

**B.Tech. (Sem.III) (Main/Back) Examination-2014**  
**Electrical Engineering**  
**3EE5 Electrical Machines-I**

Time : 3 Hours]

[Total Marks : 80  
 [Min. Passing Marks : 24

**Instructions to Candidates :**

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

**UNIT - I**

1. (a) The length of air - core coil is 25cm and has a cross sectional area of 4 cm<sup>2</sup>. The coil is wound by 65 turns. Determine the inductance of the coil. (4)
- (b) Briefly explain the physical phenomenon involved in energy conversion. (12)

**OR**

1. (a) A conductor carries a current of 150A. The length of the conductor is 2m and is placed in a magnetic field whose magnetic flux density is 0.35T. Determine the force. (4)
- (b) Discuss the energy stored in magnetic field in detail. (12)

**UNIT - II**

2. (a) A shunt generator of terminal voltage 220V delivers a current of 250A to the load. The shunt field and armature resistance are 50Ω and 0.02Ω respectively. Calculate the generated voltage. (6)
- (b) Draw the various characteristics of shunt and series DC generators. (10)

**OR**

2. (a) A 6 pole lap-wound dc generator has 600 conductors in its armature. The flux per pole is 0.05 wb. Calculate generated voltage when the speed of the generator is 1000 rpm. Also find the electromagnetic torque if the generator supplies a current of 120A. (4)
- (b) How we can improve the commutation by different methods in DC generators explain it. (12)

**UNIT - III**

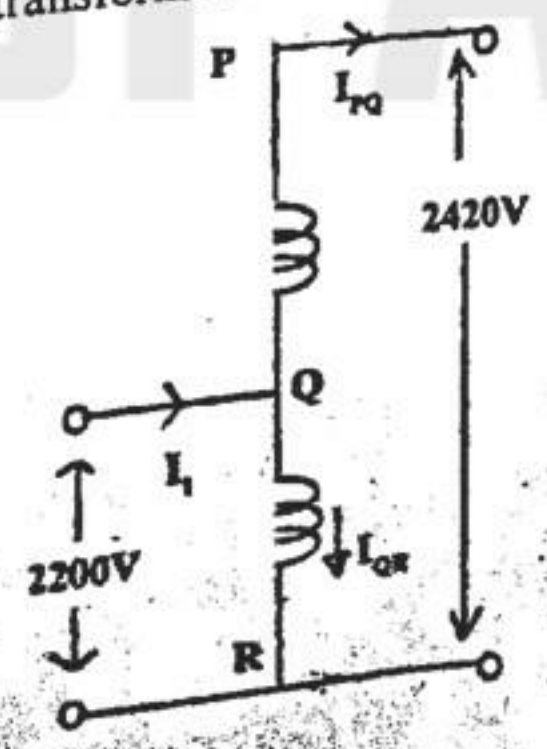
3. (a) A shunt motor takes a total current of 20A from 250V supply. The shunt field and armature resistance are 200Ω and 0.3Ω respectively. Determine the
  - (i) Value of back emf and (8)
  - (ii) Mechanical power developed in the motor armature. (8)
- (b) Elaborate the swinburne test with neat circuit diagram. (8)

**OR**

3. (a) A shunt motor has an armature circuit resistance of 0.7Ω and applied voltage 240V. The no-load and full load armature current is 5A and 30A respectively. Determine the change in back emf from no load to full load. (6)
- (b) Explain the different electric braking techniques for DC motor. (10)

**UNIT - IV**

4. (a) A single-phase 120KVA, 2200/220V transformer is connected as an autotransformer which is shown in figure. At the secondary, more than 2200V is obtained as an output. The upper portion coil voltage is 220V and lower portion coil voltage is 2200V. Find out the KVA rating of the autotransformer.



(b) What is welding transformer?

OR

4. (a) Two transformer of 200KVA and 20KVA are connected in parallel and having the impedances of  $Z_1 = 2 + j3\Omega$  and  $Z_2 = 1.5 + j4\Omega$ . Determine the load shared by each when the total load of 120kW at 0.6 power factor lagging.
- (b) How the losses can be separate for the transformer?

UNIT-V

5. (a) With neat circuit diagram, explain the open delta connection in poly phase transformer.
- (b) Briefly explain the magnetizing harmonic currents and their effects in transformer.

OR

5. (a) Explain the Scott connection with proper circuit diagram.
- (b) Write short note on inrush of magnetizing current in poly phase transformer.

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