Code No: R09222103 **R09** **Set No. 2**

II B.Tech II Semester Examinations,APRIL 2011
ELECTRICAL AND ELECTRONIC ENGINEERING
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain armature reaction in synchronous motors.
   (b) Name different methods of starting a synchronous motors. [7+8]
2. Explain the following:
   (a) Firing angle
   (b) Conduction angle of an SCR.
   (c) Once the SCR is triggered, the gate looses its control.
   (d) Equivalent circuit of SCR. [15]
3. Write short notes on the following:
   (a) Ideal transformer.
   (b) Transformation ratio.
   (c) Practical transformer.
   (d) Temparature control of transformers. [15]
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) 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. [9+6]
6. (a) List the advantages of gravity control over spring control.
   (b) List the different types of materials used in components of spring and gravity control. [7+8]

7. In a full-wave rectifier, the voltage applied to each diode is 240 sin (377t), the load resistance is $R_L = 2000\ \Omega$ and each diode has a forward resistance of 400Ω. Determine:

   (a) peak value of current,

   (b) D.C. value of current,

   (c) RMS value of current,

   (d) rectifier efficiency,

   (e) ripple factor and

   (f) output ripple frequency. [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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Code No: R09222103 **R09** **Set No. 4**

II B.Tech II Semester Examinations,APRIL 2011
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Aeronautical Engineering

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

Answer any FIVE Questions
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1. (a) Why is the shunt generator characteristic on load drooping and turns back as it is over loaded. What is meant by break point?
   (b) A 1500 KW,600 V,16 pole separately excited dc generator runs at 200 rpm .It has 2500 lap connected conductors and full load copper losses are 25 KW. Calculate the useful flux per pole and the generated voltage. [7+8]

2. Write short notes on the following:
   (a) V & I curves of synchronous motor
   (b) Main characteristics of a synchronous motor
   (c) Hunting
   (d) Damper windings. [15]

3. (a) Describe the action of PN junction diode under forward bias and reverse bias.
   (b) Explain V-I characteristics of a PN junction diode. [7+8]

4. (a) What are the special features of storage oscilloscopes?
   (b) An electron moving with initial velocity of 10^6 m/s enters an uniform magnetic field at an angle of 30^0 with it. Calculate the magnetic flux density required in order that the radius of helical path be 1m. Also, calculate the time taken by the electron for one revolution and the pitch of the helix. [7+8]

5. (a) When two capacitances of values C_1, C_2 Farads are connected in series. Find its equivalent capacitance.
   (b) Find the equivalent capacitance of the combination shown in figure 5b below across X - Y. [6+9]

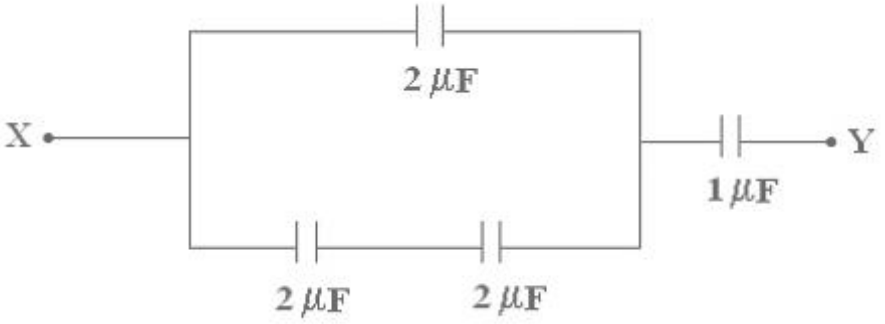

Figure 5b

6. (a) Derive the relationship between α and β.
   (b) Why does the CE Configuration provide large current amplification while the CC Configuration does not?
   (c) Draw the Input and Output characteristics of a transistor in CB configuration. [6+4+5]

7. (a) Prove that the spring control gives you a linear scale and gravity control of a cramped scale.
   (b) Derive the equation of deflecting torque in terms of inductance for a moving iron Instruments. [7+8]

8. (a) A 200KVA 1-ϕ transformer is in circuit continuously for 8 hours in a day, the load is 160 kW at 0.8 power factor for 6 hours, the load is 80kw at unity power factor and for the remaining period of 24 hours it runs on no-load. Full-load copper losses are 3.02 kW and the iron losses are 1.6 kW. Find all-day efficiency.
   (b) The maximum efficiency of a 100 KVA, single phase transformer is 98% and occurs at 80% of full load. If the leakage impedance of the transformer is 5%, find the voltage regulation at rated load of 0.8 power factor lagging & at 1/2 load 0.8 pf leading. [7+8]

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Aeronautical Engineering

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

Answer any FIVE Questions
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1. (a) Draw speed-torque characteristics of all types of dc motors. Mention industrial applications of each of these motors.
   (b) A 250 V dc shunt machine has line current of 80 A. It has armature and field resistances of 0.1 ohms and 125 ohms respectively. Calculate power developed in armature when running as
      i. Generator
      ii. Motor. [7+8]
2. (a) Trace the path of an electron entering a uniform magnetic field.
   (b) Derive expression for the electrostatic deflection sensitivity of a Cathod Ray Tube. [8+7]
3. (a) Explain the following terms :
      i. Absolute instruments
      ii. Secondary instruments.
   (b) i. Explain the different effects used in secondary instruments
      ii. The full scale torque of a 5 A moving iron ammeter is 9.8 $\times 10^6$ N-m. Estimate the rate of change of self inductance of the instrument at full scale. [7+8]
4. (a) With neat diagrams explain the voltage-current relationships for:
      i. Inductance and
      ii. Capacitance, and also give their energy Consumption.
   (b) Calculate the current I for the circuit in figure 4b. [7+8]

