 Ω resistor as shown in figure below using Thevenin's theorem. The values of resistances, voltage and current are in ohms, volt and amp respectively. 3+5+2




Determine the maximum power that can be transferred to a load resistance connected across 10 Ω.

OR

State and prove maximum power transfer theorem. Using superposition theorem, find the current through the 50Ω resistor shown in the figure below. The values of resistances, voltage and current are in ohms, volt and amp respectively. 4+6




b) Compare the properties of electric and magnetic circuits. A circular iron ring has a mean circumference of 1.5 m and a cross-sectional area of 0.01 $m^2$. A saw-cut of 4mm wide is made in the iron ring. Calculate the magnetizing current required to produce a flux of 0.8 mWb in the air gap if the ring is wound with a coil of 175 turns. Assume relative permeability of iron as 400 and leakage factor 1.25. 4+6

OR

Deduce the expression for Voltages, Currents and Power of a three phase (3-Φ) Star Connected system.
A 3-phase motor load has a p.f. of 0.397 lagging. Two wattmeters connected to measure power show the input as 30kW. Find the reading on each meter. 6+4

c) Explain briefly the principle of generation of 3-Phase voltages. Give the reasons for the use of 3- phase system. A resistance R, an inductance L=0.01 H and a capacitance C are connected in series. When an alternating voltage v = 400 sin (3000t - $20^0$) is applied to the series combination, the current flowing is 10 $\sqrt{2}$sin (3000t - $65^0$). Find the values of R and C. 4+6

OR

Deduce the expression for Average and R.M.S. value of Sinusoidal current. What do you mean by phase and phase difference? An iron-cored choke coils has a resistance of 4Ω when measured by a d.c supply. On a 240 V, 50 Hz mains supply, it dissipates 500 W, when the current being 10 A. calculate (i) Impedance (ii) the power factor (ii) the iron loss and (iv) inductance of the coil. 4+2+4

d) Discuss about five types of accessories required in the domestic electrical installations. Explain briefly, why electrical installations must be earthed. Explain plate earthing in details. 4+2+4

OR

Explain the working of principles of Permanent Magnet moving Coil Instrument and Attraction Type Moving Iron Instrument. Explain the Extension of Ammeter Range. 7+3