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Code No: A109210303 **R09** **Set No. 2**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL AND ELECTRONICS ENGINEERING
Common to Civil Engineering, Mechanical Engineering, Production Engineering, Automobile Engineering

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain with neat diagrams for the general requirement of indicating instruments. [15]

2. (a) Explain the following:
   i. Practical current source
   ii. Practical voltage source.
   iii. KCL
   iv. KVL.
   (b) What is the voltage across the resistor diagram shown in figure 2b. [15]

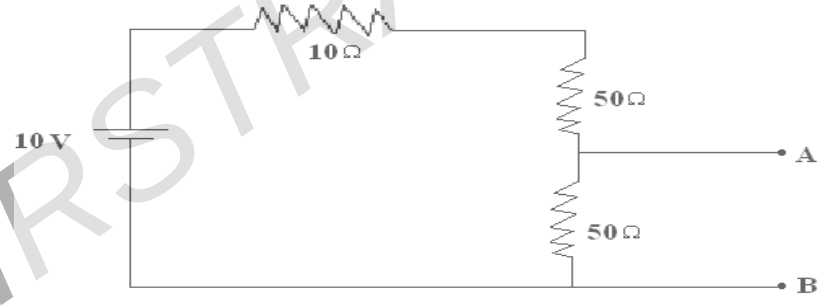

Figure 2b

3. Derive the emf equation for a single phase transformers and deduce Expression for transmission ratio in all oarametric forms. [15]

4. (a) What is Einstein relationship in a PN junction? Explain the formation of depletion region in a PN junction.
   (b) Calculate the conductivity of a pure Silicon at room temperature of 300^0K. Given that $n_i = 1.5 \times 10^{16}$ /m^3 μ_n= 0.13 m^2/V-s μ_p= 0.05 m^2/V-s and q =s 1.6×10^{-19} C. Now the silicon is doped 2 in 10^8 of a donor impurity. Calculate its conductivity if there are 5×10^{28} silicon atoms/m^3. By what factor does the conductivity increases? [15]

5. A 120 V DC shunt motor has an armature resistance of 0.2 ohms and a field resistance of 60 ohms. The full-load line current is 60A and full load speed is 1800 rpm. If the brush contact drop is 3V, find the speed of the motor at half load.[15]

6. (a) Why does an electron take a cycloidal path when it is exposed to perpendicular electric and magnetic fields?

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(b) Two parallel plates are kept a distance 12 mm apart. One plate is 800 V positive with respect to the other. An electron starts from rest from the negative plate. Find the distance traveled, time taken and the kinetic energy of the electron when it has acquired a speed of 5 $\times 10^6$ m/s. At this instant, the potential across the plates is suddenly removed. Find the total time of travel of the electron from the negative plate to the positive plate. [15]

7. For a P-N-P transistor biased in the active region, draw diagrams plotting for emitter, base and collector regions;

   (a) The potential variation

   (b) Minority carriers concentration. Explain the shape of these plots. [15]

8. The data obtained on 100 KVA, 1100V, 3-phase alternator is:
   DC resistance test: E between lines = 6V dc, I in lines = 10 A dc
   O.C test: field current = 12.5 A, Voltage between lines =420V
   SC test: field current = 12.5 A, line current = rated value.
   Calculate the voltage regulation of alternator at 0.8 power factor lagging. [15]

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Code No: A109210303 **R09** **Set No. 4**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL AND ELECTRONICS ENGINEERING
Common to Civil Engineering, Mechanical Engineering, Production Engineering, Automobile Engineering

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw the circuit diagram of an half wave rectifier and explain its operation.
   (b) Derive expressions for rectification efficiency, ripple factor, transformer utilisation factor, form factor and peak factor of an half wave rectifier with resistive load. [15]
2. (a) State the advantages and disadvantages of using short-pitch winding and distributed winding in alternator.
   (b) Deduce the relation between the number of poles, the frequency and the speed of rotation in alternator. [15]
3. (a) Explain the constructional details of single phase core type transformer.
   (b) Why is transformer core laminated?
   (c) Why does voltage drop in power transformer? [7+4+4]
4. Write short notes on the following:
   (a) Classification of DC generators with examples
   (b) Internal & External characteristics of DC generators
   (c) Self excitation mode of DC machine
   (d) Open circuit characteristics of a DC generator. [15]
5. (a) Explain the different methods of supporting the moving system in instruments.
   (b) Explain the advantages and disadvantages of different damping systems. [15]
6. (a) Write any four applications to CRO
   (b) Mention the source of electrons in a cathode ray tube. [15]
7. For the network shown in Figure 7, find the current i_x. [15]

