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

II B. Tech I Semester Regular Examinations, Dec - 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) Define Co – energy. (4M)
   b) Explain the process of commutation in a DC Machine (4M)
   c) What are the limitations of Swinburne's test. (4M)
   d) What are the two components of core losses that occur in a single phase transformers? How these are related to frequency. (4M)
   e) What is meant by slip in an Induction motor. (3M)
   f) Why single phase induction motor is not self-starting. (3M)

PART –B

2. a) Explain briefly the principle of energy conversion. (8M)
   b) Explain with the help of a neat block diagram about an electromechanical energy conversion device. (8M)

3. a) Derive an emf equation of a DC Generator (8M)
   b) The armature of a 4 – pole Shunt Motor has a lap winding accommodated in 60 slots, each containing 20 conductors. If the useful flux per pole is 23 m Wb, Calculate the Total torque developed when the armature current is 50 A. (8M)

4. a) Explain various speed control methods of a DC motor. (8M)
   b) A 10 KW, 220 V DC Shunt motor draws a line current of 5.2 A while running at no = load speed of 1200 rpm from a 220 V DC supply. It has an armature resistance of 0.25 Ω and a field resistance of 165 Ω. Calculate the efficiency of the motor when it delivers rated load. (8M)

5. a) Explain the transformer operation on Load(lagging) with a neat vector diagram (8M)
   b) Obtain the approximate equivalent circuit of a given 200/2000 V single phase 30 KVA transformer having the following results: (8M)
   OC Test: 200 V,6.2 A,360 W on l.v side
   SC Test : 75 V,18A,600 W on h.v.side

6. a) Explain the constructional details and operation of a three phase induction motor. (8M)
   b) An induction motor having 8- poles runs at 50 Hz supply. If it operates at full load at 720 rpm, calculate the slip. (8M)

7. a) Explain the operation of a shaded pole motor. (8M)
   b) Explain the operation and construction of single phase induction motor (8M)
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Code No: RT21045 **R13** SET - 2

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Time: 3 hours Max. Marks: 70

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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 principle of electromagnetic energy conversion. (4M)
   b) What is the function of brushes and yoke in a DC generator. (4M)
   c) List the applications of DC Shunt motor and DC Series Motor (3M)
   d) Explain the differences between the core type and shell type transformer (4M)
   e) Write the difference between slip ring and squirrel case induction motors. (4M)
   f) Write the principle of shaded pole motor. (3M)

PART –B

2. Explain the (i) singly excited system (ii) Multi – excited system. (16M)

3. a) Explain the magnetization and load characteristics of a DC generator. (8M)
   b) A Shunt generator delivers 50 KW at 250 V and 400 rpm. The armature and field resistances are 0.02 Ω and 50 Ω respectively. Determine the speed of the machine running as a shunt motor and taking 50 KW input at 250 V. Allow 1V per brush for contact drop. (8M)

4. a) Discuss the various losses in a DC motor. (8M)
   b) Explain the various characteristics of DC motor. (8M)

5. a) Explain the constructional details and principle of operation of a single phase transformer (8M)
   b) Derive the condition for the maximum efficiency of a single phase transformer (8M)

6. a) Draw and explain the phasor diagram of a transformer at no-load and loaded condition. (8M)
   b) A 6 pole, 50 Hz, three phase induction motor running on full load with 3 % slip develops a torque of 160 N-m at its pulley rim. The friction and windage losses are 210 W and the stator copper and iron losses equal to 1640 W. Calculate i) Rotor output ii)Rotor copper loss and iii) Efficiency at full load. (8M)

7. a) Explain cross field theory of Single phase Induction motor (8M)
   b) Explain the principle of operation and characteristics of AC servomotor. (8M)
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Code No: RT21045 **R13** SET - 3

II B. Tech I Semester Regular Examinations, Dec - 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) Write the energy balance equation in a electromechanical energy conversion systems. (4M)
   b) What are different types of DC generators? (4M)
   c) Why starter is necessary for a DC Motor (4M)
   d) Explain different losses that occur in transformer (3M)
   e) Define slip and explain its effect on a three phase induction motor (4M)
   f) Write the principle of servomotor. (3M)

PART –B

2. Explain the principle of Energy conversion. From a consideration of the various energies involved, develop the model of an electromechanical energy conversion device (16M)

3. a) Derive emf equation of a DC generator. (8M)
   b) A shunt generator has an induced voltage on open circuit of 127 V. When the machine is on load the terminal voltage is 120 V. Find the load current if the field circuit resistance be 15 Ω and the armature resistance 0.02 Ω. Ignore armature reaction. (8M)

4. a) Explain Swinburne's test to pre determine the efficiency of a DC motor. (8M)
   b) A 250 V dc Shunt motor has an armature resistance of 0.55 Ω and runs at 1200 rpm, when the armature current is 80 A. If the torque remains unchanged, find the speed and armature current when the field is strengthened by 25 % (8M)

5. a) Derive the emf equation of a single phase transformer (8M)
   b) A 3300/220 V, 30 KVA, single phase transformer takes a no - load current of 1.5 A when the low voltage winding is kept open. The iron loss component is equal to 0.4 A. Find: i) No-load input Power. ii) Magnetizing component and power factor of no-load current (8M)

6. a) Explain the torque – slip characteristics of a three phase induction motor (8M)
   b) A 3 – phase, 6-pole, 50 Hz induction motor has a slip of 1% at no – load and 3% at full load. Find: i) Synchronous Speed ii) No-Load speed iii) Full- load speed iv) Frequency of rotor current at stand still and v) frequency of rotor current at full load. (8M)

7. Write a short note on (i) shaded pole motor (ii) AC servo motor. (16M)
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Code No: RT21045 **R13** SET - 4

II B. Tech I Semester Regular Examinations, Dec - 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) Define force and torque in a magnetic field. (3M)
   b) What is the principle of DC generator. (4M)
   c) What is the difference between field and armature voltage speed control methods. (4M)
   d) Explain Voltage regulation of a transformer (3M)
   e) Explain on what factors does the starting torque depends in a three phase induction motor (4M)
   f) Explain in brief about AC Servo motor. (4M)

PART –B

2. a) For a singly excited magnetic field system, derive the relation for the magnetic stored energy (8M)
   b) Explain briefly about Faradays laws of electromagnetic induction (8M)

3. a) Explain the construction of a DC Machine and explain each part of it in detail (8M)
   b) A shunt machine connected to 250 V mains has an armature resistance (including brushes) of 0.12Ω and the resistance of the field circuit is 100 Ω. Find the ratio of speed as a generator to the speed as a motor, the line current in each case being 80A. (8M)

4. a) Explain the principle of operation of a DC motor (8M)
   b) The back emf of shunt motor is 230 V, the field resistance is 165 Ω and field current is 1.52 A. If the line current is 37 A, find the armature resistance. Also find the armature current when the motor is stationary. (8M)

5. a) Explain the open circuit and short circuit test on a single phase transformer (8M)
   b) 3300/300 V single phase 300 KVA transformer has 1100 primary turns. Find: i) Transformation ratio ii) Secondary Turns iii) Voltage per turn iv) Secondary current when it supplies a load of 200 KW at 0.8 Power factor lagging. (8M)

6. a) Explain the different starting methods of three phase induction motor. (8M)
   b) A three phase induction motor has 2 poles and is connected to 400 V, 50 Hz supply. Calculate the actual rotor speed and rotor frequency when the slip is 4% (8M)

7. a) Explain double revolving field theory of single phase induction motor (8M)
   b) Explain with a neat circuit diagram about a shaded pole induction motor. (8M)

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