

# DEPARTMENT OF MECHANICAL ENGINEERING

## QUESTION BANK

### UNIT NO. 1 - D. C. Machines

**SUBJECT: ELECTRONICS AND ELECTRICAL ENGINEERING (203152)**

**COURSE : SE ( 2015 Pattern)**

### THEORY QUESTIONS

- |      |  |   |
|------|--|---|
| Q.1  | Distinguish between squirrel cage and slip ring induction motors   | 6 |
| Q.2  | Why is starter required for d.c. motor? Discuss the working of three point starter with the help of neat schematic | 6 |
| Q.3  | Explain the working of three point starter for DC shunt motor with the help of neat schematic.                     | 6 |
| Q.4  | State methods of speed control of DC shunt and series motors. Explain any two methods in each case.                | 6 |
| Q.5  | Define the following DC motor terms: A) Field B) Armature C) Commutator D) Brush                                   | 6 |
| Q.6  | Derive emf equation of dc generator  | 6 |
| Q.7  | Derive torque equation of dc motor   | 6 |
| Q.8  | Explain any two method of speed control of dc shunt motor.   | 6 |
| Q.9  | Explain the principle of operation of dc machine as a generator.   | 6 |
| Q.10 | Sketch the neat construction diagram of dc machine list the various parts stating the fun                          | 6 |
| Q.11 | Draw and explain electrical and mechanical characteristics of dc shunt motor.                                      | 6 |
| Q.12 | State application of following dc machine a) Dc series motor b) Dc shunt Motor                                     | 6 |
| Q.13 | Why dc series motor is never started on no load?   | 6 |

### NUMERICALS

- |      |   |   |
|------|---|---|
| Q.14 | A 230V DC shunt motor has armature resistance of 0.2 Ohm and field resistance of 115 Ohm. It runs at 1500 rpm and draws a current of 50 A on full load. Calculate its speed at half load condition.   | 6 |
| Q.15 | A 230 V, 4 pole, lap, wound d.c. shunt motor take no-load current of 4 A when running at 1200 rpm. The resistance of armature winding is 0.1 ohm and shunt field winding is 115 ohm. Total brush contact drop is 2 volt, if it takes current of 60 A on full load, calculate its full load speed. Assume that flux gets weakened by 5 % on full load condition due to armature reaction.                              | 6 |
| Q.16 | A 250 V DC shunt motor has armature resistance of 0.25Ω. It takes armature current of 50 A while running at 750 rpm on certain load. If the flux on the motor is reduced by 10% without changing the load torque, find the new speed of motor.  | 6 |
| Q.17 | A 220 V DC series DC series motor takes 40 A while running at 700 rpm. Calculate current taken from supply and the speed at which the motor will run if the field is shunted by a resistance equal to field resistance and the load torque is increased by 50%. Given: armature resistance is 0.15 Ohm, field resistance is 0.1 Ohm, flux per pole is proportional to the field current prior to magnetic saturation. | 6 |

## DEPARTMENT OF MECHANICAL ENGINEERING

### QUESTION BANK

#### UNIT NO. 2 - Three Phase Induction Motors

SUBJECT: ELECTRONICS AND ELECTRICAL ENGINEERING (203152)

COURSE : SE ( 2015 Pattern)

#### THEORY QUESTIONS

- |      |   |   |
|------|---|---|
| Q.1  | Explain construction of three phase induction motor.  | 6 |
| Q.2  | Explain difference between squirrel cage rotor and slip ring rotor for three phase induction motor.                   | 6 |
| Q.3  | Explain working principle of three phase induction motor.   | 6 |
| Q.4  | Explain effect of slip on following rotor parameter : a)Frequency b) Induced emf c)Current d)Power factor e)Reactance | 6 |
| Q.5  | Explain induction motor as generalized transformer  | 6 |
| Q.6  | Derive torque equation for 3 phase induction motor.   | 6 |
| Q.7  | Obtain condition for maximum torque for three phase induction motor. State equation for maximum torque.               | 6 |
| Q.8  | Explain torque slip characteristics of induction motor.   | 6 |
| Q.9  | State the various losses taking place in induction motor.   | 6 |
| Q.10 | Explain power flow diagram of an induction motor.   | 6 |
| Q.11 | Explain necessity of starter for three phase induction motor.   | 6 |
| Q.12 | Write note on rotor resistance starter.   | 6 |
| Q.13 | Write note on speed control of 3 phase induction motor.   | 6 |

