Code No: RR212402 **Set No. 1**

II B.Tech I Semester Supplementary Examinations, November 2006
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Name the different types of elements that constitute an electric circuit.
   (b) Write down the KVL for the given circuits. (fgure 1 and 2) [8+8]

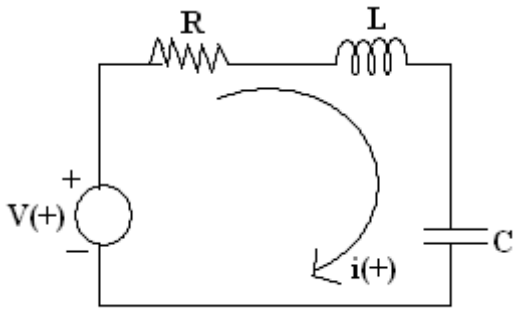

Figure 1:

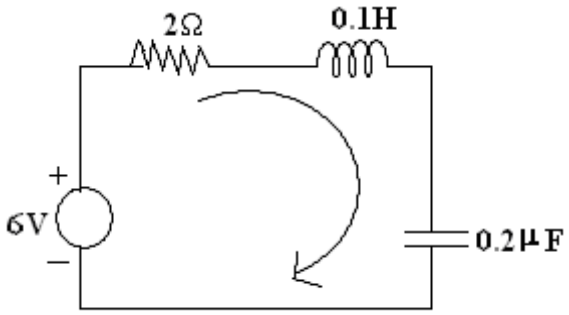

Figure 2:

2. (a) A 220V d.c; motor has an armature resistance of 0.5Ω if the full-load armature current is 20A, find the induced e.m.f when the machine acts as
      i. generator
      ii. motor
   (b) Write the power stages in a d.c. motor. Explain it clearly. [8+8]

3. (a) Write the e.m.f equation of transformer and derive it?
   (b) Define efficiency of a transformer. Obtain the condition for maximum efficiency. [8+8]

4. (a) Define slip. Hence deduce the expression for frequency of Rotor current?
   (b) Discuss in detail the Predetermination of regulation of an alternator. [8+8]

5. (a) Compare the volt-ampere characteristics of silicon and germanium diodes and determine which you would prefer to use for the most practical applications. Give proper reasoning. Sketch the variation in volt-ampere characteristics of a silicon diode with temperature change.
   (b) In the reverse bias region the saturation current of a silicon diode is about 0.1μA at 20^0C. Determine its value if the temperature is increased to 40^0C. Can a silicon diode be used as a switch? Justify your answer. [10+6]

6. (a) Describe the flow of minority and majority carriers in p-n-p transistor with neat sketches, when it is biased in the active region.
   (b) The transistor used in CB configuration is made of germanium. If $R_C = 1$kΩ, what value of R_E will cause V_{BC} to equal 0V? If R_E= 1.5kΩ, what value of R_C will cause V_{BC} to equal 0V? [6+10]

7. (a) Draw the circuit diagram for R-C phase shift oscillator and identify the important blocks of an oscillator from the circuit. What type of positive feedback is incorporated in the circuit? Give the expression for frequency of oscillations.
   (b) Derive the feedback factor for the circuit mentioned above. [10+6]

8. (a) What are the applications of Lissajous Patterns? Explain each of them with suitable sketches.
   (b) An electro-statically deflected cathode ray tube has plane parallel deflection plates, which are 2.5cm long and 0.5cm apart. The distance from their center to the screen is 20cm. The electron beam is accelerated by a potential difference of 2500V and is projected centrally between the plates. Calculate the deflection voltage required to cause the beam to strike the screen and also find the deflection. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR212402 **Set No. 2**

II B.Tech I Semester Supplementary Examinations, November 2006
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) How the Network elements can be classified. Explain it clearly.
   (b) In the network shown in figure 1, find all branch currents and voltage drops across all resistors. [8+8]

