

II B.Tech I Semester Regular Examinations, November 2006
ELECTRICAL & ELECTRONICS ENGINEERING
(Automobile Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Give the formulae to convert star connected resistances into equivalent delta resistances.
- (b) Find R_{ab} across a-b terminals of the network shown in figure 1b [6+10]

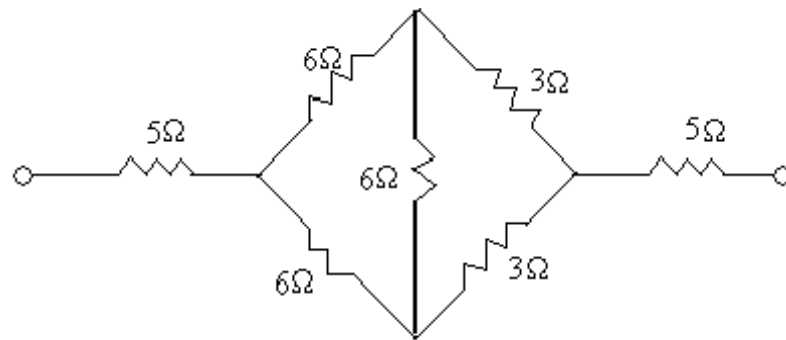


Figure 1b

2. (a) What is the necessity of a starter in a d.c. motor.
- (b) Explain the construction and working principle of 3 point starter. [6+10]
3. (a) Compare core type and shell type transformers from constructional aspects.
- (b) The efficiency of 500KVA 200/400v, 50Hz transformer is 98% at half full load 0.8 power factor and 98.5% at full load unity power factor .Determine
 - i. The core losses and
 - ii. full load copper losses of the transformer [6+10]
4. (a) Explain the principle of operation of a 3-phase induction motor.
- (b) Explain clearly with necessary circuit diagrams the tests to be conducted on a Three Phase alternator to determine the synchronous impedance of the machine [6+10]
5. (a) Explain clearly the methods commonly employed to produce controlling Torque in an indicating instrument. Bring out their relative merits and demerits.
- (b) Describe the working of a permanent magnet moving coil instrument with a neat sketch. Discuss the possible source of errors in such an instrument and indicate the methods to reduce these errors. [8+8]
6. (a) With neat sketch explain the working of center tap full wave rectifier?

- (b) In center tap full wave rectifier, the maximum voltage across half of secondary winding is 50V and load resistance is 200 ohms. Find the average load voltage and PIV ? Assume the diodes to be ideal. [8+8]
7. (a) Explain how an SCR is used to adjust the average power delivered to the load from an ac source.
- (b) In the Half wave power controller using SCR, the ac voltage of 120V-rms and load resistance of 40 ohms and 1V is dropped across the SCR, When it conducting. Find firing angle if it is desired to deliver an average current of 1A to the load. And also what is the average power delivered to the load under the above conditions. [8+8]
8. (a) How is the electron beam focused to a fine spot on the face of the cathode ray tube?
- (b) Why is an attenuator probe used for measurements with oscilloscope?
- (c) What is delayed sweep? Why it is used in oscilloscopes? [6+4+6]

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1. (a) Define the following:
 - i. potential
 - ii. potential difference
 - iii. EMF and
 - iv. Electrical power
- (b) Calculate the total current supplied by the battery as shown in figure 1b. Also calculate the current in each resistance. [8+8]