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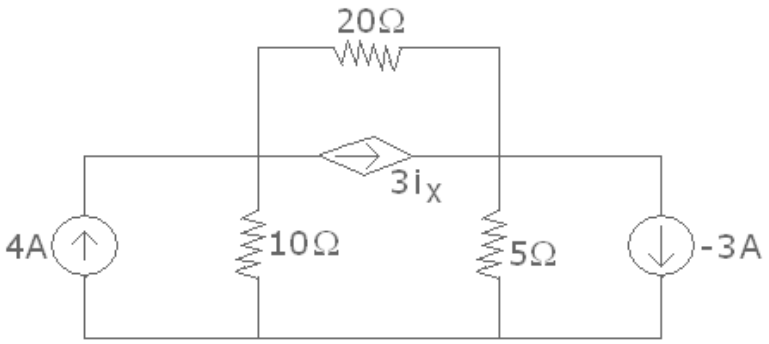

Figure 7

8. (a) Write the Ebers-Moll equations for a transistor.

   (b) Define the terms emitter efficiency and the base transport factor β^*. How are these related to transistor α? [15]

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Code No: A109210303 **R09** **Set No. 1**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL AND ELECTRONICS ENGINEERING
Common to Civil Engineering, Mechanical Engineering, Production Engineering, Automobile Engineering

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the different types of instruments with examples of each type. [15]
2. Explain with the help of a neat diagrams how a rotating magnetic field is produced in a 3-phase induction motor. [15]
3. (a) Determine the reactance of a 50 μF capacitor in a D.C supply and also in an A.C supply of 100Hz.
   (b) When three inductances of values L_1, L_2 and L_3 Henries are connected in parallel. Find its equivalent inductance. [15]
4. A 4-pole, long shunt, lap wound generator supplies 25 KW at a terminal voltage of 500 V. The armature resistance is 0.03 ohms, series field resistance is 0.04 ohms and shunt field resistance is 200 ohms. The brush drop may be taken as 1 V. determine:
   (a) the EMF generated
   (b) Cu -Losses & iron Losses
   (c) efficiency at Full Load. [15]
5. Draw diagrams indicating the biasing arrangements in P-N-P and N-P-N transistors working in active region. [15]
6. Derive expression for the magnetostatic deflection sensitivity of a Cathod Ray tube in terms of the length of the field, distance of the field from the fluorescent screen and final anode voltage. [15]
7. (a) Write equations showing the variation of reverse saturation current wth temperature for *Ge* diode and Si diode.
   (b) How does the diode voltage at constant current vary with temperature? [15]
8. The primary and secondary windings of a 500 KVA transformer has resistance of 0.42 ohms and 0.0011 ohms respectively. The primary and secondary voltages are 6600 V and 400 V respectively, and the iron loss is 2.9 KW. Calculate the efficiency at full load assuming the power factor of the load to be 0.8. [15]

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Code No: A109210303 **R09** **Set No. 3**

II B.Tech I Semester Examinations,November 2010
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Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. With a neat diagram explain the working of moving iron attraction type instrument. [15]

2. (a) What are the sources of heat in a power transformer?
   (b) What is the purpose of performing open-circuit test on a power transformer?
   (c) What is the purpose of performing short-circuit test on a power transformer? [15]

3. (a) What is a rectifier? Show that a PN diode works as rectifier.
   (b) Define the following terms,
      i. ripple factor,
      ii. peak inverse voltage,
      iii. efficiency,
      iv. transformer utilisation factor,
      v. form factor and
      vi. peak factor. [15]

4. (a) Discuss the motion of an electron in a magneto - static field when it enters with
      i. Zero initial velocity into the field
      ii. An initial velocity 'μ_0' parallel to the field.
      iii. An initial velocity 'μ_0' perpendicular to the field.
   (b) An electron enters the uniform magnetic field of flux density 10^3 wb/m^2 with a velocity of 10^8 m/sec normal to the field. Find the radius of the circular path of the electron. [15]

5. (a) Mention the factors on which the hysteresis loss and Eddy current loss in the armature of a DC machine depend. How can these losses be reduced?
   (b) Derive efficiency equation of a DC motor. [15]

6. Draw the circuit symbol of an N-P-N transistor and indicate the reference directions for the three currents in the transistor and also the reference polarities of the three voltages. [15]

7. A 3-phase, 4-pole, 50 Hz induction motor supplies a useful torque of 159 N-m. Calculate at 5 % slip,:

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(a) the rotor input,

(b) the motor input,

(c) the motor efficiency if friction and windage losses is 500 W and the stator losses equal to 1000 W. [15]

8. When a DC voltage is applied to a capacitor, the voltage across its terminals is found to build up in accordance with $V_C = 50(1\text{-}e^{-100t})$. After a lapse of 0.01 seconds, the current flow is equal to 2mA:

(a) Find the value of capacitance.

(b) How much energy is stored in the electric field by that time? [15]

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