

**B.TECH. SEM -I (CIVIL/ ELECTRICAL/ MECHANICAL/
 PRODUCTION/ COMPUTER/ INFO. TECH. 2014 COURSE (CBCS) :
 WINTER - 2017**

SUBJECT : FUNDAMENTALS OF ELECTRICAL ENGINEERING

Day **Saturday**
 Date **20/01/2018**

Time **10.00 AM TO 01.00 PM**
 Max. Marks : 60

W-2017-2002

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of calculator is **ALLOWED**.

Q.1 a) A platinum coil has resistance 3.146Ω at 40°C and 3.767Ω at 100°C . (05)
 Find the resistance at 0°C .

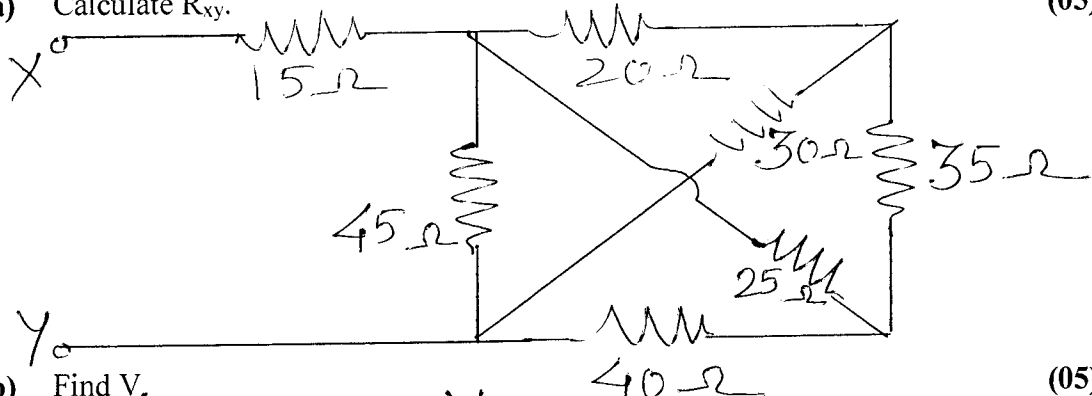
b) Prove that $\alpha_t = \frac{\alpha_0}{1 + \alpha_0 t}$. (05)

OR

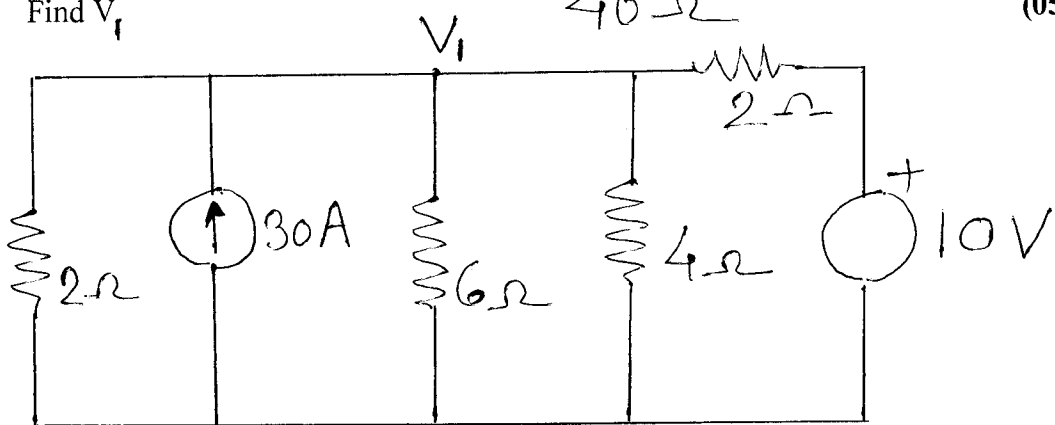
a) Find the rating of motor in hp which drives an electric generator supplying (05)
 20 A at 220 V to a load at 0.8 efficiency.

b) A 200 V DC motor draws a current 10 A while driving a certain load at 1500 (05)
 rpm. It produces a torque of 11.5 Nm. Calculate the efficiency of the motor.