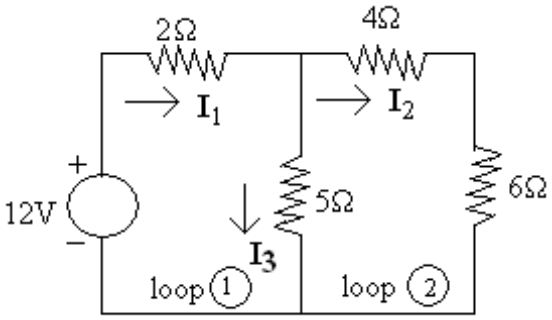

Figure 1:

2. (a) Draw the characteristics of a d.c. generator and explain it clearly.
   (b) A long-shunt compound generator delivers a load current of 50A at 500v and has armature, series field and shunt field resistances of 0.05Ω, 0.03Ω and 250Ω respectively. Calculate the generated voltage and the Armature current. Allow IV per brush for contact drop. [8+8]

3. (a) Write the e.m.f equation of transformer and derive it?
   (b) Define efficiency of a transformer. Obtain the condition for maximum efficiency. [8+8]

4. (a) Explain clearly about open-circuit and short-circuit tests in Alternator.
   (b) Draw the slip-Torque characteristics of an Induction Motor. Explain it clearly. [8+8]

5. (a) Explain the operation of a full-wave rectifier with capacitor filter using neat circuit diagram and waveforms.
   (b) A 9V - 0 - 9V transformer secondary is used in a full-wave rectifier with capacitor filter. Determine the output D.C voltage and ripple factor if the load resistance and the capacitor are 1kΩ and 470μF respectively. Assuming the diodes to be ideal and the line frequency is 50Hz. Neglect the resistance of secondary winding of the transformer. [8+8]

6. (a) What do you mean by the parameters I_{EO} and I_{CO}? Explain the importance of each parameter and obtain relation between them.

   (b) The following data has been used for a common base circuit using $n-p-n$ silicon transistor: V_{EE}= 5V, $R_E = 500\Omega$, $R_C = 2\text{k}\Omega$, $V_{CC} = 12$V. Determine the operating point i.e., I_C and V_{CB}. Repeat the same if the transistor is made of germanium. [6+10]

7. (a) Enumerate the effects of negative feedback on the various characteristics of the amplifier.

   (b) Describe with necessary derivations, the effect of negative feedback on the bandwidth and distortion in an amplifier.

   (c) The distortion in an amplifier is found to be 3% when the feedback ratio of negative feedback amplifier is 0.04. When the feedback is removed, the distortion becomes 15%. Find the open loop and closed loop gains. [4+6+6]

8. (a) With the help neat diagram, explain the internal structure of Cathode Ray Tube.

   (b) Prove that the deflection sensitivity of a Cathode Ray Tube (CRT) is inversely proportional to accelerating voltage with suitable derivation. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR212402 **Set No. 3**

II B.Tech I Semester Supplementary Examinations, November 2006
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Derive the formula for the following:
   i. RMS value
   ii. Average value
   (b) Write the formula for the following:
   i. Form factor
   ii. Average value of a sinusoidal quantity. [8+8]

2. (a) A 200V d.c. series motor runs at 800 r.p.m when taking a current a 25A. The resistance of the Armature is 0.5Ω and that of field is 0.3Ω W. If the current remains constant, calculate the resistance to reduce the speed to 300 r.p.m.
   (b) Form the first principles, derive an equation for torque developed in a D.C motor. [8+8]

3. (a) Explain the principle of working of 1-ϕ transformer on no-load conditions. Also explain the nature of no-load current.
   (b) Explain how the equivalent circuit parameters can be obtained from open circuit and short circuit tests. [8+8]

4. (a) A 2000V, 1-ϕ alternator was tested on open circuit and short circuit. The details of which are as follows. A field current of 2.5a produced a short circuit current of 100A. With open circuit, the same field current generated an e.m.f of 500V. The effective resistance of the armature is 0.8 ohm. Calculate the regulation at full load current of 100A.
   i. At a power factor of 0.65 leading
   ii. At a power factor of 0.65 leading.
   (b) Write the condition for Maximum Torque under Running conditions and derive it. [8+8]

5. (a) Derive suitable expression for conductivity of p-type and n-type semiconductors.
   (b) A crystal of pure germanium is sufficiently added with antimony to produce 1.5×10^{22} antimony atoms/m^3. The electron and hole mobility are $0.38 m^2$/volt-sec and $0.18 m^2$/volt-sec respectively, and the intrinsic charge carrier density is $2.5 \times 10^{19}/m^3$. Calculate
   i. the density of electrons and holes in the crystal and

ii. the conductivity of the material.

