SEAT No. :

[Total No. Of Pages : 3

[5925]-342

S.E. (Robotics and Automation)
Industrial Electronics and Electrical Technology
(2019 Pattern) (211501) (Semester - III)

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 additional data, if necessary.*
5) *Use of non-programmable calculator is allowed.*

Q1) a) Draw and explain the interfacing of Atmega 328P microcontroller with the temperature sensor (LM35). **[6]**

b) Draw and explain the interfacing diagram of Atmega 328P microcontroller to control the operation of DC motor using PWM. **[6]**

c) What is accelerometer? Explain how does it works, mention its types.**[6]**

OR

Q2) a) Explain in detail the concept of ADC in Atmega 328P based Arduino board. **[6]**

b) Draw interfacing circuit diagram of LVDT to Atmega 328P microcontroller and explain the algorithm for the interfacing. **[6]**

c) Explain the concept of PWM in detail. What is duty cycle of the signal? What will be duty cycle of pulse with period of 10m sec, which will remain on for 2 m sec. **[6]**

Q3) a) Explain with a neat sketch. the construction of a DC motor. **[6]**

b) Draw and explain following characteristics of DC motor. **[6]**

    i)   Torque - Armature current characteristics (T Vs I_a)

    ii)   Speed - Armature current characteristics (N Vs I_a)

    iii) Speed - Torque characteristics (N Vs T)

c) A 4 pole, 250 V, DC series motor has a wave-connected armature with 220 conductors. The flux per pole is 25 m Wb when motor is drawing 50 A from the supply. Armature resistance is 0.20 Ω while series field winding resistance is 0.25 Ω Calculate speed under this condition. **[5]**

OR

Q4) a) Explain construction and working of three-point starter along with its sketch. **[6]**

b) Explain any two methods of speed control of DC shunt motor. **[6]**

c) A 240 V, DC shunt motor takes a line current of 15 A. Resistance of shunt field winding is 150 Ω and resistance of armature is 0.3 Ω. Find the armature current and back emf. **[5]**

Q5) a) Derive the torque equation of three-phase induction motor. **[6]**

b) Sketch and explain typical torque-slip characteristics of three-phase induction motor. **[6]**

c) The power input to the rotor of 440 V, 50Hz, 6 pole, 3-phase induction motor is 60 kW. The motor electromotive force is observed to make 100 complete alterations per minute. Calculate i) Slip; ii) rotor speed; iii) rotor copper loss per phase. **[6]**

OR

Q6) a) Compare the squirrel cage and wound rotor induction motor in detail.

[6]

b) A 400 V,4 pole, 3 phase and 50 Hz star connected induction motor has a rotor resistance and reactance per phase equal to 0.02 Ω and 0.2 Ω respectively.Determine i) Starting torque; ii) Slip at which maximum torque will occur; iii) Speed at which maximum torque will occur; iv) Maximum torque; v) Full load slip. Assume stator to rotor turns as 4.

[6]

c) Enlist the different speed control methods of three-phase induction motor. Explain v/f speed control method in detail with suitable diagram or characteristics.

[6]

Q7) a) Explain construction and working of Brush less DC motor (BLDC) with neat sketch.

[6]

b) Explain construction and working of linear induction motor (LIM) with neat sketch.

[6]

c) Explain the construction and working of Universal motor with neat sketch.

[5]

OR

Q8) a) Explain construction and working of stepper motor with neat sketch.**[6]**

b) Explain the construction and working of shaded pole induction motor with neat sketch.

[6]

c) Compare ac series and dc series motor in detail.

[5]

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