No. of Printed Pages : 3

ET-202(B)

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

01601

Term-End Examination

December, 2013

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) Define resistance, inductance and capacitance. Give their V-I relationships. 6

(b) Express the phasor's of the following sinusoidal signals in both rectangular and polar co-ordinates forms : 6

(i) $v(t) = 100 \sin(wt - 45°)$

(ii) $v(t) = 50\sqrt{2} \cos(wt + 135°)$

(iii) $i(t) = -10\sqrt{2} \sin(wt + 120°)$

(c) What is the advantage of an iron-cored inductor over an air-cored inductor ? 2

2. (a) Explain resonance in series RLC circuit and draw resonance curve. 6

(b) What is KVL ? Given that $E_1 = 15V$, $E_2 = 10V$, $V_s = 20 \sin 500t$, find current I in the circuit of figure 1, 6

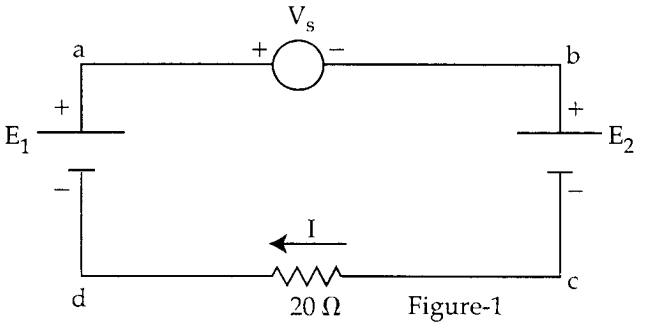

Figure-1

(c) A practical voltage source can be converted into an equivalent current source. Draw an equivalent circuit diagram for this. 2

3. (a) What are the applications of a CRO ? 6

(b) A 400V, 50 Hz, 3-phase voltage source supplies the following loads : 6

(i) 10 kW at unity p.f.

(ii) 100 kW at 0.8 p.f. lagging

(iii) 40 kW at 0.9 p.f. lagging

Find the overall p.f. of the load.

(c) State and explain Norton's theorem. 2

4. (a) What are different types of flip-flops. Explain any two of them. 6

(b) What is difference between a compiler and an assembler ? Describe ROM and RAM. 6

(c) What is analog output voltage of a D-to-A converter corresponding to an input 1101 ? 2

5. (a) Explain the working of a dual slope integrating type ADC. 6

(b) Explain any four applications of op-amps with relevant circuit diagrams. 6

(c) Write a brief note on FET. 2

6. (a) How is power measured in a 3-phase circuit using two wattmeter method ? Draw the circuit diagram also. 6

(b) A 400V, 50 Hz, 4-pole, 3 phase induction motor has the following equivalent circuit parameters at standstill = $R_1 = 2.0\Omega$, $R_2^1 = 4.0\ \Omega$, $X_1 = 2.6\ \Omega$, $X_2^1 = 2.0\ \Omega$ and $X_\phi = 70\ \Omega$. Draw equivalent circuit of the machine and find torque and power developed. 6

(c) Write Kirchhoff's First Law. 2

7. (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) Name different types of single phase induction motors. Explain any one of them. 6

(c) Write down the relationship between phase and line voltage, and phase and line currents for star connections in a 3-phase supply. 2