



Zeal Education Society's
ZEAL POLYTECHNIC, PUNE

NARHE | PUNE -41 | INDIA

DEPARTMENT OF ELECTRICAL ENGINEERING

SECOND YEAR (SY)

SCHEME: I

SEMESTER: IV

**NAME OF SUBJECT: DIGITAL ELECTRONICS &
MICROCONTROLLER APPLICATIONS**

Subject Code: 22421

**UNIT WISE MULTIPLE CHOICE
QUESTIONS BANK**

B) Commutative Properties

D) All Of Above

Answer: - Option A

Explanation: - The expression for Associative property is given by $A+(B+C) = (A+B)+C$ & $A*(B*C) = (A*B)*C$.

5. How many AND gates are required to realize $Y = CD + EF + G$

A) 4

C) 3

B) 5

D) 2

Answer: - Option A

Explanation: - $Y = CD + EF + G$

The number of two input AND gate = 2.

6. The NOR gate output will be high if the two inputs are

A) 00

C) 10

B) 01

D) 11

Answer: - Option A

Explanation: - A HIGH output (1) results if both the inputs to the gate are LOW (0)

7. Universal gates are _____

A) NAND & NOR

C) XOR & OR

B) AND & OR

D) EX-NOR & XOR

Answer: - Option A

Explanation: - Universal gates are NAND & NOR

8. How many two input AND gates and two input OR gates are required to realize $Y = BD + CE + AB$?

A) 3, 2

C) 1, 1

B) 4, 2

D) 2, 3

Answer: - Option A

Explanation: - There are three product terms. So, three AND gates of two inputs are required.

9. The gates required to build a half adder are _____

A) EX-OR Gate And NOR Gate

C) EX_OR Gate And AND Gate

B) EX-OR Gate And OR Gate

D) EX-NOR Gate And AND Gate

Answer: - Option A

Explanation: - The gates required to build a half adder are EX-OR gate and AND gate. EX-OR outputs the SUM of the two input bits whereas AND outputs the CARRY of the two input bits.

10. The inverter is

A) NOT Gate

C) AND Gate

B) OR Gate

D) None Of The Above

Answer: - Option A

Explanation: - The inverter is NOT gate

11. The inputs of a NAND gate are connected together. The resulting circuit is

A) OR Gate

C) NOT Gate

B) AND Gate

D) None Of The Above

Answer: - Option A

Explanation: - The two inputs of the NAND gate are connected, only two input combinations can be used. The NAND Gate will emit a LOW if any input is HIGH. The NAND gate would be output HIGH if all inputs are LOW

12. The NOR gate is OR gate followed by

- A) AND Gate
- B) NAND Gate
- C) NOT Gate
- D) None Of The Above

Answer: - Option A

Explanation: - The NOR gate is OR gate followed by NOT gate

13. The NAND gate is AND gate followed by

- A) NOT Gate
- B) OR Gate
- C) AND Gate
- D) None Of The Above

Answer: - Option A

Explanation: - The NAND gate is AND gate followed by NOT gate

14. Digital circuit can be made by the repeated use of

- A) OR Gates
- B) NOT Gates
- C) NAND Gates
- D) None Of The Above

Answer: - Option C

Explanation: - NAND gate is universal gate.

15. The only function of NOT gate is to

- A) Stop Signal
- B) Invert Input Signal
- C) Act As A Universal Gate
- D) None Of The Above

Answer: - Option A

Explanation: - The only function of NOT gate is to Invert Input signal

16. When an input signal 1 is applied to a NOT gate, the output is

- A) 0
- B) 1
- C) Either 0 & 1
- D) None Of The Above

Answer: - Option A

Explanation: -

17. In Boolean algebra, the bar sign (-) indicates

- a) OR operation
- b) AND operation
- c) NOT operation
- d) None of the above

Answer: - Option A

Explanation: -

22. An OR gate has 4 inputs. One input is high and the other three are low.

The output is

- A) Low
- B) High
- C) Alternately High And Low
- D) May Be High Or Low Depending On Relative Magnitude Of Inputs

Answer: - Option B

Explanation: -

23. Both OR and AND gates can have only two inputs.

- A) True B) False

Answer: - Option B

Explanation: -

24. The output will be a LOW for any case when one or more inputs are zero in a/an

- A) OR Gate C) AND Gate
B) NOT Gate D) NAND Gate

Answer: - Option C

Explanation: -

25. NAND circuits are contained in a 7400 NAND IC.

- A) 1 C) 4
B) 2 D) 8

Answer: - Option C

Explanation: -

26. truth table entries are necessary for a four-input circuit.

- A) 4 C) 12
B) 8 D) 16

Answer: - Option D

Explanation: -

27. The basic logic gate whose output is the complement of the input is

- A) OR Gate C) INVERTER Gate
B) AND Gate D) Comparator

Answer: - Option C

Explanation: -

28. input values will cause an AND logic gate to produce a HIGH output.

