

M. Sc.-II (Semester -IV) Question Bank.
ELECTRONICS

**MET401:-ARM Programming and Embedded Communication
Protocols.**

2 marks questions

1. Define exceptions.
2. Give list of data transfer instructions.
3. What are branch instructions?
4. What is stack?
5. Define software interrupts.
6. Enlist of software interrupts.
7. What is MUL instruction?
8. Define data types.
9. Define data processing instruction.
10. Define I2c Communication protocol.
11. Draw neat labeled diagram of I2C protocol.
12. Define address mechanism in I2C protocol.
13. Give some specification of I2C protocol.
14. Give some applications of I2C protocol.
15. Define SPI communication protocol.
16. Draw labeled diagram of SPI protocol.
17. Give some characteristics of SPI protocol.
18. Give some applications of SPI protocol.
19. Define RTC.
20. Define inter system protocol.
21. Define intra system protocol.
22. Define CAN Protocol?
23. Define extended format of frame.
24. Define differential signal.
25. Define bit monitoring mechanism.
26. Give list of digital temperature sensors.
27. Define EEPROM.
28. Define single wire protocol.
29. What are types of bus signals?
30. Draw labeled diagram of USART.

4 marks Questions

1. Explain data processing instructions with examples.
2. Write short note on barrel shifter.
3. Write short note on logical instructions.
4. Explain supported data types for high level languages.
5. Discuss arithmetic instructions with examples.
6. Write short note on stack operation.
7. Explain supported conditional statements and loops for HLL.
8. Explain different multiply instructions with examples.
9. Comparison between I2C and SPI protocol.
10. Write short note on characteristics of I2C protocol.
11. Discuss bus signals in I2C protocol.
12. Why CAN is the message-oriented protocol?
13. How many Types of CAN frame exist?
14. Write short note on I2C protocol with neat labeled diagram
15. Comparison between SPI and CAN protocol.
16. Write specification of SPI protocol.
17. Explain master slave configuration of SPI protocol.
18. Write short note on SPI protocol with neat labeled diagram.
19. Write short note on 1-wire technology.
20. Give Application of CAN?
21. Draw neat diagram of standard format of CAN frame and explain each block.
22. Write short note on error handling mechanism.
23. Explain extended addressing mode in CAN protocol.
24. Write short note on data frame.
25. Write specification of CAN protocol.
26. Write short note on UART protocol.
27. Write short note on EEPROM,RTC.
28. What is the difference between standard CAN and Extended CAN?
29. Draw labeled diagram of SD card interfacing using SPI protocol.
30. Explain multiply instructions SMUL,UMLAL,UMULL.
31. Explain data transfer instructions.
32. Explain conditional statements in high level language.
33. Explain loops in high level language.
34. Draw neat interfacing diagram of RTC with controller using SPI.
35. Draw neat interfacing diagram of EEPROM with controller using I2C.

36. Write short note on Master configuration in SPI protocol.
37. Write short note on slave configuration of I2C protocol.
38. Draw neat interfacing diagram of ADC with controller using SPI.
39. What is the Standard CAN Frame Formats?
40. What is the Basic Principle of CAN Protocol?
41. Explain the types of CAN error? Which concept is used behind bit error detection?
42. What are the 4 logic signals specified by the SPI bus?
43. What is the role of the shift register in Master and Slave devices in SPI?
44. Explain the physical layer of the I2C protocol
- 45.** Explain the operation and frame of I2C protocol.

6 marks questions

1. What are branch instructions? Explain different branch instructions with examples.
2. Explain arithmetic and logical instructions with examples.
3. Explain load and store instructions with examples.
4. Discuss compare and swap instructions with examples.
5. Discuss software interrupt instructions.
6. Write code of EEPROM interface with microcontroller using I2C protocol.
7. Write code of ADC interface with microcontroller using I2C protocol
8. Write code of RTC interface with microcontroller using I2C protocol
9. Write code of Temperature sensor interface with microcontroller using I2C protocol
10. Write code of EEPROM interface with microcontroller using SPI protocol.
11. Write the code of ADC interfacing with ARM using SPI protocol
12. Write code of RTC interface with microcontroller using SPI protocol
13. Temperature sensor interface with microcontroller using SPI protocol
14. Explain types of messages frame?
15. Explain Error Detection Mechanisms.
16. Draw neat diagram of extended format of CAN frame and explain each block.
17. What addressing modes of CAN?
18. Write short note on bus signal.
19. What is bit stuffing?
20. Differentiate between I2C, SPI and CAN.
21. Write short note on subtraction instructions.

