

Total No. of Questions—8]

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Seat No.

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S.E. (Mechanical, Mech. Sandwich & Auto.)

(Second Semester) EXAMINATION, 2019

ELECTRICAL AND ELECTRONICS ENGINEERING

(2015 PATTERN)

Time : Two Hours

Maximum Marks : 50

N.B. :— (i) Attempt question Nos. 1 or 2, 3 or 4, 5 or 6, 7 or 8.

(ii) Neat diagrams must be drawn wherever necessary.

(iii) Figures to the right indicate full marks.

(iv) Assume suitable data, if necessary.

1. (a) A 250 V DC shunt motor runs at 1000 rpm at no load and takes 8 A. The armature and shunt field resistances are 0.2 Ohm and 250 Ohm respectively. Calculate the speed of motor while taking 50 A current from supply under certain load. Assume the flux and brush contact drops to be constant. [6]
- (b) Derive the generalized equation for torque developed in a three phase induction motor and draw the torque-slip characteristic curve. [7]

P.T.O.

Or

2. (a) Explain Field Control Method applied to vary speed of DC shunt and series motors. [6]
 - (b) The power input to a 500V, 50 Hz, 6-pole, 3-phase induction motor running at 975 rpm is 40 kW. The stator losses are 1 kW and the friction-windage losses are 2 kW. Calculate :
 - (i) Slip
 - (ii) Rotor copper loss
 - (iii) Shaft output
 - (iv) Efficiency of motor. [7]
3. (a) Suggest suitable motor amongst Stepper motor / Linear induction motor / Universal motor for the following applications :
 - (1) Aircraft launching system
 - (2) Floppy disk drives
 - (3) Vacuum cleaner
 - (4) Watches
 - (5) Coffee grinder
 - (6) Automatic sliding doors in malls. [6]

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- (b) The bit pattern of the status register after the execution of most recent instruction is found to be :

1 0 1 0 0 1 1

Answer the following questions with reference to the above bit pattern :

- (1) What is the meaning of each bit in the bit pattern of a status register ?
- (2) What is the present status of the interrupt enable from the above bit pattern ?
- (3) How many bits in this register are flag bits ? Which of the flags are found to be set from the above bit pattern of the status register ? [6]

Or

4. (a) Explain construction and working of shaded pole induction motor with the help of suitable diagrams. Mention its any two applications. [6]
- (b) Distinguish between a microcontroller and a microprocessor considering significant features. [6]

5. (a) Explain the following Arduino functions used for serial communication :

- (i) Serial.begin()
- (ii) Serial.end()
- (iii) Serial.available()

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P.T.O.

- (b) Draw and explain the interfacing of an LED with Arduino board. Write an algorithm to blink an LED. [6]

Or

6. (a) Draw the schematic showing general purpose Arduino Board. [6]
- (b) Draw the interfacing diagram of LCD with Arduino board. Also write basic algorithm used for this interfacing. [6]

7. (a) Draw a neat schematic showing the interfacing of temperature sensor LM 35 with Atmega 328P based Arduino board. The output of LM 35 is connected to analog pin A4 of the Arduino board. [6]

What is the operating temperature range of LM 35 ?

What is typical accuracy of LM 35 over its full operating temperature range ?

What is the output voltage of LM 35 per degree Celsius temperature ? [6]

- (b) Draw the schematic showing the interfacing of Atmega based Arduino board to a DC motor using a Transistor, acting as a switch and connected to pin 9. [6]

What is duty cycle ?

What are the numbers that represent 25% and 50% duty cycle in Atmega 328P based Arduino board ? Draw the waveform corresponding to these duty cycles. [7]

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8. (a) Explain in brief the following functions along with syntax for the same : [6]

(i) `analogRead()`

(ii) `analogWrite()`

(iii) `analogReference()`.

(b) What is the principle of operation of strain gauge ? Draw a neat diagram showing the interfacing of strain gauge with Atmega 328P based Arduino board given that output voltage from strain gauge after signal conditioning is connected to analog pin 0 of Arduino board.

Write algorithmic steps to display strain on serial monitor. [7]