- A) At Least One Input Is HIGH C) All Inputs Are HIGH
B) At Least One Input Is LOW D) All Inputs Are LOW

Answer: - Option C

Explanation

29. A NAND gate has inputs and output.

- A) LOW Inputs And LOW Outputs
B) HIGH Inputs And HIGH Outputs
C) Low Inputs And High Outputs
D) None Of The Above

Answer: - Option C

Explanation: -

30. truth table entries are necessary for a four-input circuit.

- A) 4 C) 12

B) 8 D) 16

Answer: - Option D

Explanation: -

31. Exclusive-OR (XOR) logic gates can be constructed fromlogic gates.

A) OR Gates Only

C)AND Gates, OR Gates, And NOT Gates

B) AND Gates And NOT Gates

D) OR Gates And NOT Gates

Answer: - Option C

32. NAND circuits are contained in a 7400 NAND IC.

A) 1

C) 4

B) 2

D) 8

Answer: - Option C

33. The inputs of a NAND gate are connected together. The resulting circuit is

A) OR gate

B) AND gate

C) NOT gate

D) none of the above

Answer: Option C

34. How many OR gates are required to realize $Y = CD + EF + G$

A)4

C)3

B)5

D)2

Answer : Option D

Explanation:-The number of two input OR gate = 2

35 The only function of NOT gate is to

Stop signal

Invert input signal

Act as a universal gate

None of the above

Answer : 2

36. When an input signal 1 is applied to a NOT gate, the output is

0

1

Either 0 & 1

None of the above

Answer : 1

37. In Boolean algebra, the bar sign (-) indicates

OR operation

AND operation

NOT operation

None of the above

Answer : 3

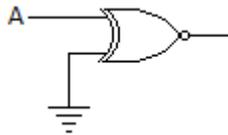
38. An OR gate has 4 inputs. One input is high and the other three are low. The output is

Low

High
 alternately high and low
 may be high or low depending on relative magnitude of inputs
 Answer : 2
 Explanation: In OR any input high means high output.

39. . Both OR and AND gates can have only two inputs.
 True
 False
 Answer : 2
 Explanation: Any number of inputs are possible

40. For the gate in the given figure the output will be



- A. 0
- B. 1
- C. A
- D. \bar{A}

Answer : 4
 Explanation: If $A = 0$, $Y = 1$ and $A = 1$, $Y = 0$ Therefore $Y = \bar{A}$

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Question Bank for Multiple Choice Questions

02-Combinational logic circuit.	Marks:-18
Content of Chapter: 2.1 Standard Boolean representation: Sum of Product (SOP) and Product of Sum(POS), Min-term and Max-term, conversion between SOP and POS forms, realization using NAND /NOR gates 2.2 K-map reduction technique for the Boolean expression: Minimization of Boolean functions up to 4 variables (SOP and POS form) 2.3 Design of arithmetic circuits and code converter using K-map: Half and full Adder, half and full Subtractor , gray to binary and binary to gray (up to 4 bits) 2.4 Arithmetic circuits: (IC 7483) Adder and Subtractor, BCD adder 2.5 Encoder/Decoder: Basics of encoder, decoder, comparison, (IC 7447) BCD to 7 segment decoder/driver 2.6 Multiplexer and Demultiplexer: working , truth table and applications of Multiplexers and Demultiplexers, MUX tree. IC 74151 as MUX; DEMUX tree, DEMUX as decoder, IC 74155 as DEMUX 2.7 Buffer: Tristate logic, unidirectional and bidirectional buffer (1 C74LS244,74LS245)	

1. A full adder logic circuit will have

- a) Two inputs and one output
- b) Three inputs and three outputs
- c) Two inputs and two outputs
- d) Three inputs and two outputs

Answer: - Option D

Explanation: - Full adder have three input A,B and C and Two output sum and carry.

2. The gates required to build a half adder are

- a) EX-OR gate and NOR gate
- b) EX-OR gate and OR gate
- c) EX-OR gate and AND gate
- d) EX-NOR gate and AND gate

Answer: - Option C

Explanation: - $SUM = A \oplus B$, $CARRY = A \cdot B$

3. There are _____ cells in a 4-variable K-map.

- a) 12
- b) 16
- c) 18
- d) 8

Answer: - Option B

4. Don't care conditions can be used for simplifying Boolean expressions in

- a) Registers
- b) Terms
- c) K-maps
- d) Latches

Answer: - Option C

5. No. of Inputs available for Half Subtractors are

- a) 1
- b) 2
- c) 3
- d) 4

Answer: - Option B

6. No. of Outputs of Full Adders are

- a) 1
- b) 2
- c) 3
- d) 4

Answer: - Option B

Explanation: - Output of full adder are sum and carry.

7. Multiplexer is a

- a) Type of decoder which decodes several inputs and gives one output
- b) Device which converts many signals into one
- c) Takes one input and results into many output
- d) Type of encoder which decodes several inputs and gives one output

Answer: - Option B

Explanation: - Multiplexer have many input and only one output.

8. The function of an enable input on a multiplexer chip is

- a) To apply Vcc
- b) To connect ground
- c) To active the entire chip
- d) To active one half of the chip

Answer: - Option B

Explanation: - Enable input used in multiplexer to active the entire chip.

