Code No: R05222104

Set No. 1

II B.Tech II Semester Supplimentary Examinations, Aug/Sep 2008
ELECTRICAL AND ELECTRONICS ENGINEERING
(Aeronautical Engineering)
Time: 3 hours   Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Define Resistance & Energy. What is the role of resistance in an electric circuit?

   (b) Using series & parallel combinations for the electric network Figure 1b given below, calculate: [6+10]
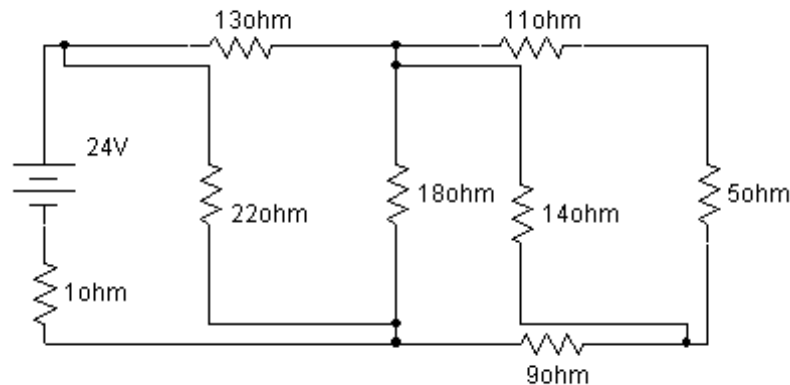

Figure 1b

   i. Current flowing in the branch with 22 Ω resistance
   ii. PD across branch with 22 Ω resistance.

2. (a) Derive the EMF equation of DC Generator.

   (b) An 8 pole DC generator has per pole flux of 40mWb and winding is connected in lap with 960 conductors. Calculate the generated EMF on open circuit when it runs at 400 rpm. If the armature is wave wound at what speed must the machine be driven to generate the same voltage.   [8+8]

3. (a) Explain the procedure for SC test of transformer.

   (b) A transformer when tested on full load is found to have a resistive drop of 1.7% & reactance drop of 3.8%. Calculate full load regulation at pf of 0.8 lagging & 0.9 leading.   [6+10]

4. With neat diagram explain the OC & SC tests conducted on an alternator to find the voltage regulation of an alternator.   [16]

5. (a) How can the range of Moving Iron voltmeter be extended?

(b) A 20V Moving Iron voltmeter has a resistance of 300Ω and an inductance of 0.12H. Assume that voltmeter reads correctly on dc. What will be the percentage error when the instrument is placed on 15V ac supply at 100Hz.

[8+8]

6. (a) Derive the expression for efficiency of a half-wave rectifier.

   (b) A diode has internal resistance $r_f = 40\ \Omega$ is used for HWR. If the applied voltage is V=100Sinωt and load resistance $R_L = 1k\ \Omega$, Find I_m, I_{dc}, I_{rms} , ac power input, dc power output, dc output voltage and efficiency of rectification.

[8+8]

7. (a) Explain transistor operation in CE configuration.

   (b) Derive the relation between α and β.

   (c) If for a transistor $\beta = 50$, find α. [8+4+4]

8. (a) Explain the measurement of frequency by

      i. using signal waveform
      ii. using lissajous figures

   (b) Explain the measurement of phase angle between two alternating voltages with the help of a neat sketch.

   (c) Draw the lissajous figures if [8+4+4]

      i. f_H / f_V = 4/1
      ii. f_H / f_V = 3/2.

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Set No. 2

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ELECTRICAL AND ELECTRONICS ENGINEERING
(Aeronautical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) State & explain the Kirchoff's Laws?

   (b) A resistance of 5 Ohm is connected to a 10 V supply. If this resistance increases the temperature of 1 liter of water in 10 minutes by 1^0C, how much time it will take to increase temperature of 2 liters of water by 1^0C, if voltage increased to 20 V. [6+10]

2. (a) Explain the operation of compound generator. What are the various types of compound generators.

   (b) A shunt generator delivers 200 A at a terminal voltage of 250 V. If the armature resistance is 0.1Ω and shunt resistance is 200 Ω calculate the generated EMF. [8+8]

3. (a) Explain why short circuit test is conducted on transformer. Give related calculations.

   (b) Obtain the equivalent circuit of a 200/400 V, 4 kVA transformer, referred to LV side; with following test data:
   OC test: 200 V, 0.8 A, 70 W (LV side)
   SC test: 20 V, 10 A, 60 W (HV side). [6+10]

4. (a) Explain the terms Slip, Slip speed, Rotor frequency, Rotor EMF.

   (b) A 3-Φ, 50 Hz slip ring IM gives a standstill open circuit voltage of 500 V between slip rings. Calculate the current and power factor at standstill when the per phase rotor winding resistance and inductance are 0.2 Ω & 0.04 H and slip rings are short circuited. Repeat the calculation when slip is 4 %. [8+8]

5. (a) How can the range of Moving Iron voltmeter be extended?

   (b) A 20V Moving Iron voltmeter has a resistance of 300Ω and an inductance of 0.12H. Assume that voltmeter reads correctly on dc. What will be the percentage error when the instrument is placed on 15V ac supply at 100Hz. [8+8]

6. (a) Define Peak Inverse voltage, d.c.forward resistance, a.c. forward resistance and reverse resistance in case of a diode.

   (b) Explain the phenomenon of avalanche breakdown and Zener breakdown that occur in a diode.

   (c) Draw the circuit arrangement of zener diode as a regulator. [4+8+4]

Set No. 2

7. (a) Explain the working of a SCR when
    i. gate is open
    ii. gate is positive wrt. cathode.