#### NUMERICALS

- |      |  |   |
|------|--|---|
| Q.14 | A 4 pole ,3 phase,50 Hz, star connected induction motor has full load slip of 4 % .Calculate full load speed of the motor.   | 6 |
| Q.15 | 3 phase ,2500 V, 20 pole, 50 Hz induction motor runs at 296 rpm on full load. It's rotor resistance per phase is 0.02 Ohm and standstill rotor leakage reactance per phase is 0.3 Ohm. Calculate the ratio of full load torque to maximum torque.  | 6 |
| Q.16 | A 50 Hz, 8 pole, 3 phase induction motor has full load slip of 4%. The rotor resistance is 0.001 ohm/phase and standstill reactance is 0.005 ohm/phase. Find i) the ratio of maximum torque to full load torque ii) the speed at which maximum torque occurs.  | 6 |
| Q.17 | A 3 phase induction motor running at full load with 4% slip develops a torque of 149.3 N-m at a shaft. The friction and windage losses are 200 W and the stator copper and iron losses are amounts to 1620 W . Calculate<br>a) output power<br>b) rotor copper losses<br>c) efficiency at full load, | 6 |

**DEPARTMENT OF MECHANICAL ENGINEERING**  
**QUESTION BANK**

**UNIT NO. 3 - Special Purpose Motors**

**SUBJECT: ELECTRONICS AND ELECTRICAL ENGINEERING (203152)**

**COURSE : SE ( 2015 Pattern)**

**THEORY QUESTIONS**

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|------|--|---|
| Q.1  | Explain construction and working principle of stepper motor.         | 6 |
| Q.2  | Write a short note on universal motor.                               | 6 |
| Q.3  | Differentiate between AC series motor and dc series motor.           | 6 |
| Q.4  | State types of single phase induction motor and explain any one.     | 6 |
| Q.5  | Explain construction and working of shaded pole induction motor.     | 6 |
| Q.6  | Write down application of brushless dc motor.                        | 6 |
| Q.7  | What is servomotor?  | 6 |
| Q.8  | Explain construction and working of AC series motor.                 | 6 |
| Q.9  | Draw and explain characteristics of stepper motor.                   | 6 |
| Q.10 | Write a note on linear induction motor.                              | 6 |
| Q.11 | How does universal motor works?                                      | 6 |
| Q.12 | What are advantages of brushless dc motor and give its applications? | 6 |
| Q.13 | Write note on split phase induction motor.                           | 6 |
| Q.14 | Sketch and explain characteristics of AC series motor?               | 6 |
| Q.15 | Why AC series motor called as universal motor?                       | 6 |

**NUMERICALS**

- |      |   |   |
|------|---|---|
| Q.16 | The pole pitch of linear induction motor is 0.5 m & frequency of 3 ph voltage is 60 Hz The speed of primary side of motor is 200 km/hour and developed thrust is 100 kN calculate developed power by the moter and copper loss in secondary side. | 6 |
|------|---|---|

**DEPARTMENT OF MECHANICAL ENGINEERING**  
**QUESTION BANK**

**UNIT NO. 4 - Introduction to Microcontrollers**

**SUBJECT: ELECTRONICS AND ELECTRICAL ENGINEERING (203152)**

**COURSE : SE ( 2015 Pattern)**

**THEORY QUESTIONS**

Q.1	What is Role of Arduino in embedded system?	6
Q.2	What is an embedded system? What aspects must be considered in the design of an embedded system	6
Q.3	Compare Microprocessor and Microcontroller.	6
Q.4	What is difference between Arduino and 8051 Microcontroller	6
Q.5	Write short note on vector algebra method.	6
Q.6	What are advantages of Arduino	6
Q.7	Describe in your own words the Arduino open source concept	6
Q.8	Write Features of Atmega 328P	6
Q.9	Draw and Explain Architecture of Atmega 328P	6
Q.10	Sketch a block diagram of the ATmega328 and its associated systems. Describe the function of each system.	6
Q.11	Explain Port Structure of Atmega 328P.	6
Q.12	Explain software development tool used to develop Arduino based Project	6
Q.13	Describe the steps in writing a sketch and executing it on an Arduino processing board	6
Q.14	Which IDE is used to develop Arduino based Project.	6
Q.15	What is an include file, what are the three pieces of code required for a program function?	6
Q.16	Describe the key portions of a C program.	6
Q.17	Describe how to define a program constant.	6
Q.18	What is the difference between for and while loop	6
Q.19	What is Arduino? How to program it.	6
Q.20	Explain following programming concept with respect to arduino IDE a) Variables b) Functions c) conditional statement	6
Q.20	Explain following data types used in arduino programming: bit, byte, int, and char.	6
Q.20	Explain following with application and examples, a)sensors b)actuators	6