9. Number of select lines would be required for an 8-line-to-1-line multiplexer?

- a) 2
- b) 4
- c) 8
- d) 3

Answer: - Option D

Explanation: - No of input $= 2^n$ (n= no of select lines)

10. The word Demultiplexer means

- a) One into many
- b) Many into one
- c) both a & b
- d) One into one

Answer: - Option A

Explanation: - Demultiplexer means one to many.

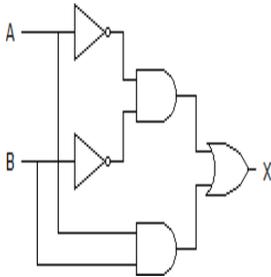
11. In 1-to-4 Demultiplexer, how many select lines are required ?

- a) 2
- b) 3
- c) 1
- d) 4

Answer: - Option A

Explanation: - No of input = 2^n (n= no of select lines)

12. Which of the following logic expressions represents the logic diagram shown?



- a) $X = AB' + A'B$
- b) $X = (AB)' + AB$
- c) $X = (AB)' + A'B'$
- d) $X = A'B' + AB$

Answer: - Option D

Explanation: - Logical diagram is constructed using AND ,OR and NOT Gate.

13. Which of the following combinations of logic gates can decode binary 1101?

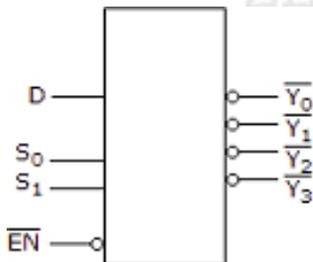
- a) One 4-input AND gate
- b) One 4-input AND gate, one inverter
- c) One 4-input NOT gate
- d) One 4-input NAND gate.

Answer: - Option B

Explanation: - One 4-input AND gate and one inverter is required to decode binary 1101.

14. For the device shown here, assume the D input is LOW, both S inputs are LOW and the input is LOW. What is the status of the Y' outputs?

- a) All are HIGH
- b) All are LOW
- c) All but Y0 are LOW
- d) All but Y0 are HIGH



Answer: - Option D

15. 3 bits full adder contains

- a) 3 combinational inputs
- c) 6 combinational inputs

b) 4 combinational inputs

d) 8 combinational inputs

Answer: - Option D

Explanation: - No of input $= 2^n$ (n= no of combinational inputs)

16. The basic building blocks of the arithmetic unit in a digital E&Tcs are

a) Subtractors

c) Multiplexer

b) Adders

d) Comparator

Answer: - Option B

Explanation: -Adders are acts as basic building blocks of the arithmetic unit in a digital E&Tcs.

17. A digital system consists of _____types of circuits.

a) 2

c) 4

b) 3

d) 5

Answer: - Option A

Explanation: - A digital system consists of Combinational circuit and sequential circuit.

18. In a combinational circuit, the output at any time depends only on the _____ at that time.

a) Voltage

c) Input values

b) Intermediate values

d) Clock puls

Answer: - Option C

Explanation: - combinational circuit dose not have memory.

19. In a sequential circuit, the output at any time depends only on the input valuesat that time.

a) Past output values

c) Both past output and present input

b) Intermediate values

d) Present input values

Answer: - Option C

Explanation: - sequential circuit have memory.

20. All logic operations can be obtained by means of

a) AND and NAND operations

c) OR and NOT operations

b) OR and NOR operations

d) NAND and NOR operations

Answer: - Option D

Explanation: - NAND and NOR Gate acts as a universal gate.

21. The flag bits in an ALU is defined as

a) The total number of registers

c) The total number of control lines

b) The status bit conditions

d) All of the Mentioned

Answer: - Option B

Explanation: -The flag bits is defined as the status bit conditions.

22. How many NOT gates are required for the construction of a 4-to-1 multiplexer?

a) 3

c) 2

b) 4

d) 5

Answer: - Option C

Explanation: - For the construction of a 4-to-1 multiplexer two 1-input NOT gates and one 4-inputs OR gate is required.

23. The enable input is also known as

a) Select input

c) Strobe

b) Decoded input

d) Sink

Answer: - Option C

Explanation: - strobe is also known as enable.

24. In which of the following gates, the output is 1, if and only if at least one input is 1?

a) NOR

c) OR

b) AND

d) NAND

Answer: - Option C

Explanation: - Logic of OR Gate is- "if any input is high, then output is also high".

25. The time required for a gate or inverter to change its state is called

a) Rise time

c) Propagation time

b) Decay time

d) Charging time

Answer: - Option C

Explanation: - The time required for a gate or inverter to change its state is called as Propagation time.

26. The time required for a pulse to change from 10 to 90 percent of its maximum value is called

a) Rise time

c) Propagation time

b) Decay time

d) Operating speed

Answer: - Option A

Explanation: -The time required for a pulse to change from 10 to 90 percent of its maximum value is called as Rise time.

27. What is the minimum number of two-input NAND gates used to perform the function of two input OR gate ?

a) one

c) three

b) two

d) four

Answer: - Option C

Explanation: -NAND Gate is acts as a universal gate.

28. Odd parity of word can be conveniently tested by

- a)OR gate
- b)AND gate
- c)NOR gate
- d)XOR gate

Answer: - Option D

Explanation: -XOR Gate is used as a parity tester.

