

00515
B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering)

Term-End Examination

June, 2010

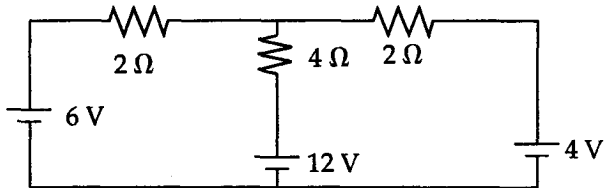
**ET-202(B) : PRINCIPLES OF ELECTRICAL
 SCIENCES**

Time : 3 hours

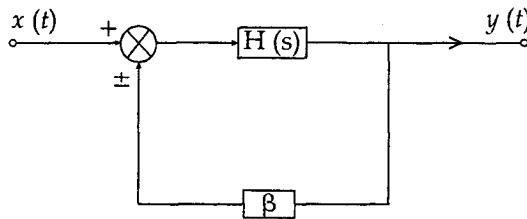
Maximum Marks : 70

Note : Answer any five questions in all. Use of calculator is permissible.

1. (a) State the relative merits of iron-cored and air-cored inductors. If the current fed to an ideal inductor has a periodical symmetrical triangular waveform, what would be the waveform of the voltage across the inductor ? Explain. 6
- (b) State and explain : 4
- (i) Superposition theorem
- (ii) Thevenin's theorem
- (c) Solve for all the current in the circuit shown below by the loop current method : 4



2. (a) Explain briefly the necessity of power factor correction. 4
- (b) A 2-terminal network "N" draws a power "P" of 100W and a relative power "Q" of 75 VAR when connected to a 100 V, 50 Hz sinusoidal voltage source. If N comprises two elements in series, determine the nature and values of these two elements. 6
- (c) Determine the system function for the system shown below and hence find the system function for a unity feedback system employing negative feedback. 4



3. (a) What are the different components of power loss that takes place in a transformer? How do they vary with the load current? What component (or components) of the power loss does the short circuit test on a transformer provide. 6
- (b) Give brief reasons for the following : 6
- (i) Fuses are not employed on the neutral side of a residential wiring installation.
 - (ii) The use of 3 pin plugs and sockets is recommended for use with portable electrical appliances.

- (c) A practical voltage source can be converted into an equivalent practical current source. Draw an equivalent circuit diagram for this. 2
4. (a) What are the basic components used in electrical installations ? State briefly the function of each component. 6
- (b) A 0.8 p.f balanced 3 phase load takes 8.66 A from a 400 V, 3-Phase mains. Find the readings of two wattmeters connected to measure the power input to the load. Draw a phasor diagram showing the current and voltage fed to the wattmeter. 6
- (c) A lissajous pattern obtained on a CRO screen has $f_y = 150$ Hz, No. of touching points on a horizontal tangent = 3, No. of touching points on a vertical tangent = 2. 2
5. (a) What are the applications of semiconductor diodes ? Give the basic circuit diagram of each application, 6
- (b) If a BJT differential amplifier is operating with a current source $I_0 = 1$ mA and collector resistance $R_c = 1$ k ohm, determine the differential mode gain of the amplifier. Assume $V_T = 26$ mV and $\alpha = 0.9$. 6
- (c) An 8-bit A-to-D converter of the successive approximation type is used in a DVM. The output of the ADC is 10111101. Find the contents of the Successive Approximation Register (SAR) at the end of each previous stage of conversion during the conversion process. 2

6. (a) What is a multiplexer ? Draw the symbol of a 4-to-1 multiplexer showing the various inputs and outputs and write its truth table. 6
- (b) Design a summing amplifier circuit using an operational amplifier to obtain an output voltage V_0 give by $0.1 V_{i1} - 10 V_{i2} - 102 V_{i3}$ where V_{i1} , V_{i2} and V_{i3} are input voltages. 4
- (c) Design a Wien Bridge oscillator for a frequency of 100 kHz. 4
7. (a) What are the different addressing modes available in the 8085 microprocessor ? Give an example of each mode. 6
- (b) Write an 8085 assembly language program to add five data types stored in consecutive memory locations starting with the address 1000_H and store the sum and carry in two successive locations after the data. Assume that no overflow is caused. 6
- (c) Find the decimal equivalent to : 2
- (i) $(1110101)_2$
- (ii) $(101011)_2$
-