Code No: RT21045 **R13** SET - 1

II B. Tech I Semester Regular Examinations, Jan - 2015
ELECTRICAL TECHNOLOGY
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) Differentiate between statically induced e.m.f and dynamically induced e.m.f
   b) What is meant by co-energy?
   c) What is back e.m.f?
   d) Draw the equivalent circuit of a transformer.
   e) What is slip and write its expression. How does the slip vary with load?
   f) List the applications of Induction motors.
   g) How the direction of rotation is reversed for capacitor start capacitor run motor?
   h) Write any 5 differences between single phase and three phase induction motors?
   (3M+2M+3M+3M+3M+2M+3M+3M)

PART-B

2. Show that the torque developed in doubly excited system is equal to the rate of increase of field energy with respect to displacement at constant current. (16M)

3. a) Explain constructional features and operation of a DC generator.
   b) Draw and explain the load characteristics of series, shunt and compound generators.
   (8M+8M)

4. a) Explain different speed control methods of DC motor.
   b) Describe how Swinburne's test is conducted on DC machine. State its advantages and disadvantages. (8M+8M)

5. A 7 kVA 200/1000 V, 50 Hz, single-phase transformer gave the following test results:
   O.C Test (L.V. Side): 2000 V, 1.2 A, 90 W
   S.C Test (H.V. Side): 50 V, 5 A, 110 W
   i) Calculate the parameters of the equivalent circuit referred to the L.V side.
   ii) Calculate the output secondary voltage when delivering 3 kW at 0.8 p.f. lagging, the input primary voltage being 200 V and also find the percentage regulation. (16M)

6. a) Obtain the condition for maximum torque under running condition in Induction motor.
   b) Describe construction and principle of operation of 3-phase squirrel cage induction motor.
   (8M+8M)

7. Explain the construction and operation of single phase induction motor. (16M)
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Code No: RT21045 **R13** SET - 2

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ELECTRICAL TECHNOLOGY
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Write the expression for energy in magnetic field.
   b) List out the types of DC generators.
   c) What is meant by brush voltage drop? What is its general value?
   d) What is a transformer? What is its function?
   e) Draw equivalent circuit of 3-phase induction motor on load.
   f) What is the effect of increasing air-gap length in an induction motor?
   g) Define slip and torque with respect to 3-phase induction motor?
   h) List out the applications of shaded pole motor. (3M+2M+3M+3M+3M+2M+3M+3M)

PART –B

2. Discuss briefly general analysis of electromechanical system, and derive an expression for the mechanical force developed in a current excited system (16M)

3. a) A 4-pole, long-shunt lap-wound generator supplies 25 kW at a terminal voltage of 500 V. The armature resistance is 0.03 ohm, series field resistance is 0.04 ohm and shunt field resistance is 200 ohm. The brush drop may be taken as 1.0 V. Determine the e.m.f. generated. Also calculate number of conductors if the speed is 1200 rpm and flux per pole is 0.02 Wb. Neglect armature reaction.
   b) How the DC generators are classified. Explain with neat circuit diagrams. (8M+8M)

4. a) Explain the flux and armature speed control methods of a DC motor and explain their merits and demerits.
   b) Draw different types of characteristics of a DC shunt motor and explain. (8M+8M)

5. a) Derive the expression for induced e.m.f in a transformer in terms of frequency, maximum value of flux and number of turns on the windings
   b) In a 20 kVA, 2000/200 V, single-phase transformer, the iron and full-load copper losses are 350 and 400 W respectively. Calculate the efficiency at unity power factor on (i) full load (ii) half full-load. (8M+8M)

6. Explain, in detail, various starting methods of induction motor. (16M)

7. a) Compare the operating characteristics of spit phase, capacitor start, and shaded pole motors.
   b) Explain the operation of AC servo motor. (8M+8M)

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Code No: RT21045 **R13** SET - 3

II B. Tech I Semester Regular Examinations, Jan - 2015
ELECTRICAL TECHNOLOGY
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) State the principle of electromechanical energy conversion.
   b) What is the working principle of DC Generator?
   c) List out different speed control methods. Which is the more popular method?
   d) How does a transformer transfer electrical energy from one circuit to another?
   e) Define regulation and efficiency of a transformer.
   f) Is Induction motor a self starting machine? What is the necessity for starting methods on it?
   g) List out the three applications of capacitor start Induction run motor
   h) What is AC servomotor? Give its applications.
   (3M+2M+3M+3M+3M+2M+3M+3M)