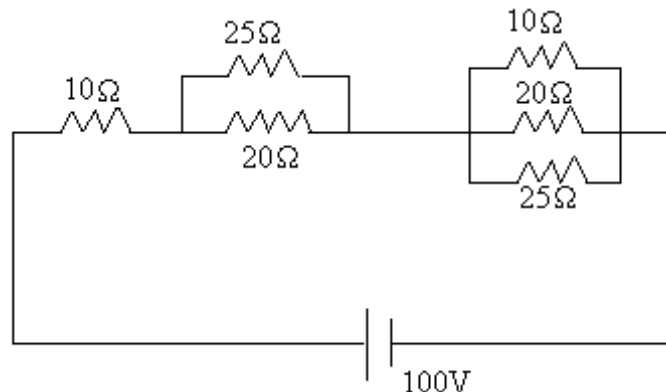


Figure 1b

2. (a) Give the constructional details of a 3 point starter used in a d.c. motor with a neat sketch.
- (b) A 250V d.c. shunt machine has line current of 80A. It has armature and field resistances of 0.1Ω and 125Ω respectively. Calculate the power developed in armature when running as motor. [8+8]
3. (a) Explain the working of a single Phase transformer
 - i. On no load and
 - ii. when supplying a lagging power factor load with relevant Phasor diagram.
- (b) A 40 KVA, single Phase has 250 Turns on the primary and 50 Turns on the seconding winding. The Primary winding is connected to 3000V, 50Hz mains. Calculate
 - i. Primary and Secondary currents on full load
 - ii. the secondary EMF
 - iii. max flux in the core. [8+8]

4. (a) Draw a neat sketch showing the various parts of a Synchronous Generator and Explain each part briefly.
(b) Explain why a 3 Phase induction motor can not run at Synchronous speed.
(c) A 3 Phase 50 Hz slip ring induction motor runs at 290 rpm at full load. Determine
 - i. the number of poles
 - ii. the slip at full load and
 - iii. frequency of rotor currents[6+4+6]
5. (a) Discuss the classification of electrical measuring instruments employed for measurement of current.
(b) Explain the significance of controlling torque and damping torque relevant to the Operation of indicating instruments?[6+10]
6. (a) Draw the symbol of diode and explain how the diode polarities are identified?
(b) Discuss the importance of peak inverse voltage in diode rectifier circuit.
(c) Give the reasons why the transformer is used in diode rectifiers. [6+6+4]
7. (a) Why the transistor named as Bipolar Junction type transistor?
(b) Draw and explain the circuit of biasing the npn transistor.
(c) The emitter current in a certain npn transistor is 8.4mA. If 0.8% of the minority carriers injected into the base recombine with holes and the leakage current is $0.1\mu\text{A}$, Find
 - i. the base current
 - ii. the collector current
 - iii. the exact value of α and
 - iv. the approximate value of α , neglecting I_{CBO} .[4+4+8]
8. (a) What are the major blocks of the oscilloscope, and explain each block.
(b) What precautions must be taken while measuring frequency with the oscilloscope?[8+8]

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1. (a) Give the volt-Ampere relationship for
 - i. inductance and
 - ii. capacitance.(b) Define
 - i. Inductance and
 - ii. capacitance(c) A coil consists of 750 turns and a current of 10A in the coil gives rise to a magnetic flux of 1.2 mwb. Calculate the inductance of the coil. If the current in the coil is reversed in 0.01 sec,. Determine the average voltage induced in the coil. [4+4+8]
2. (a) Explain the principle of operation of a d.c. generator? Also, give its constructional details.
(b) A 4 pole d.c. generator is delivering 20A to a load of $10\ \Omega$. If the armature resistance is $0.5\ \Omega$, and the shunt field resistance is $50\ \Omega$ calculate the induced e.m.f? Allow a drop of 1V per brush. [8+8]
3. (a) Explain the working of a single Phase transformer
 - i. On no load and
 - ii. when supplying a lagging power factor load with relevant Phasor diagram.(b) A 40 KVA, single Phase has 250 Turns on the primary and 50 Turns on the seconding winding. The Primary winding is connected to 3000V, 50Hz mains. Calculate
 - i. Primary and Secondary currents on full load
 - ii. the secondary EMF
 - iii. max flux in the core. [8+8]
4. (a) Draw a neat sketch showing the various parts of a Synchronous Generator and Explain each part briefly.
(b) Explain why a 3 Phase induction motor can not run at Synchronous speed.
(c) A 3 Phase 50 Hz slip ring induction motor runs at 290 rpm at full load. Determine
 - i. the number of poles
 - ii. the slip at full load and