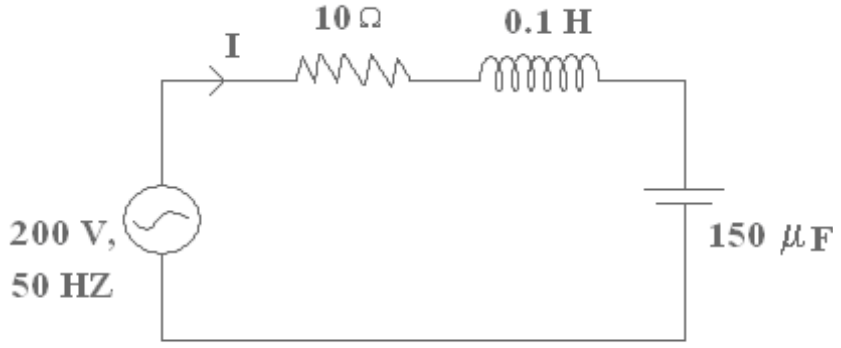

Figure 4b

5. (a) The effective resistance of a 2200 V, 50 Hz, 440 KVA, 3-phase alternator is 0.5 ohms on short circuit a field current of 40 amps gives the full load Current of 200 A. The emf on open circuit with the same excitation is 1160V.

   (b) Explain the emf method for finding the regulation of an Alternator. [7+8]

6. (a) 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.

   (b) Draw diagrams indicating the biasing arrangements in P-N-P and N-P-N transistors working in active region. [6+9]

7. In a bridge rectifier, the transformer is connected to 220 V, 60 Hz mains and the turns ratio of the step down transformer is 11:1. Assuming the diodes to be ideal, find

   (a) the voltage across the load,

   (b) I_{dc}. and

   (c) PIV. [15]

8. (a) Draw and explain no-load phasor diagram for a single phase Transformer.

   (b) A single phase transformer with 10:1 turn ratio and rated at 50 KVA, 2400/240 V, 50 Hz is used to step down the voltage of a distribution system. The low tension voltage is to be Kept constant at 240 V. Find the value of load impedance of the low tension side so that the transformer will be loaded fully. Find also the value of maximum flux inside the core if the low tension side has 23 turns. [7+8]

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Code No: R09222103 **R09** **Set No. 3**

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

Answer any FIVE Questions
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1. (a) Write down the similarities and dissimilarities between motors and generators in principle of operation & applications point of veiw.
   (b) The power input to a 230V dc shunt motor is 8477 KW. The field resistance is 230 ohms and armature resistance is 0.28 ohms. Find the input current, armature current and back EMF. [7+8]

2. Find the power loss across 5ohms resistor in figure 2. [15]

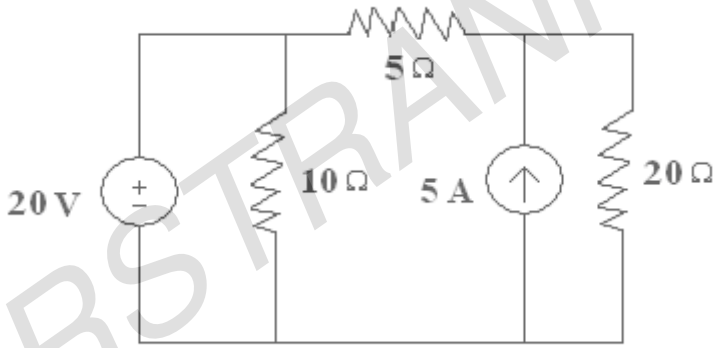

Figure 2

3. Explain the procedure for conducting OC and SC tests on a single phase transformer with neat diagrams & give the justification for each assumption. [15]

4. (a) Describe the method of electrostatic focusing in a cathode ray tube?
   (b) Write any four applications to CRO.
   (c) Mention the source of electrons in a cathode ray tube. [7+4+4]

5. (a) An ideal Ge P-N junction diode has at a temperature of 125^0C and reverse saturation current of 30 μA. Determine the dynamic resistance for 0.2V bias of forward bias.
   (b) Find the resistivity of intrinsic silicon at room temperature? [15]

6. (a) Explain Eddy current damping with neat diagram.
   (b) Derive the torque equation for induction type instruments. [7+8]

7. (a) Making use of the diagram showing the various electron and hole current components crossing each junction, obtain the expression for the collector current I_c. Define each symbol used in the expression,

(b) Generalize the expression for I_c so that it is valid for a transistor not operating in the active region. [7+8]

8. A 4-pole, 50 Hz induction motor has a full load slip of 5 %. Each rotor phase has a resistance of 0.3 ohms and a stand still reactance of 1.2 ohms. Find the ratio of the maximum torque to the full load torque and the speed at which the maximum torque occurs. [15]

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