PART –B

2. Derive an expression for the magnetic force developed in a multiple-excited magnetic system. (16M)

3. a) Derive the emf equation of a generator.
   b) A 4-pole, lap-wound, DC shunt generator has a useful flux per pole of 0.07 Wb. The armature winding consists of 220 turns each of 0.004 Ω resistance. Calculate the terminal voltage when running at 900 r.p.m. if the armature current is 50 A. (8M+8M)

4. a) What are various losses in a DC machine? Explain each one in detail.
   b) A series motor whit an unsaturated magnetic circuit and 0.5 0hm total resistance when running at a certain speed takes 60 A at 500V. If the load torque varies as the cube of the speed. Calculate the resistance required to reduce the speed by 25%. (8M+8M)

5. a) Develop the equivalent circuit of a single phase transformer.
   b) Consider a 20 kVA, 2200/220 V, 50 Hz transformer. The O.C./S.C. test results are as follows :
   O.C. test : 220 V, 4.2 A, 148 W (1.v. side)
   S.C. test : 86 V, 10.5 A, 360 W (h.v. side)
   Determine regulation at 0.8 p.f. lagging and at full load. What is the p.f. on short-circuit? (8M+8M)

6. a) Draw and explain the slip-torque characteristics of a 3-phase induction motor.
   b) Explain the principle of operation of slip-ring induction motor. (8M+8M)

7. Describe the construction and principle of operation of shaded pole motor. (16M)
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Code No: RT21045 **R13** SET - 4

II B. Tech I Semester Regular Examinations, Jan - 2015
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Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) Write the energy balance equation in a electromechanical energy conversion system.
   b) Give the applications of DC generators
   c) How is speed of a DC motor reversed?
   d) Draw the phasor diagram of an ideal transformer.
   e) Write the expressions for starting and running torque of an induction motor.
   f) Draw a neat sketch of slip torque characteristics of 3-phase induction motor.
   g) Why short circuit test is conducted on HV side of a transformer?
   h) Write the applications of shaded pole motor. (3M+2M+3M+3M+3M+2M+3M+3M)

PART –B

2. For singly excited magnetic field system, derive the relation for the magnetic stored energy. (16M)
3. a) An 8 pole D.C shunt generator with 778 wave-connected armature conductors and running at 600 r.p.m supplies a load of 15 ohms resistance and at terminal voltage of 70 V. The armature resistance is 0.3 ohms and the field resistance is 260 ohms. Find the armature current the induced e.m.f and the flux per pole.
   b) Draw and explain magnetization characteristics of DC shunt and compound Generators. (8M+8M)
4. a) Draw and explain the performance characteristics of DC shunt motor.
   b) Swinburne test gave the following results on a de shunt motor: Supply voltage: 500 V, no load current: 5 A, Armature resistance: 0.5 ohms and Field resistance 250 ohms. Determine the efficiency of the machine (i) as a generator delivering 100 A at 500 V (ii) as a motor having a line current of 100 A at 500 V. Neglect temperature rise during operation. Assume stray losses at 1 % of output. (8M+8M)

5. a) Derive the condition for maximum efficiency in a transformer
   b) A 4 kVA, 200/400 V, single-phase transformer takes 0.7 A and 65 W on Open circuit. When the low-voltage winding is short-circuited and 15 V is applied to the high-voltage terminals, the current and power are 10 A and 75 W respectively. Calculate the full-load efficiency at unity power factor and full-load regulation at 0.80 power-factor lagging (8M+8M)

6. a) Explain the various schemes of starting squirrel cage induction motor.
   b) If the e.m.f. in the stator of an 8-pole induction motor has a frequency of 50 Hz and that in the rotor 1.5 Hz, at what speed is the motor running and what is the slip?
   c) A 12 pole, 3-phase alternator is coupled to an engine running at 500 rpm. It supplies an induction motor which has a full load speed of 1 440 rpm. Find the percentage slip and the no. of poles of the motor. (8M+8M)

7. Explain why the starting torque of a capacitor start induction run motor is better that that if a resistance start induction run motor (16M)
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