SE311

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S.E. Mechanical (Sem-III) (Revised Course 2016-2017)
EXAMINATION Nov/Dec 2019
Electrical Technology

[Duration : Three Hours] **[Total Marks : 100]**

Instructions:
1) Answer any two Questions from Part-A.
2) Answer any two Questions from Part-B
3) Answer any one Question from Part-C
4) Assume suitable additional data if necessary

Part- A

1.
a. Describe the principle of operation of a DC motor. **(7)**
b. Explain the operation of a Hybrid stepper motor. **(7)**
c. A 3-phase 4-pole, 440V , 50Hz, Induction motor runs with a slip of 4%. Find the rotor speed and frequency of the rotor current. **(6)**
Explain the significance of slip in an Induction motor.

2.
a. With neat sketches, briefly describe the constructional features of the following basic type of Synchros: (i) Control Transmitter, (ii) Control receiver, (iii) Control differential **(9)**
b. In a 100V, short shunt compound generator, the resistances of the armature, series field and shunt field windings are 0.06Ω, 25Ω and 0.04Ω respectively. The load consists of 200 lamps each rated at 55W, 110V. Find the generated emf and the armature current. **(6)**
c. Distinguish between squirrel cage rotor and wound rotor of 3-phase induction motor. **(5)**

3.
a. Explain the construction and operation of a DC Servomotor. Draw its Torque-speed characteristics. **(6)**
b. With the help of a neat sketch explain the operation of four point starter for a DC motor. **(7)**
c. A 4 pole, 220V, lap connected DC shunt motor has 36 slots, each slot containing 16 conductors. It draws a current of 40A from the supply. The field and armature resistances are 110Ω and 0.1Ω respectively. The motor develops an output power of 6KW. The flux per pole is 40m Wb. Calculate: (i) the speed, (ii) the torque developed by the armature and (iii) the shaft torque. **(7)**

Part-B

4.
a. A single phase energy meter has a constant of 1500rev/KWh. If 8 lamps of 100W, 6 fans of 60W and 2 heaters of 1000 W, operate for one hour, the disc makes 4500 revolutions. Find out, whether the meter reads correctly. If not, find the percentage error. **(6)**
b. Explain the counter-current braking and dynamic braking of DC Series motor. **(7)**
c. Describe the construction and working of an OFF delay time relay. **(7)**

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5.

a. Explain the construction and working of Bimetallic overcurrent relay. **(6)**

b. Draw the block diagram of an ELCB and explain its working. Mention its application. **(8)**

c. Draw a neat block diagram of resistance welding set. Explain each component along with their function. **(6)**

6.

a. With the help of a neat sketch, explain the construction and working of Permanent magnet moving coil type instrument. Mention its advantages. **(10)**

b. Explain the working principle of (i) Dielectric heating and (ii) indirect Resistance heating. Mention their advantages and applications. **(10)**

Part-C

7.

a. A three phase, 6 pole, 50Hz, Induction motor produces a useful torque of 200Mn. The frequency of rotor emf is 2Hz. Calculate : (i) the motor output, (ii) rotor copper loss and (iii) efficiency at full load, if the mechanical losses are equivalent to a torque of 20Nm and stator losses are 1000W. **(8)**

b. Compare the Speed-current characteristics of a DC shunt motor and DC series motor. Give justification. **(7)**

c. Write a short note of Electric Arc welding. **(5)**

8.

a. With the help of a neat circuit diagram explain the working of a capacitor-start capacitor-run split phase induction motor. Draw its Torque-speed characteristics. **(7)**

b. Describe the four quadrant operation of a Hoist drive with the help of its torque speed characteristics. **(7)**

c. Explain the construction and working of electromagnetic contactors. **(6)**

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