29. Which of the following gates would output 1 when one input is 1 and other input is 0 ?

- a)OR gate
- b)AND gate
- c)NAND gate
- d)both (a) and ©

Answer: - Option D

Explanation: - Logic of OR Gate is “if any input is high ,then output is also high” and Logic of NAND Gate is “if any input is low ,then output is also high”.

30. Which of the following gates are added to the inputs of the OR gate to convertit to the NAND gate ?

- a)NOT
- b)AND
- c)OR
- d)XOR

Answer: - Option A

Explanation: - NAND Gate is called as bubbled OR Gate.

31. The EXCLUSIVE NOR gate is equivalent to which gate followed by an inverter ?

- a)OR
- b)AND
- c)NAND
- d)XOR

Answer: - Option D

Explanation: - XOR Gate +NOT Gate=XNOR Gate.

32. A positive AND gate is also a negative

- a)NAND gate
- b)NOR gate
- c)AND gate
- d)OR gate

Answer: - Option D

Explanation: - A positive AND gate is also a negative OR gate.

33. An OR gate can be imagined as

- a)Switches connected in series
- b)Switches connected in parallel
- c)MOS transistors connected in series
- d)None of these

Answer: - Option B

Explanation: - An OR gate can be imagined as Switches connected in parallel.

34. Which combination of gates does not allow the implementation of an arbitrary boolean function?

- a) OR gates and AND gates only
- b) OR gates and exclusive OR gate
- c) OR gates and NOT gates only
- d) NAND gates only

Answer: - Option B

Explanation: - OR gates and exclusive OR gate are not allow the implementation of an arbitrary boolean function.

35. Which one of the following will give the sum of full adders as output ?

- a) Three point majority circuit
- b) Three bit parity checker
- Three bit comparator
- Three bit counter

Answer: - Option D

Explanation: - Three bit counter will give the sum of full adders as output .

36. The maximum frequency at which digital data can be applied to gate is called

- a) Operating speed
- b) Propagation speed
- c) Binary level transaction period
- d) Charging time

Answer: - Option A

Explanation: - The maximum frequency at which digital data can be applied to gate is called as Operating speed.

37. If the two numbers include a sign bit in the highest order position, the bit conditions of interest are the sign of the result, a zero indication and

- a) An underflow condition
- b) A neutral condition
- c) An overflow condition
- d) One indication

Answer: - Option C

Explanation: - If the two numbers include a sign bit in the highest order position then it is an overflow condition

38. In the expression $A + BC$, the total number of minterms will be

- 1. 2
- 2. 3
- 3. 4
- 4. 5

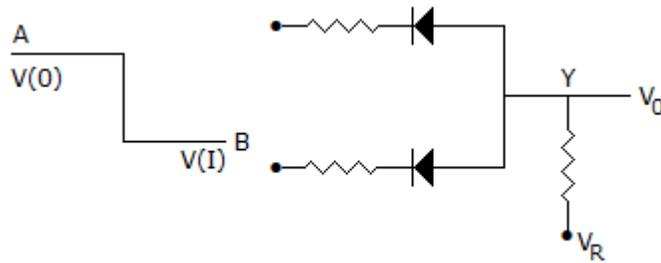
Answer : 4

39. Which of the following is non-saturating?

- 1. TTL
- 2. CMOS
- 3. ECL
- 4. Both 1 and 2

Answer : 3

40. The circuit in the given figure is a gate.



1. positive logic OR gate
2. negative logic OR gate
3. negative logic AND gate
4. positive logic AND gate

Answer : 2

Explanation: Since $V(1)$ is lower state than $V(0)$ it is a negative logic circuit. Since diodes are in parallel, it is an OR gate.

41. Algebra of logic is termed as _____

- a) Numerical logic
- b) Boolean algebra
- c) Arithmetic logic
- d) Boolean number

Answer: c

Explanation: The variables that can have two discrete values False(0) and True(1) and the operations of logical significance are dealt with Boolean algebra.

42. Boolean algebra can be used _____

- a) For designing of the digital E&Tcs
- b) In building logic symbols
- c) Circuit theory
- d) Building algebraic functions

Answer: a

Explanation: For designing digital E&Tcs and building different electronic circuits boolean algebra is accepted widely.

43. What is the definition of Boolean functions?

- a) An arithmetic function with k degrees such that $f:Y \rightarrow Y^k$
- b) A special mathematical function with n degrees such that $f:Y^n \rightarrow Y$
- c) An algebraic function with n degrees such that $f:X^n \rightarrow X$
- d) A polynomial function with k degrees such that $f:X^2 \rightarrow X^n$

Answer: b

Explanation: A Boolean function is a special mathematical function with n degrees and where $Y = \{0,1\}$ Boolean domain with being a non-negative integer. It helps in describing the way in which the Boolean is derived from Boolean inputs.

44. $F(X,Y,Z,M) = X'Y'Z'M'$. The degree of the function is _____
- a) 2
 - b) 5
 - c) 4
 - d) 1

Answer: c

Explanation: This is a function of degree 4 from the set of ordered pairs of Boolean variables to the set $\{0,1\}$.

