BTS(C) – I – 06 – 008 (A)

B. Tech Degree I & II Semester (Combined) Examination June 2006

IT/CS/EC/CE/ME/SE/EB/EI/EE 108 FUNDAMENTALS OF ENGINEERING II

(a) ELECTRICAL ENGINEERING

(All Questions Carry EQUAL marks)

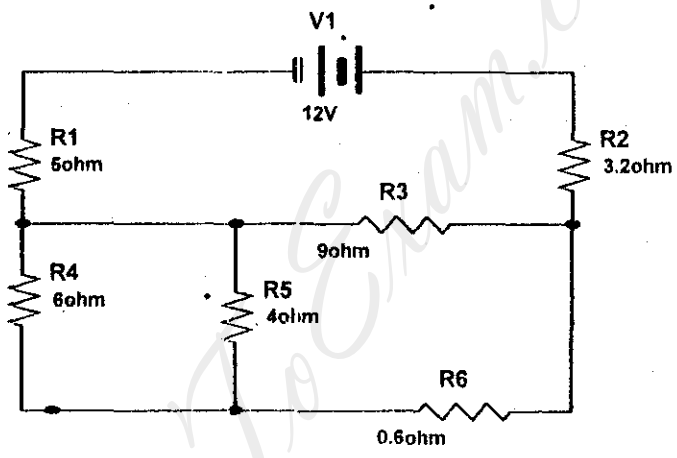
Time : 3 Hours Maximum Marks : 100

(a) Electrical Engineering

(All questions carry equal marks)

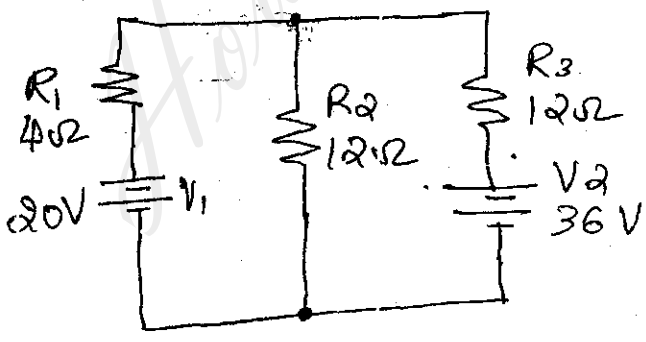
I. (a) State the three forms of Ohm's law relating V, I and R.

(b) In the following circuit what is the net resistance across the voltage source? Also calculate the voltage across R_3 and R_6.



OR

II. (a) Solve V_{R2}, the voltage across R2 using super position theorem.



(b) State and explain Norton,s theorem with an arbitrary example of your own.

III. (a) The flux density of 0.002 T in the air core of an electromagnet. When an iron core is inserted, the flux density in the core is 0.6 T. How much is the relative permeability μ_r of the iron core?

(b) Explain the working principle of a D'Arsonval movement. A 50 μA movement has r_M of 1000 Ω. What R_S is needed to extend the range to 500 μA?

OR

IV. (a) Explain how magnetic materials are classified? Give example materials and μ_r values.

(b) Calculate the rate of flux change $d\phi/dt$ in Wb/Sec for, 6 Wb increasing to 8 Wb in one second and 8 Wb decreasing to 6 Wb in 1 s. Calculate the voltage induced in 400 turns by each of the flux change.

V. (a)What R is needed in series with a 0.01 μF for a phase angle of -64°, with f of 800 Hz?

(b) Draw a series R-L-C circuit and derive the resonance frequency. Also obtain expressions for the Q-factor and voltage across each of the component.

OR

VI. (a) Define and explain the time constants of RC and RL circuits.

(b) Show that the line current drawn by a balanced Δ-connected load from a balanced 3-phase source is $\sqrt{3}$ times the phase current. Draw the current phasor diagram for ABC sequence.

(b) Electronics Engineering

VII. (a) Explain the working principle of Zener diodes with the help of its V-I characteristics. Which is the material used for its fabrication? Why?

(b) Compare the general electrical features of Si and Ge diodes.

(c) Draw the full wave bridge rectifier circuit. Give its output with and without capacitor filter and explain the role of filters.

OR

VIII. (a) Compare CE and CC transistor configurations with respect to current gain, voltage gain, input impedance and output impedance. Which is suitable for amplifier design?

(b) Explain the temperature dependence of electrical conductivity of intrinsic semiconductors. Mention one use for intrinsic semiconductors. Explain how doping will affect the conductivity.

IX. (a) Differentiate between active and passive transducers with examples for each. What is thermocouple? Explain the principle of operation. List the materials for fabrication.

(b) Explain how LCDs are classified? Explain the principles of operation. Compare LEDs and LCDs as display devices.

OR

X. (a) Explain the methods for phase and frequency measurement using CRO.

(b) Draw the characteristics of a P-channel FET and explain. Define μ and g_m.

(c) What is strain gauge? Define gauge factor. List the advantages of semiconductor strain gauges.

XI. (a) Define and explain modulation index in AM and FM. Compare the features of frequency and amplitude modulation schemes.

(b) What are the essential components of a digital communication system? Explain.

OR

XII. (a) Compare digital and analog communication systems.

(b) Explain the principle of AM and FM demodulation.