

II B. Tech I Semester Supplementary Examinations, September - 2014
ELECTRICAL TECHNOLOGY
(Com. to ECE, EIE, BME)

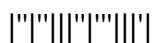
Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

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1. a) Explain the construction and operating principle of DC machine  
b) Explain the load characteristics of DC series generator and mention its applications?
2. a) Explain the working of 3-point starter with neat sketch.  
b) A 250 V DC motor takes 3 A at no load. If the armature and shunt field resistances are  $0.2 \Omega$  and  $110 \Omega$  respectively. Find the output power and efficiency, when motor taken 30A at full load.
3. a) Develop the equivalent circuit of a single phase transformer. What is the use of equivalent circuit?  
b) A 30 kVA, 2400/120V 50 Hz transformer has a high voltage winding resistance of  $0.1\Omega$  and a leakage reactance of  $0.22\Omega$ . The low voltage winding resistance is  $0.035\Omega$  and the leakage reactance is  $0.12\Omega$ . Find the equivalent winding resistance reactance and impedance referred to i) High voltage side ii) Low voltage side
4. a) Briefly explain about O.C and S.C tests on a single phase transformer.  
b) Explain various losses that occur in a transformer. How these are minimized.
5. a) Discuss torque-speed characteristics of 3-phase induction motor and derive expression for maximum torque and starting torque  
b) Write briefly about the different starting methods for a 3-phase induction motor.
6. a) Explain the constructional features and operation of an Alternator.  
b) Discuss synchronous impedance method to determine the regulation of alternator.
7. a) Explain the working principle of single-phase induction motor.  
b) Write short notes on AC servo motor and stepper motor.
8. a) Discuss the principle and working of moving coil instruments.  
b) Discuss the merits and demerits of MI and MC instruments.



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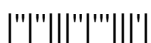
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1. a) Explain the Load characteristics of DC shunt and compound generators.
b) Derive the e.m.f equation of a DC machine.
2. a) Discuss various speed control methods for a DC shunt motor.
b) Explain the Swinburne's test to determine the efficiency of a DC shunt motor.
3. a) Explain the construction and principle of operation of a 1-phase transformer.
b) A 3300/230 V, 50 Hz, single phase transformer is built on a core having an effective cross sectional area 125 cm^2 and 70 turns on low voltage winding calculate:
i) the value of maximum flux density and ii) the number of turns on high voltage winding
4. a) Draw the circuit for no-load test of a transformer and explain the parameters calculated from no-load test.
b) Define the efficiency of a transformer. Derive the condition for maximum efficiency of a transformer.
5. a) Explain about the production of rotating magnetic field in 3-phase Induction motor.
b) Sketch and explain the slip-torque characteristics of 3-phase Induction motor.
6. a) Briefly discuss about distribution and coil span factors of an Alternator.
b) Explain how regulation of alternator is pre-determined by synchronous impedance method.
7. a) Explain the construction and working of shaded pole motor.
b) Draw and explain the characteristics of capacitor start and capacitor run motor.
8. a) Explain the construction and operation of moving iron type instruments.
b) Compare the working of M.I and M.C instruments.



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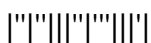
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1. a) Derive the e.m.f equation of a D.C Generator and discuss the factors affecting the generated e.m.f?  
b) A lap wound DC generator has an armature e.m.f of 100V, when the useful flux per pole is 20 m Wb, and the speed is 800rpm. Calculate the generated e.m.f (i) at the same flux and a speed of 1000 rpm and (ii) at the flux per pole of 24m Wb and a speed of 900 rpm.
2. a) Discuss various losses present in DC motor. How these are minimized.  
b) Explain performance characteristics of DC shunt motor.
3. a) Explain the phasor diagram for 1-phase transformer under loaded and unloaded conditions.  
b) A 250 kVA, 3500/250 V, 50 Hz single phase transformer has 90 turns on the secondary winding. Assuming an ideal transformer, calculate (i) primary and secondary currents at full load (ii) maximum value of flux and (iii) number of primary turns.
4. a) Define the voltage regulation of the transformer. Deduce the expression for the voltage regulation.  
b) Draw the circuit for short-circuit test of the transformer and explain the parameters calculated from S.C test?
5. a) Draw and explain torque speed characteristics of three phase induction motor? Explain the importance of the characteristics.  
b) Distinguish the constructional features of slip ring and squirrel cage induction motor?
6. a) Explain the types of alternators based on rotor construction?  
b) Derive the e.m.f equation of synchronous generator? Discuss the factors affecting the e.m.f.
7. a) Explain the operating principle of a single-phase induction motor.  
b) Draw and explain the characteristics of stepper motor and capacitor motor?
8. a) Explain the basic principle of indicating instruments.  
b) Discuss the working principle of moving iron type instrument.



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1. a) Discuss different types of DC generator and give their applications?
b) An 8-pole DC shunt generator has 778 wave connected armature conductors running at 500 rpm, supplied a load of 12.5Ω resistance at a terminal voltage of 250V. The armature resistance is 0.24Ω and the field resistance is 250Ω . Find out the armature current, the induced e.m.f and the flux per pole.
2. a) Discuss the Swinburne's test on DC shunt motor to determine the no-load loss?
b) Explain external characteristics of DC series generator?
3. a) Draw the approximate equivalent circuit of a transformer referred to the primary side and indicate how it differs from the exact equivalent circuit.
b) What is a transformer? Differentiate between step-up and step-down transformers.
4. a) Draw the circuit for open circuit and short circuit tests on a transformer and explain how parameters can be calculated from these tests?
b) In a no-load test of a single phase transformer, the following test data were obtained: primary voltage 220V; secondary voltage 110V; primary current 0.5A; power input 30W; find (i) The turns ratio (ii) The magnetizing component of no-load current (iii) The iron loss component of no-load current.
5. a) Explain the principle of operation of three phase squirrel cage induction motor.
b) Show that the voltage generated in the rotor circuit of a three-phase induction motor at any slip 's' is equal to 's' times the voltage generated at standstill.
6. a) Explain constructional details and working of an alternator?
b) Explain the procedure to conduct OC and SC tests to determine the regulation of alternator?
7. a) Draw and explain the characteristics of shaded pole motor?
b) Write short notes on AC servomotor and Synchronos?
8. a) Explain the principle and working of moving coil instrument.
b) Discuss the advantages and disadvantages of moving Iron instrument?