45. A _____ value is represented by a Boolean expression.
- a) Positive
 - b) Recursive
 - c) Negative
 - d) Boolean

Answer: d

Explanation: A Boolean value is given by a Boolean expression which is formed by combining Boolean variables and logical connectives.

46. Which of the following is a Simplification law?
- a) $M.(\sim M+N) = M.N$
 - b) $M+(N.O) = (M+N)(M+O)$
 - c) $\sim(M+N) = \sim M.\sim N$
 - d) $M.(N.O) = (M.N).O$

Answer: a

Explanation: By Simplification Law we can have $X.(\sim X+Y) = X.Y$ and $X+(\sim X.Y) = X+Y$. By De' Morgan's law $\sim(X+Y) = \sim X.\sim Y$. By commutative law we can say that $A.(B.C) = (A.B).C$.

47. What are the canonical forms of Boolean Expressions?
- a) OR and XOR
 - b) NOR and XNOR
 - c) MAX and MIN
 - d) SOM and POM

Answer: d

Explanation: There are two kinds of canonical forms for a Boolean expression-> 1)sum of minterms(SOM) form and 2)product of maxterms(SOM) form.

48. Which of the following is/are the universal logic gates?
- a) OR and NOR
 - b) AND
 - c) NAND and NOR
 - d) NOT

Answer: c

Explanation: NAND and NOR gates are known as the universal logic gates. A universal gate is a gate which can implement any Boolean function without the help of 3 basic gate types.

49. The logic gate that provides high output for same inputs _____

- a) NOT
- b) X-NOR
- c) AND
- d) XOR

Answer: b

Explanation: The logic gate which gives high output for the same inputs, otherwise low output is known as X-NOR or Exclusive NOR gate.

50. The _____ of all the variables in direct or complemented form is a maxterm.

- a) addition
- b) product
- c) moduler
- d) subtraction

Answer: a

Explanation: The Boolean function is expressed as a sum of the 1-minterms and the inverse of function is represented as 0-minterms.

51. A Karnaugh map (K-map) is an abstract form of _____ diagram organized as a matrix of squares.

- a) Venn Diagram
- b) Cycle Diagram
- c) Block diagram
- d) Triangular Diagram

Answer: a

Explanation: A Karnaugh map (K-map) is an abstract form of Venn diagram organized as a matrix of squares, where each square represents a Maxterm or a Minterm.

52. There are _____ cells in a 4-variable K-map.

- a) 12
- b) 16
- c) 18
- d) 8

Answer: b

Explanation: There are $16 = (2^4)$ cells in a 4-variable K-map.

53. The K-map based Boolean reduction is based on the following Unifying Theorem: $A + A' = 1$.

- a) Impact
- b) Non Impact
- c) Force

d) Complementarity

Answer: b

Explanation: The given expression $A + A' = 1$ is based on non-impact unifying theorem.

54. Each product term of a group, $w'.x.y'$ and $w.y$, represents the _____ in that group.

- a) Input
- b) POS
- c) Sum-of-Minterms
- d) Sum of Maxterms

Answer: c

Explanation: In a minterm, each variable w , x or y appears once either as the variable itself or as the inverse. So, the given expression satisfies the property of Sum of Minterm.

55. The prime implicant which has at least one element that is not present in any other implicant is known as _____

- a) Essential Prime Implicant
- b) Implicant
- c) Complement
- d) Prime Complement

Answer: a

Explanation: Essential prime implicants are prime implicants that cover an output of the function that no combination of other prime implicants is able to cover.

56. Product-of-Sums expressions can be implemented using _____

- a) 2-level OR-AND logic circuits
- b) 2-level NOR logic circuits
- c) 2-level XOR logic circuits
- d) Both 2-level OR-AND and NOR logic circuits

Answer: d

Explanation: Product-of-Sums expressions can be implemented using 2-level OR-AND & NOR logic circuits.

57. Each group of adjacent Minterms (group size in powers of twos) corresponds to a possible product term of the given _____

- a) Function
- b) Value
- c) Set
- d) Word

Answer: a

Explanation: Each group of adjacent Minterms (group size in powers of twos) corresponds to a possible product term of the given function.

58. Don't care conditions can be used for simplifying Boolean expressions in _____

- a) Registers
- b) Terms
- c) K-maps
- d) Latches

Answer: c

Explanation: Don't care conditions can be used for simplifying Boolean expressions in K-maps which helps in pairing with 1/0.

59. It should be kept in mind that don't care terms should be used along with the terms that are present in _____

- a) Minterms
- b) Expressions
- c) K-Map
- d) Latches

Answer: a

Explanation: It should be kept in mind that don't care terms should be used along with the terms that are present in minterms as well as maxterms which reduces the complexity of the boolean expression.

60. Using the transformation method you can realize any POS realization of OR-AND with only.

- a) XOR
- b) NAND
- c) AND
- d) NOR

Answer: d

Explanation: Using the transformation method we can realize any POS realization of OR-AND with only NOR.

61. There are many situations in logic design in which simplification of logic expression is possible in terms of XOR and _____ operations.

