PB3708

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S.E. (Robotics and Automation Engineering)
INDUSTRIAL ELECTRONICS AND ELECTRICAL TECHNOLOGY
(2019 Pattern) (Semester - III) (211501)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:
1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data, if necessary.*
5) *Use of non-programmable calculator is allowed.*

Q1) a) Draw interfacing diagram of temperature sensor (LM35) with ArduinoAtmega 328P. Output of LM35 is connected to Arduino analog input pin number A2. **[4]**

    b) Explain the concept of PWM with waveform. **[6]**

    c) Draw and explain interfacing of strain gauge with Arduino Atmega 328P. Write its algorithm. **[8]**

OR

Q2) a) What is ADC? Write features of ADC in AtMega 328P microcontroller.**[4]**

    b) Explain following functions used in ADC **[6]**

      i) analogRead() function;

      ii) analog Write() function;

      iii) analogReference() function

    c) Draw and explain interfacing of LVDT with Arduino Atmega 328P. Write its algorithm. **[8]**

Q3) a) Draw and explain Speed-Armature current characteristics for DC series motor. **[4]**

    b) Derive the torque equation of DC motor. **[6]**

    c) Explain construction of DC generator along with its neat diagram. **[7]**

OR

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Q4) a) Draw and explain Torque-Armature current characteristics for DC series motor. **[4]**

b) Explain the following types of DC motors with the neat diagram. **[6]**

   i) DC Series Motor;

   ii) DC Shunt motor.

c) Explain the armature resistance control method used for controlling the speed of the DC motor. Explain with neat diagram. What are the drawbacks of that method? **[7]**

Q5) a) Explain power stages in three phase induction motor. **[4]**

b) A 6 pole, 50 Hz, 3-phase induction motor running at full load with 5% slip develops a torque of 155 N-m at the shaft. The friction and windage losses are 250 W, and stator iron losses amounts to 1600W. **[6]**

   Calculate

   i) Output Power;

   ii) Rotor Copper loss;

   iii) Efficiency at full load.

c) Explain working, principle of three-phase induction motor along with the neat diagram. **[8]**

OR

Q6) a) Draw and explain Torque-slip characteristics for three phase induction motor. **[4]**

b) The power input to the 550 V, 50 Hz, 6 pole, 3 phase induction motor running at 970 rpm is 45 kW. The stator losses are 1 kW and windage loss are 2 kW. **[6]**

   Calculate

   i) Slip;

   ii) Rotor copper loss;

   iii) Efficiency of motor.

c) What is the need of the starter? Explain the star-delta starter used to start three phase induction motor, with the neat sketch. **[8]**

Q7) a) Compare AC series and DC series motor in detail. **[4]**

b) Draw neat sketch of Universal motor and explain its working. **[6]**

c) Explain the construction and working of the permanent magnet stepper motor with neat diagram. **[7]**

OR

Q8) a) Write down two applications of the following motors. **[4]**

i) Stepper motor;

ii) BLDC motor.

b) Draw the sketch of shaded pole induction motor and explain its working.**[6]**

c) Explain construction and working of Linear Induction Motor with neat sketch. **[7]**

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