# DEPARTMENT OF MECHANICAL ENGINEERING

## QUESTION BANK

### UNIT NO. 5 - Peripheral Interface-1

SUBJECT: ELECTRONICS AND ELECTRICAL ENGINEERING (203152)

COURSE : SE ( 2015 Pattern)

#### THEORY QUESTIONS

Q.1	How General purpose Input Outputs (GPIO) are used in Arduino IDE.	6
Q.2	Describe the three different register types associated with each port	7
Q.3	Explain following functions used to handle GPIO,	6
	a) pinMode()      b) digitalWrite()    c) digitalRead()	6
Q.4	Provide the C program statement (sketch) to set PORTB pins 1 and 7 to logic one.	6
Q.5	Provide the C program statement (sketch) to reset PORTB pins 1 and 7 to logic zero	6
Q.6	Summarize the differences between parallel and serial communication.	6
Q.7	What is difference between Asynchronous and synchronous communication?	6
Q.8	Explain serial communication protocol.	7
Q.9	Explain following Arduino functions used for serial communication.	8
	a)Serial.begin()   b)Serial.end()    c)Serial.available() d)Serial.read() e)Serial.Write    f)Serial.print()   f)Serial.println()    g) Serial.flush()	
Q.10	What is Baud Rate; explain its significance in serial communication.	4
Q.11	How many timers are present in Atmega 328P.in which mode these timer works.	6
Q.12	Write applications of Timer.	2
Q.13	Write and explain functions used in Arduino to generate delay.	6
Q.14	What is LCD? Explain in detail, with its applications.	6
Q.15	Explain LCD functions:-	8
	a. lcd.begin(numCols, numRows);	1
	b. lcd.setCursor(colNumber, rowNumber);	1
	c. lcd.print(Data to be displayed);	1
	d. lcd.clear();	1
	e. lcd.blink(); & lcd.noBlink();	1
	f. lcd.display(); & lcd.noDisplay ();	1
	g. lcd.scrollDisplayLeft();	1
	h.lcd.scrollDisplayRight();	6
Q.16	Draw Interfacing circuit diagram of Arduino Board & LCD, Write basic Arduino algorithm used for this interfacing.	6
Q.17	Explain functions used to interface Arduino Board & LCD.	6
Q.18	Draw Interfacing circuit diagram of Arduino Board, LCD & KEYPAD, Write basic Arduino algorithm used for this interfacing.	7
Q.19	Explain getKey() functions used to interface Arduino Board & KEYPAD.	4
Q.20	Write algorithm to interface keypad and Arduino.	6

**DEPARTMENT OF MECHANICAL ENGINEERING**  
**QUESTION BANK**

**UNIT NO. 6 - Peripheral Interface-2**

**SUBJECT: ELECTRONICS AND ELECTRICAL ENGINEERING (203152)**

**COURSE : SE ( 2015 Pattern)**

**THEORY QUESTIONS**

Q.1	What is data acquisition system. Draw and explain block diagram & write examples.	6
Q.2	What is ADC, Explain features of Atmega 328P based Arduino board ADC.	6
Q.3	Which type of ADC is present on Atmega 328P.(successive approximation).	6
Q.4	Explain Resolution of ADC, pins of Atmega 328P based Arduino board ADC.	6
Q.5	Explain following function used to handle Arduino board ADC, analogRead().	6
Q.6	Write c program statement (sketch) to read analog value on pin 3 and display value on LCD.	7
Q.7	What is LM 35 .Draw Diagram to interface LM35 with Arduino Board.	6
Q.8	Write algorithm to interface LM35 with Arduino Board. Display temp. Value on LCD.	7
Q.9	What is PWM, role of PWM in electronics?	6
Q.10	Explain PWM function: analogWrite().	4
Q.11	Which pins are used for PWM in arduino, How to control DC motor using PWM module.	6
Q.12	Write c program statement to control intensity of LED using PWM.	6
Q.13	Draw interfacing diagram and Write algorithm to interface DC motor to arduino.	6
Q.14	Which driver IC is required to interface DC motor to Arduino board, Explain.	6
Q.15	Explain working principle of following: LVDT, strain gauge, accelerometer	6
Q.16	Write applications of :LVDT, strain gauge, accelerometer	6
Q.17	Which signal conditioning circuit is used for LVDT interface with arduino?	6
Q.18	Explain signal conditioning circuit used with strain guage.(Wheatstone bridge)	6
Q.19	Design sketch for Accelerometer.	6
Q.20	What is Load cell, Draw and explain block diagram to interface load cell with Atmega 328P based Arduino board	7