- a) X-NOR
- b) XOR
- c) NOR
- d) NAND

Answer: a

Explanation: There are many situations in logic design in which simplification of logic expression is possible in terms of XOR and XNOR operations.

Expression of XOR : $AB' + A'B$

Expression of XNOR : $AB + A'B'$

62. These logic gates are widely used in _____ design and therefore are available in IC form.

- a) Sampling
- b) Digital
- c) Analog
- d) Systems

Answer: b

Explanation: These logic gates(XOR, XNOR, NOR) are widely used in digital design and therefore are available in IC form as digital circuits deal with data transmission in the form of binary digits.

63. In case of XOR/XNOR simplification we have to look for the following _____

- a) Diagonal Adjacencies
- b) Offset Adjacencies
- c) Straight Adjacencies
- d) Both diagonal and offset adjencies

Answer: d

Explanation: In case of XOR/XNOR simplification we have to look for the following diagonal and offset adjacencies. XOR gives output 1 when odd number of 1s are present in input while XNOR gives output 1 when even number of 1s or all 0s are present in input.

64. Entries known as _____ mapping.

- a) Diagonal
- b) Straight
- c) K
- d) Boolean

Answer: a

Explanation: Entries known as diagonal mapping. The diagonal mapping holds true when for any relation, there is a projection of product on the factor.

65. Which statement below best describes a Karnaugh map?

- a) It is simply a rearranged truth table
- b) The Karnaugh map eliminates the need for using NAND and NOR gates
- c) Variable complements can be eliminated by using Karnaugh maps
- d) A Karnaugh map can be used to replace Boolean rules

Answer: a

Explanation: K-map is simply a rearranged truth table. It is a pictorial representation of truth table having a specific number of cells or squares, where each cell represents a Maxterm or a Minterm.

66. Which of the examples below expresses the commutative law of multiplication?

- a) $A + B = B + A$
- b) $A \cdot B = B + A$
- c) $A \cdot (B \cdot C) = (A \cdot B) \cdot C$
- d) $A \cdot B = B \cdot A$

Answer: d

Explanation: The commutative law of multiplication is $(A \cdot B) = (B \cdot A)$.
The commutative law of addition is $(A + B) = (B + A)$.

67. The Boolean expression $Y = (AB)'$ is logically equivalent to what single gate?

- a) NAND
- b) NOR
- c) AND
- d) OR

Answer: a

Explanation: If A and B are the input for AND gate the output is obtained as AB and after inversion we get (AB)', which is the expression of NAND gate. NAND gate produces high output when any of the input is 0 and produces low output when all inputs are 1.

68. The observation that a bubbled input OR gate is interchangeable with a bubbled output AND gate is referred to as

- a) A Karnaugh map
- b) DeMorgan's second theorem
- c) The commutative law of addition
- d) The associative law of multiplication

Answer: b

Explanation: DeMorgan's Law: $\sim(P+Q) \Leftrightarrow (\sim P) \cdot (\sim Q)$ Also,
 $\sim(P \cdot Q) \Leftrightarrow (\sim P) + (\sim Q)$.

69. The systematic reduction of logic circuits is accomplished by _____

- a) Symbolic reduction
- b) TTL logic
- c) Using Boolean algebra
- d) Using a truth table

Answer: c

Explanation: The systematic reduction of logic circuits is accomplished by using boolean algebra.

70. Each "1" entry in a K-map square represents _____

- a) A HIGH for each input truth table condition that produces a HIGH output
- b) A HIGH output on the truth table for all LOW input combinations
- c) A LOW output for all possible HIGH input conditions
- d) A DON'T CARE condition for all possible input truth table combinations

Answer: a

Explanation: Each "1" entry in a K-map square represents a HIGH for each input truth table condition that Produces a HIGH output. Thus, it represents a minterm.

71. Each "0" entry in a K-map square represents _____

- a) A HIGH for each input truth table condition that produces a HIGH output
- b) A HIGH output on the truth table for all LOW input combinations
- c) A LOW output for all possible HIGH input conditions
- d) A DON'T CARE condition for all possible input truth table combinations

Answer: c

Explanation: Each "0" entry in a K-map square represents a LOW output for all possible HIGH input conditions. Thus, it represents Maxterm.

72. Which of the following statements accurately represents the two BEST methods of logic circuit simplification?

- a) Actual circuit trial and error evaluation and waveform analysis
- b) Karnaugh mapping and circuit waveform analysis
- c) Boolean algebra and Karnaugh mapping
- d) Boolean algebra and actual circuit trial and error evaluation

Answer: c

Explanation: The two BEST methods of logic circuit simplification are Boolean algebra and Karnaugh mapping. Boolean Algebra uses the Laws of Boolean Algebra for minimization of Boolean expressions while Karnaugh Map is a pictorial representation and reduction of the Boolean expression.

73. Looping on a K-map always results in the elimination of _____

- a) Variables within the loop that appear only in their complemented form
- b) Variables that remain unchanged within the loop
- c) Variables within the loop that appear in both complemented and uncomplemented form
- d) Variables within the loop that appear only in their uncomplemented form

Answer: c

Explanation: Looping on a K-map always results in the elimination of variables within the loop that appear in both complemented and uncomplemented form.