22. Write short note on barrel shift arithmetic instructions.
23. Explain EOR and BIC instructions.
24. Explain TEQ,TST instruction.
25. Explain Load instructions with examples.
26. Explain store instructions with examples.
27. What is stack? Explain STMFd instructions.
28. Explain program status register instructions.
29. Explain conditional statements for high level languages.
30. Differentiate between exceptions and instructions.

(MET402) Industrial Automation

@ 2 marks

Unit I: PROCESS MODEL

- a. Enlist four Process Characteristics
- b. Enlist Control System parameters
- c. Define error of an control system
- d. Draw the block diagram of error detector and controllers
- e. Define dead time of a control system

Unit II: Tuning of Controllers

- a. Define discontinuous controller mode.
- b. Define continuous controller mode.
- c. Define Direct action.
- d. Define neutral zone.
- e. Give the names of continuous Controller Modes.

Unit III: Programmable Controllers and SCADA

- a. Define scan time.
- b. State main building blocks of PLC
- c. Draw the Ladder Diagram for AND gate
- d. Give the two symbols of PLC input
- e. Give symbol for PLC input with logic

Unit IV: Digital Controller design

- a. Define Phase margin and Gain margin.
- b. Draw block diagram of the control scheme of a typical power electronic system
- c. Enlist four modern controller design techniques.
- d. State Bode's Theorem I
- e. State Bode's Theorem II

@ 6 marks

Unit I: PROCESS MODEL

- a. Discuss Process characteristics in details.
- b. A controller Outputs a 4 to 20 mA signal to control motor speed from 140 to 600 rpm with a linear dependence. Calculate a) current corresponding to 310 rpm and b) the value of (a) expressed as the percent of control output. **(ANS:I=9.91 P =36.9%)**

- c. A Liquid –level control system linearly converts a displacement of 2 to 3 m into a 4 to 20 mA control signal. A relay serves as the two position controller to open or close an inlet valve. The relay closes at 12 mA and opens at 10 mA. Find a) the relation between displacement level and current b) the neutral zone or displacement gap in meters **(ANS: $3m = K(20mA) + H_0$ and neutral zone 0.0125 m)**
- d. Discuss control system parameters.
- e. Discuss Error of control system.

Unit II: Tuning of Controllers

- a. Explain multiposition mode with three position controller action.
- b. Explain neutral zone of two position controller. Give applications.
- c. Explain floating control mode for single speed and multiple speed.
- d. Discuss derivative control mode with its characteristics.
- e. Discuss Proportional Control Mode

Unit III: Programmable Controllers and SCADA

- a. With neat block diagram of PLC explain PLC system.
- b. Design PLC Ladder diagrams for AND and OR gates with its truth table and logic diagrams
- c. Design PLC Ladder diagrams for NAND and NOR gates with its truth table and logic diagrams
- d. Discuss Block diagram of SCADA.
- e. With neat labeled layout explain Modem in SCADA systems.

Unit IV: Digital Controller design

- a. Discuss the design steps in the controller design with Bode diagram.
- b. What is full state feedback? Explain block diagram describing the full state feedback
- c. Discuss PID Controller Design with neat labeled experimental setup for tuning the parameters of the PID controller. Write steps for experiment.
- d. Discuss the steady – state equivalent circuit of an induction motor.
- e. Discuss the reference current generation for single – phase unidirectional unity power factor converter.
- f. Discuss the block schematic of the direct and indirect field oriented vector control on induction motor

@ 4 marks

Unit I: PROCESS MODEL

- a. Write a short note on process load.
- b. Derive expression for control parameter range.
- c. Explain Process equation with diagram of temperature control.
- d. Explain Static Model
- e. Explain Dynamic Models.
- f. Write a note on four parameter Model
- g. Write a note on dead time

Unit II: Tuning of Controllers

- a. Explain PD Control Mode.
- b. Write a short note on Composite control modes.
- c. Explain PI Composite control mode.
- d. Explain PID control mode.
- e. Write a note on proportional control mode.
- f. Write a note on continuous controller mode.
- g. Explain Absolute error for tuning of controller

Unit III: Programmable Controllers and SCADA

- a. Design PLC Ladder diagrams for NAND gate with its truth table and logic diagrams
- b. Design PLC Ladder diagrams for NOT gate with its truth table and logic diagrams
- c. Design PLC Ladder diagrams for AND gate with its truth table and logic diagrams
- d. Write a short note on input field devices in PLC
- e. Explain CPU of PLC
- f. Write a note on SCADA
- g. Design Ladder Diagram to operate Spray-Painting.

Unit IV: Digital Controller design

- a. Explain controller design techniques.
- b. Draw block diagram of full state feedback.
- c. Explain Regulator for full state feedback
- d. Explain tracker for full state feedback
- e. Write a note on State space method
- f. Explain Root locus Method
- g. Write a note on Controllability
- h. Write a note on Observability