- iii. frequency of rotor currents [6+4+6]
5. (a) Explain with a neat sketch the constructional details of a permanent magnet moving Coil instrument.
(b) Derive the expression for deflecting torque in the above type of instruments. [6+10]
6. (a) With neat sketch explain the working of center tap full wave rectifier?
(b) In center tap full wave rectifier, the maximum voltage across half of secondary winding is 50V and load resistance is 200 ohms. Find the average load voltage and PIV ? Assume the diodes to be ideal. [8+8]
7. (a) Why the transistor named as Bipolar Junction type transistor?
(b) Draw and explain the circuit of biasing the npn transistor.
(c) The emitter current in a certain npn transistor is 8.4mA. If 0.8% of the minority carriers injected into the base recombine with holes and the leakage current is $0.1\mu\text{A}$, Find
i. the base current
ii. the collector current
iii. the exact value of α and
iv. the approximate value of α , neglecting I_{CBO} . [4+4+8]
8. (a) How is the vertical axis of an oscilloscope deflected? How does this differ from the horizontal axis?
(b) In cathode ray tube, the length of the deflecting plates in the direction of the beam is 2 cm , the spacing of the plates is 0.5 cm and the distance of the fluorescent screen from the center of the plates is 18 cm. Calculating the deflection sensitivity in cm/volt, if the final anode voltage is 500 V. Derive the formulae used . [8+8]

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1. (a) State and explain Ohm's law?
- (b) Reduce the network shown in figure 1b to a single equivalent resistance placed across terminals A-B.

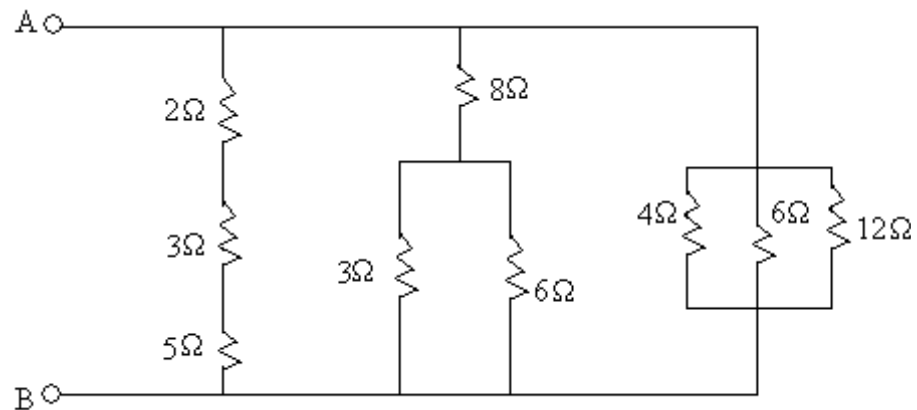


Figure 1b

Also calculate the total current if applied voltage is 100 volts across A-B terminals.

[6+10]

2. (a) Draw a neat sketch of a d.c. generator and label each part. State the function of each part.
- (b) A 4 pole d.c. generator with wave wound armature has 51 slots, each having 48 conductors. The flux per pole is 7.5 mwb. At what speed must the armature be driven to give an induced emf of 440V. [8+8]
3. (a) Explain clearly what you understand by voltage Regulation in a transformer. Derive an approximate expression for percentage voltage regulation in terms of its parameters.
- (b) A single Phase transformer has 400 primary and 1000 secondary Turns. The net cross sectional area of the core is 60cm^2 . If the primary winding is connected to a 50 Hz, 500 V supply, Calculate
 - i. The peak value of Flux density in the core and
 - ii. Voltage induced in secondary winding. [8+8]
4. (a) Draw a neat sketch showing the various parts of a Synchronous Generator and Explain each part briefly.

- (b) Explain why a 3 Phase induction motor can not run at Synchronous speed.
- (c) A 3 Phase 50 Hz slip ring induction motor runs at 290 rpm at full load. Determine
- i. the number of poles
 - ii. the slip at full load and
 - iii. frequency of rotor currents [6+4+6]
5. (a) Explain with a neat sketch the working of a repulsion type of moving iron Instrument?
- (b) Derive the expression for deflecting torque in the above type of M.I. instrument. [8+8]
6. (a) Draw and explain the V-I characteristics of a pn junction.
- (b) Discuss the rectifying action of the diode with some example. [8+8]
7. (a) Explain the construction and working of an SCR.
- (b) Give some applications of transistor amplifier in detail. [8+8]
8. (a) How is the electron beam focused to a fine spot on the face of the cathode ray tube?
- (b) Why is an attenuator probe used for measurements with oscilloscope?
- (c) What is delayed sweep? Why it is used in oscilloscopes? [6+4+6]

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