(b) Explain the V-I characteristics of an SCR showing the various regions. [8+8]

8. (a) Explain the measurement of frequency by
    i. using signal waveform
    ii. using lissajous figures

(b) An electrostatic cathode ray tube has a final anode voltage of 600V. The deflection plates are 5cm long and 1cm apart. The screen is at a distance of 20cm from the centre of plates. A voltage of 30V is applied to the deflection plates. Calculate [8+8]
    i. velocity of electron on reaching the field
    ii. acceleration due to deflection field.
    iii. deflection produced on the screen in cm and
    iv. deflection sensitivity in cm/V.

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Set No. 3

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(Aeronautical Engineering)

Time: 3 hours
Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) State & explain the Kirchoff's Laws?

   (b) A resistance of 5 Ohm is connected to a 10 V supply. If this resistance increases the temperature of 1 liter of water in 10 minutes by 1^0C, how much time it will take to increase temperature of 2 liters of water by 1^0C, if voltage increased to 20 V. [6+10]

2. (a) Obtain the torque equation of DC motor.

   (b) A 110 V shunt generator has a full load current of 100 A, shunt field resistance of 55 Ω and constant losses of 500 W. If full load efficiency is 88 %, find the armature resistance. Find the load current corresponding to maximum efficiency. [8+8]

3. (a) What is the transformer ratio? What is the importance of Transformer ratio? Obtain the transformer ratio from its basic equation.

   (b) A 50 kVA single phase transformer has 500 turns on the primary & 100 turns on the secondary. The primary connected to 2500 V, 50 Hz supply. Calculate the following: [6+10]
      i. The secondary voltage on open circuit.
      ii. The current flowing through the windings on full load.
      iii. The maximum value of flux.

4. (a) Explain various losses taking place in IM.

   (b) A 4-pole, 3-Φ, 50 Hz, IM supplies a useful torque of 160 Nm at 5 % slip. Calculate: rotor input, motor input, efficiency if friction & windage losses are 500 W and stator losses are 1000 W. [6+10]

5. (a) Classify the electrical measuring instruments according to their functions.

   (b) What are the different methods by which controlling torque is provided in indicating instruments? Explain one of the methods in detail with appropriate diagram. [8+8]

6. (a) Derive the expression for efficiency of a half-wave rectifier.

   (b) A diode has internal resistance rf = 40 Ω is used for HWR. If the applied voltage is V=100Sinωt and load resistance R_L = 1k Ω, Find I_m, I_{dc}, I_{rms} , ac power input, dc power output, dc output voltage and efficiency of rectification. [8+8]

7. (a) Explain transistor operation in CE configuration.

   (b) What are the different transistor biasing techniques? Explain the voltage divider bias circuit. [8+8]

8. (a) Explain the measurement of frequency by

       i. using signal waveform

       ii. using lissajous figures

   (b) An electrostatic cathode ray tube has a final anode voltage of 600V. The deflection plates are 5cm long and 1cm apart. The screen is at a distance of 20cm from the centre of plates. A voltage of 30V is applied to the deflection plates. Calculate [8+8]

       i. velocity of electron on reaching the field

       ii. acceleration due to deflection field.

       iii. deflection produced on the screen in cm and

       iv. deflection sensitivity in cm/V.

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$\boxed{\textbf{Set No. 4}}$

II B.Tech II Semester Supplimentary Examinations, Aug/Sep 2008
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Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) What are the different types of elements used in electrical circuit? Explain the importance of each of them.

   (b) From the basic definitions obtain the expression for power & Energy: [8+8]

2. (a) Explain the operation of DC motor.

   (b) A DC shunt generator has an induced voltage of 127 V. When the machine is on-load, the terminal voltage is 120 V. Find the load current, if the field resistance is 150 Ω and armature resistance is 0.02 Ω.   [8+8]

3. (a) Explain how efficiency can be calculated from OC & SC test data of transformer.

   (b) A 50 kVA, 3000/300 V, 50 Hz, single-phase transformer has the following winding resistances and leakage reactances:
   R_1=2.12Ω, R_1=0.011 Ω , X_1= 3.25 Ω , X_1= 0.41 Ω. Calculate the following:
   Equivalent resistance & reactance referred to HV side.   [8+8]

4. (a) Define synchronous impedance. What is role of synchronous impedance in operation of alternator? Explain how to find synchronous impedance from OC & SC test data.

   (b) A 500 kVA, 1100 V, 50 Hz star connected alternator has an effective impedance of 0.1 + j 1.5 Ω. Find the voltage regulation at full load and at a power factor of 0.8 leading.   [8+8]

5. (a) Classify the electrical measuring instruments according to their functions and give a brief explanation about each.

   (b) Explain the construction and working of a Permanent Magnet Moving Coil Instrument.   [8+8]

6. (a) Derive the expression for efficiency of a half-wave rectifier.

   (b) A HWR having a R_L = 1k Ω, rectifies an alternating voltage of 300V peak value and the diode has forward resistance of 100 Ω. Calculate   [8+8]

      i. peak, average , rms value of current
      ii. dc power output
      iii. ac input power
      iv. efficiency of rectifier.

7. (a) Explain transistor as an amplifier with a neat circuit diagram.

(b) What are the different transistor biasing techniques? Explain one of them in detail. [8+8]

8. (a) Explain the measurement of frequency by

    i. using signal waveform

    ii. using lissajous figures

(b) Explain the measurement of phase angle between two alternating voltages with the help of a neat sketch.

(c) Draw the lissajous figures if [8+4+4]

    i. $f_H / f_V = 4/1$

    ii. $f_H / f_V = 3/2$.

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