Q.2 a) Calculate R_{xy} . (05)



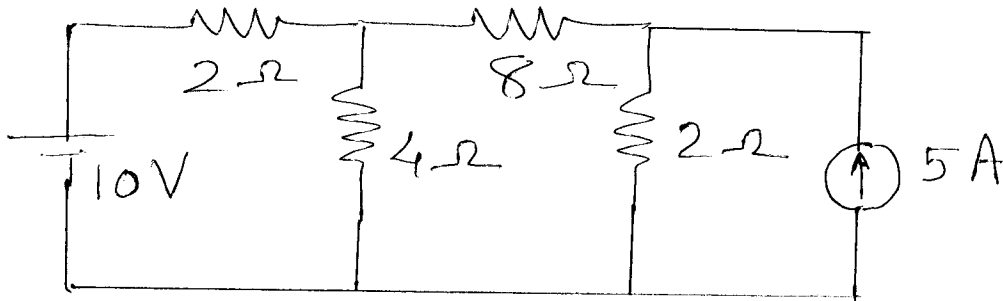
b) Find V_1 (05)



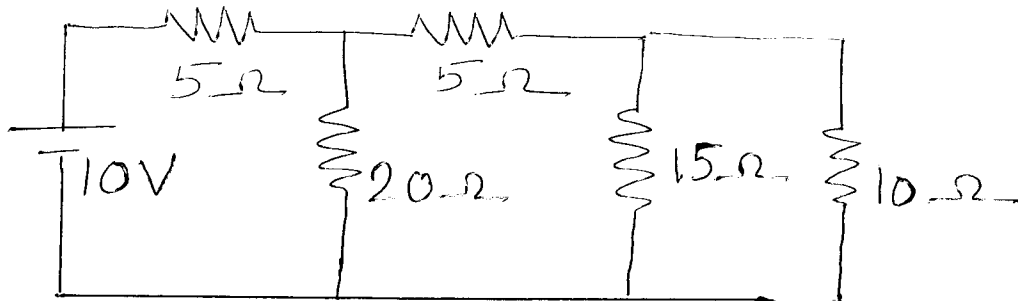
P.T.O.

OR

- a) Find voltage drop across $4\ \Omega$ resistor using Superposition theorem. (05)



- b) Using Thevenin's theorem, find the current through $10\ \Omega$ resistor. (05)



- Q.3 a) Define the following: (05)
i) Permittivity
ii) Electric field strength
iii) Dielectric strength

- b) Two capacitors of $10\ \mu\text{F}$ and $25\ \mu\text{F}$ are connected in series across a 230 V DC supply. Calculate : i) Potential difference across each capacitor. (05)
ii) The charge on each capacitor.

OR

- Q.3 a) Derive an expression for energy stored in capacitor. (05)

- b) What are the different types of capacitors? Explain any two in brief. (05)

- Q.4 a) Draw and explain phasor diagram of transformer on NO LOAD. (05)

- b) A 100 kVA, 2200/220 V, 50 Hz single phase transformer iron loss of 400 w. The full load copper loss is 500 w. Find the efficiency of the transformer at half load 0.8 p.f. lagging. (05)

OR

- a) A mild steel ring has a mean circumference of 500 mm and a uniform cross sectional area of $300\ \text{mm}^2$. An air gap of 1 mm is then cut in the ring. Determine the current required in the coil of 500 turns wound over the ring to produce a flux of $147\ \mu\text{Wb}$ in the airgap. Assume $\mu_r = 1200$. (05)

- b) Compare electric and magnetic circuits. (05)

P.T.O.

- Q.5** a) Calculate current and its p.f. when a resistance of 12Ω , inductance of 0.1 H and a capacitor of $100\mu\text{F}$ is connected in series across a 220 V , 50 Hz supply. (05)
- b) A balanced star connected load of $(3 + j4)\Omega$ per phase is connected to a balanced 3ph 440 V supply. Find the line current drawn, p.f., power and total voltamperes. (05)

OR

Draw and explain the phasor diagrams for (10)

i) 3 phase star connected system.

ii) 3 phase delta connected system

Also state the relationships between :

i) Line current and phase current

ii) Line voltage and phase voltage

in both the cases. Also state the expression of power in line values as well phase values in both.

- Q.6** a) What are the different types of wiring systems used for household wiring? Explain any one in detail. (05)
- b) What are the different types of earthing? Explain any one in brief. (05)

OR

- a) Describe the constructional details of sodium vapour lamp. Also state its disadvantages. (05)
- b) What is tariff? Explain it in accordance with L.T. Bill. (05)