774. Which of the following expressions is in the sum-of-products form?

- a) $(A + B)(C + D)$
- b) $(A * B)(C * D)$
- c) $A * B *(CD)$
- d) $A * B + C * D$

Answer: d

Explanation: Sum of product means that it is the sum of all product terms. Thus, the number is multiplied first and then it is added: $A * B + C * D$.

75. Which of the following is an important feature of the sum-of-products form of expressions?

- a) All logic circuits are reduced to nothing more than simple AND and OR operations
- b) The delay times are greatly reduced over other forms
- c) No signal must pass through more than two gates, not including inverters
- d) The maximum number of gates that any signal must pass through is reduced by a factor of two

Answer: a

Explanation: An important feature of the sum-of-products form of expressions in the given option is that all logic circuits are reduced to nothing more than simple AND and OR operations. Sum Of Product means it is the sum of product terms containing variables in complemented as well as uncomplemented forms.

76. In boolean algebra, the OR operation is performed by which properties?

- a) Associative properties
- b) Commutative properties
- c) Distributive properties
- d) All of the Mentioned

Answer: d

Explanation: The expression for Associative property is given by $A+(B+C) = (A+B)+C$ & $A*(B*C) = (A*B)*C$.

The expression for Commutative property is given by $A+B = B+A$ & $A*B = B*A$.

The expression for Distributive property is given by $A+BC=(A+B)(A+C)$ & $A(B+C) = AB+AC$.

77. The expression for Absorption law is given by _____

- a) $A + AB = A$
- b) $A + AB = B$
- c) $AB + AA' = A$
- d) $A + B = B + A$

Answer: a

Explanation: The expression for Absorption Law is given by: $A+AB = A$.

Proof: $A + AB = A(1+B) = A$ (Since $1 + B = 1$ as per 1's Property).

78. According to boolean law: $A + 1 = ?$

- a) 1
- b) A
- c) 0
- d) A'

Answer: a

Explanation: $A + 1 = 1$, as per 1's Property.

79. The involution of A is equal to _____

- a) A
- b) A'
- c) 1
- d) 0

Answer: a

Explanation: The involution of A means double inversion of A (i.e. A'') and is equal to A.

Proof: $((A)')' = A$

80. $A(A + B) = ?$

- a) AB

- b) 1
- c) $(1 + AB)$
- d) A

Answer: d

Explanation: $A(A + B) = AA + AB$ (By Distributive Property) = $A + AB$ ($A.A = A$ By Commutative Property) = $A(1 + B) = A \cdot 1$ ($1 + B = 1$ by 1's Property) = A.

81. DeMorgan's theorem states that _____

- a) $(AB)' = A' + B'$
- b) $(A + B)' = A' * B'$
- c) $A' + B' = A'B'$
- d) $(AB)' = A' + B$

Answer: a

Explanation: The DeMorgan's law states that $(AB)' = A' + B'$ & $(A + B)' = A' * B'$, as per the Dual Property.

82. $(A + B)(A' * B') = ?$

- a) 1
- b) 0
- c) AB
- d) AB'

Answer: b

Explanation: The DeMorgan's law states that $(AB)' = A' + B'$ & $(A + B)' = A' * B'$, as per the Dual Property.

83. Complement of the expression $A'B + CD'$ is _____

- a) $(A' + B)(C' + D)$
- b) $(A + B')(C' + D)$
- c) $(A' + B)(C' + D)$
- d) $(A + B')(C + D')$

Answer: b

Explanation: $(A'B + CD')' = (A'B)'(CD')'$ (By DeMorgan's Theorem) = $(A'' + B')(C' + D'')$ (By DeMorgan's Theorem) = $(A + B')(C' + D)$.

84. Simplify $Y = AB' + (A' + B)C$.

- a) $AB' + C$
- b) $AB + AC$
- c) $A'B + AC'$
- d) $AB + A$

Answer: a

Explanation: $Y = AB' + (A' + B)C = AB' + (AB')'C = (AB' + C)(AB' + AB') = (AB' + C).1 = (AB' + C)$.

85. The boolean function $A + BC$ is a reduced form of _____

- a) $AB + BC$

- b) $(A + B)(A + C)$
- c) $A'B + AB'C$
- d) $(A + C)B$

Answer: b

Explanation: $(A + B)(A + C) = AA + AC + AB + BC = A + AC + AB + BC$ (By Commutative Property) $= A(1 + C + B) + BC = A + BC$ ($1 + B + C = 1$ By 1's Property).

86. What is the use of Boolean identities?

- a) Minimizing the Boolean expression
- b) Maximizing the Boolean expression
- c) To evaluate a logical identity
- d) Searching of an algebraic expression

Answer: a

Explanation: Boolean identities are used for minimizing the Boolean expression and transforming into an equivalent expression.

87. _____ is used to implement the Boolean functions.

- a) Logical notations
- b) Arithmetic logics
- c) Logic gates
- d) Expressions

Answer: c

Explanation: To implement a Boolean function logic gates are used. Basic logic gates are AND, OR and NOT.

