Total No. of Questions : 8]

SEAT No. :

PE-4342

[Total No. of Pages : 3

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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 Q1 or Q2; Q3 or Q4; Q.5 or Q.6; Q.7or Q.8***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assum suitable additional data, if necessary.***
5) ***Use of a non-programmable calculator is allowed.***

Q1) a) Explain the concept of ADC in ATmega 328P-based Arduino board. **[4]**

b) What is the duty cycle in case of Pulse Width Modulation (PWM)? Explain the meaning of following instruction related to PWM. **[6]**

i) analog Write (3, 127)

ii) analogWrite (3, 0)

iii) analogWrite (3, 255)

iv) analogWrite (3, 191)

c) What is the function of LM35? Explain its interfacing with the Arduino board with the help of the interfacing diagram. **[8]**

OR

Q2) a) Draw the interfacing circuit showing the DC motor interface with Arduino. **[4]**

b) Draw and explain the interfacing of the Accelerometer with Arduino ATmega 328P. Write its algorithm. **[6]**

c) Draw the interfacing diagram of LVDT to the Arduino board and explain its algorithm for interfacing. **[8]**

P.T.O.

Q3) a) Write down any two applications of the DC series and the DC shunt motors. **[3]**

b) Derive the expression for the armature torque developed in the DC motor. **[6]**

c) Explain Field Control Method applied to vary the speed of the DC shunt motor along with its diagram. **[8]**

OR

Q4) a) What is the use of the starter in the case of the operation of a DC motor? Draw the diagram of a three-point starter with labelling. **[3]**

b) Explain the working principle of the D.C. generator with diagrammatic representation. **[6]**

c) Draw and explain the characteristics of DC shunt motors, along with their explanation. **[8]**

Q5) a) Distinguish between squirrel cage and slip ring induction motors. **[4]**

b) The power input to 500V, 50 Hz, 6 poles three-phase induction motor running at 975 rpm is 40kW. The stator losses are 1 kW and friction and Windage losses are 2 kW. Calculate Slip, Rotor Copper Loss, and Efficiency of the Motor. **[6]**

c) Derive the generalized equation for torque developed in a three-phase induction motor and draw the torque-slip characteristic curve. **[8]**

OR

Q6) a) Write any four industrial applications of the three-phase induction motor. **[4]**

b) Explain the power stages in the three-phase induction motor along with its formulae and diagram. **[6]**

c) Explain the operation of the autotransformer starter used for three-phase induction motor with the help of a neat schematic. **[8]**

Q7) a) Match the pair suggesting a suitable motor amongst Stepper motor / Linear induction motor / Universal motor/ Servomotor for the following applications. **[3]**

Sr. No.	Type of the Motor	Applications
1.	It is used to start, move and also stop the conveyor belts	Stepper Motor
2.	It is used in table fans, hairdryers and grinders	Linear induction motor
3.	Automatic sliding doors in electric trains.	Universal motor
4.	Used in tape drives, floppy disc drives, printers and electric watches.	Servomotor

b) Describe the constructional details and operation of the capacitor start capacitor run induction motor with the help of diagrams. **[6]**

c) Explain the construction and working principle of the universal motor. Draw its diagram. Give its two applications. **[8]**

OR

Q8) a) Give the point of difference between the AC series and DC series motor. Write any four valid points. **[3]**

b) Explain the construction and working principle of the AC and DC servomotor with the help of a suitable diagram. **[6]**

c) Explain the construction and working of the shaded pole induction motor with the help of suitable diagrams. Mention any two applications. **[8]**

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