01161

B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering) Term-End Examination December, 2015

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

Time : 3 hours   *Maximum Marks : 70*

Note : *Answer any five questions in all.*

1. (a) Explain the following terms pertaining to AC wave :   6

    (i) Peak and Average value of sinusoidal current

    (ii) Effective or r.m.s. value

   (b) What is superposition theorem ? Give an example using a circuit diagram.   6

   (c) Draw the block diagram of any basic feedback control system and write the transfer function for this.   2

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

(b) What is KVL ? Given that $E_1 = 15$ V, $E_2 = 10$ V, $V_s = 20 \sin 500$ t, find the current 'i' in the following circuit :   6
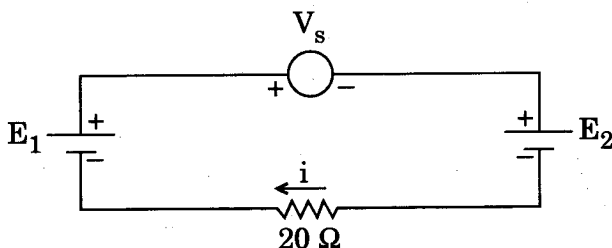
(c) A practical voltage source can be converted into an equivalent practical current source. Draw an equivalent circuit diagram for this.   2

3. (a) Explain the necessity for power factor correction. What are the different methods for power factor correction ?   6

(b) What are the basic components used in electrical installations ? State briefly the function of each component.   6

(c) What is the significance of equivalent circuits ?   2

4. (a) Draw and explain the speed-torque characteristics of a d.c. series motor.   6

(b) A d.c. machine generates an armature voltage of 220 V on no load at 1000 r.p.m, the field current being 2 A. The armature resistance is 0·5 Ω. Find its speed when it draws a current of 5 A as motor from 220 V supply. (Neglect armature reaction and brush voltage drop)   6

(c) A Lissajous pattern obtained on a CRO screen has f_y = 50 Hz. Number of touching points on a horizontal tangent = 5 and the number of touching points on a vertical tangent = 3. Find f_x. 2

5. (a) Explain any four applications of op-amp with relevant circuit diagrams. 6

(b) Discuss the different types of flip-flops used in digital circuits. 6

(c) Draw a circuit diagram of Wien Bridge Oscillator. 2

6. (a) What are the different components of power loss in a transformer ? How is the efficiency of a transformer calculated ? 6

(b) A 3-phase induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate : 6

(i) Synchronous speed

(ii) Rotor current frequency when the rotor runs at 1200 r.p.m.

(c) Draw the v – i characteristics of a reverse biased p-n junction. 2

7. (a) How can transistor (BJT) be used as amplifier and switch ?   *6*

(b) What is meant by an interrupt in a microprocessor ? List all interrupts that are available in 8085 microprocessor.   *6*

(c) Find the binary equivalent of the following :   *2*

    (i) $(79)_{10}$

    (ii) $(265)_{10}$

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