International Islamic University Chittagong

Department of Computer Science and Engineering

Final Examination, Autumn-2018 Program: B.Sc. in CSE
Course Code: EEE- 3507 Course Title: Electrical Drives
Time: 2 hour 30 minutes Full Marks: 50

Group-A

[Answer any ***two*** questions from the followings]

1(a) Explain the working principle of an alternator in details. **4**
(b) Write short note on voltage regulation of alternator. **2**
(c) A 60-KVA, 220V, 50-Hz, single phase alternator has effective armature resistance of 0.016 ohm and an armature leakage reactance of 0.07 ohm. Compute the voltage induced in the armature when the armature is delivering rated current at a load power factor of (i) unity (ii) 0.7 lagging and (iii))0.7 leading. **4**

2(a) What is the basic difference between generator and motor? **2**
(b) Write down the working principle of DC motor. **4**
(c) A d.c. motor takes an armature current of 110A at 480 V. The armature circuit resistance is 0.2 ohm. The machine has 6-poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate (i) the speed and (ii) the gross torque developed by the armature. **4**

3(a) Explain the speed Regulation of D.C motor. **2**
(b) Explain the torque and armature current (Ta/Ia) characteristics of series motor. Speed and armature current (N/Ia) characteristics of shunt motor with proper diagram. **3**
(c) A 100-kVA, 3000V, 50 Hz, 3 phase star connected alternator has effective resistance of 0.2 ohm. The field current of 40A produces short-circuit current of 200A and open circuit emf of 1040 V (line value). Calculate full load voltage regulation at 0.8 pf lagging and 0.8 pf leading. Draw phasor diagrams. **5**

Group-B

[Answer any ***three*** questions from the followings]

4(a) Write down the losses of D.C generator. **2**
(b) Explain the working principle of D.C generator. **4**
(c) A 4-pole, d.c. shunt generator with a shunt field resistance of 100 ohm and an armature resistance of 1 ohm has 378 wave connected conductors in its armature. The flux per pole is 0.02 Wb. If a load resistance of 10 Ohm is connected across the armature terminals and the generator is driven al 1000 r.p.m., Calculate the power absorbed by the load. **4**

5(a) Explain the working principle of a stepper motor. **4**
(b) Write down the applications of stepper motors **3**
(c) A stepper motor has a step angle of 2.5°. Determine (i) resolution (ii) number of steps required for the shaft to make 2 revolutions and (iii) shaft speed , if the stepping frequency is 3600 pps **3**

6(a) Why does rotor rotes? **3**
(b) Write down the classification of Rotor. Which one is mostly used and why? **3**
(c) A 480-V, 60-Hz, 50- hp three-phase induction motor is drawing 60A at 0.85 PF lagging. The stator copper losses are 2 kW, and the rotor copper losses are 700 W. The friction and windage losses are 600 W, the core losses are 1800 W, and the stray losses are negligible. Find: **4**
i) The air gap power
ii) The power converted
iii) The output power
iv) The efficiency of the motor.

7(a) Explain the operating principle of an induction motor. **4**
(b) Write down the applications of a stepper motor. Write a short note on the step angle of a stepper motor. **3**
(c) Draw the power flow diagram of an induction motor. **3**