[8+8]

6. (a) Sketch the family of CB input and output characteristics for bipolar junction transistor and indicate the cutoff, active and saturation regions. Explain the importance of each region.

   (b) A bipolar transistor is operating with $\beta = 80$, $V_{BE} = 0.65$V, $I_{CE0} = 2\mu$A, and $I_E = 1.5$mA. Determine I_B, I_C, and α. [8+8]

7. (a) Draw the circuit diagram for R-C phase shift oscillator and identify the important blocks of an oscillator from the circuit. What type of positive feedback is incorporated in the circuit? Give the expression for frequency of oscillations.

   (b) Derive the feedback factor for the circuit mentioned above. [10+6]

8. (a) Describe various types of electric Arc welding processes. Explain why very frequencies should not be used for dielectric heating.

   (b) The power required for dielectric heating of a slab of resin of 150sq.cm in area and 2cm thick is 200W at a frequency of 30MHz. The material has relative permittivity of 5 and a power factor of 0.05. Determine the voltage necessary and current flowing through the material. If the voltage is limited to 600V, what will be the value of the frequency to obtain the same heating? [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR212402 **Set No. 4**

II B.Tech I Semester Supplementary Examinations, November 2006
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) How the Network elements can be classified. Explain it clearly.
   (b) In the network shown in figure 1, find all branch currents and voltage drops across all resistors. [8+8]

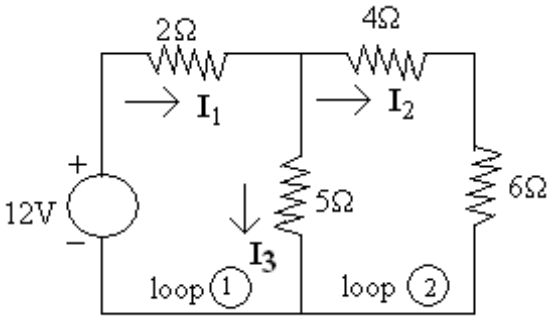

Figure 1:

2. (a) Explain clearly about the different methods of Excitation of D.C generators with suitable diagrams.
   (b) Write the necessity of Commutator and Brusher for operation of a D.C machine. [8+8]

3. (a) Explain about the working principle of transformer.
   (b) Clearly explain about core type Transformer and shell-type transformer. What are the main differences between them? [8+8]

4. (a) Define slip. Hence deduce the expression for Rotor induced e.m.f under running condition of a 3-ϕ Induction motor?
   (b) Write the Torque equation of An-Alternator and derive it? [8+8]

5. (a) Explain the operation of a full-wave rectifier with capacitor filter using neat circuit diagram and waveforms.
   (b) A 9V - 0 - 9V transformer secondary is used in a full-wave rectifier with capacitor filter. Determine the output D.C voltage and ripple factor if the load resistance and the capacitor are 1kΩ and 470μF respectively. Assuming the diodes to be ideal and the line frequency is 50Hz. Neglect the resistance of secondary winding of the transformer. [8+8]

6. (a) Draw the input and output characteristics of n-p-n transistor in common base configuration and explain how they are obtained?

   (b) In a fixed bias circuit using n-p-n transistor, find the operating point if V_{CC} = 24V, R_B = 220kΩ, R_C = 4.7kΩ. [10+6]

7. What are the techniques that are commonly used in the conversion of analog signal to digital one? Explain operation of any two of them with suitable block diagrams. [16]

8. (a) Describe various types of electric Arc welding processes. Explain why very frequencies should not be used for dielectric heating.

   (b) The power required for dielectric heating of a slab of resin of 150sq.cm in area and 2cm thick is 200W at a frequency of 30MHz. The material has relative permittivity of 5 and a power factor of 0.05. Determine the voltage necessary and current flowing through the material. If the voltage is limited to 600V, what will be the value of the frequency to obtain the same heating? [8+8]

⋆ ⋆ ⋆ ⋆ ⋆