88. Inversion of single bit input to a single bit output using _____

- a) NOT gate
- b) NOR gate
- c) AND gate
- d) NAND gate

Answer: a

Explanation: A NOT gate is used to invert a single bit input (say A) to a single bit of output ($\sim A$).

89. There are _____ numbers of Boolean functions of degree n.

- a) n
- b) $2(2^n)$
- c) n^3
- d) $n(n^2)$

Answer: b

Explanation: There are 2^n different n-tuples of 0's and 1's. A Boolean function is an assignment of 0's or 1's to each of these 2^n different n-tuples. Hence, there are $2(2^n)$ different Boolean functions.

90. A _____ is a Boolean variable.

- a) Literal
- b) String
- c) Keyword
- d) Identifier

Answer: a

Explanation: A literal is a Boolean variable or its complement. A maxterm is a sum of n literals and a minterm is a product of n literals.

91. Minimization of function $F(A,B,C) = A*B*(B+C)$ is _____

- a) AC
- b) B+C
- c) B'
- d) AB

Answer: d

Explanation: $AB(B+C)$

$$= ABB + ABC \text{ [Applying distributive rule]}$$

$$= AB + ABC \text{ [Applying Idempotent law]}$$

$$= AB (1+C)$$

$$= AB*1 \text{ [As, } 1+C=1]$$

92. The set for which the Boolean function is functionally complete is _____

- a) $\{*, \%, /\}$
- b) $\{., +, -\}$
- c) $\{\wedge, +, -\}$
- d) $\{\%, +, *\}$

Answer: b

Explanation: A Boolean function is represented by using three operators $., +, -$. We can find a smaller set of functionally complete operators if one of the three operators of this set can be expressed in terms of the other two.

93. $(X+Y')(X+Z)$ can be represented by _____

- a) $(X+Y'Z)$
- b) $(Y+X')$
- c) XY'
- d) $(X+Z')$

Answer: a

Explanation: $(X+Y')(X+Z)$

$$= XX + XZ + XY' + Y'Z$$

$$= X + XZ + XY' + Y'Z$$

$$= X(1+Z) + XY' + Y'Z$$

$$= X.1 + XY' + Y'Z$$

$$= X(1+Y') + Y'Z$$

$$= X + Y'Z.$$

94. _____ is a disjunctive normal form.

- a) product-of-sums
- b) product-of-subtractions
- c) sum-of-products
- d) sum-of-subtractions

Answer: c

Explanation: The sum of minterms that represents the function is called the sum-of-products expansion or the disjunctive normal form. A Boolean sum of minterms has the value 1 when exactly one of the minterms in the sum has the value 1. It has the value 0 for all other combinations of values of the variables.

95. $a \oplus b =$ _____

- a) $(a+b)(a'+b')$
- b) $(a+b')$
- c) b'
- d) $a' + b'$

Answer: a

Explanation: $a \oplus b$

$$= a'b + ab'$$

$$= \square b + aa' + bb' + ab' \quad [As, a*a' = 0 \text{ and } b*b' = 0]$$

$$= a'(a+b) + b'(a+b)$$

$$= (a+b)(a'+b').$$

96. In parts of the processor, adders are used to calculate _____

- a) Addresses
- b) Table indices
- c) Increment and decrement operators
- d) All of the Mentioned

Answer: d

Explanation: Adders are used to perform the operation of addition. Thus, in parts of the processor, adders are used to calculate addresses, table indices, increment and decrement operators, and similar operations.

97. Total number of inputs in a half adder is _____

- a) 2
- b) 3
- c) 4
- d) 1

Answer: a

Explanation: Total number of inputs in a half adder is two. Since an EXOR gates has 2 inputs and carry is connected with the input of EXOR gates. The output of half-adder is also 2, them being, SUM and CARRY. The output of EXOR gives SUM and that of AND gives carry.

98. In which operation carry is obtained?

- a) Subtraction
- b) Addition
- c) Multiplication
- d) Both addition and subtraction

Answer: b

Explanation: In addition, carry is obtained. For example: $1\ 0\ 1 + 1\ 1\ 1 = 1\ 0\ 0$; in this example carry is obtained after 1st addition (i.e. $1 + 1 = 1\ 0$). In subtraction, borrow is obtained. Like, $0 - 1 = 1$ (borrow 1).

99. If A and B are the inputs of a half adder, the sum is given by _____

- a) A AND B
- b) A OR B
- c) A XOR B
- d) A EX-NOR B

Answer: c

Explanation: If A and B are the inputs of a half adder, the sum is given by A XOR B, while the carry is given by A AND B.

100. If A and B are the inputs of a half adder, the carry is given by _____

- a) A AND B
- b) A OR B
- c) A XOR B
- d) A EX-NOR B

Answer: a

Explanation: If A and B are the inputs of a half adder, the carry is given by: $A(AND)B$, while the sum is given by $A\ XOR\ B$.

101. Half-adders have a major limitation in that they cannot _____

- a) Accept a carry bit from a present stage
- b) Accept a carry bit from a next stage
- c) Accept a carry bit from a previous stage
- d) Accept a carry bit from the following stages

Answer: c

Explanation: Half-adders have a major limitation in that they cannot accept a carry bit from a previous stage, meaning that they cannot be chained together to add multi-bit numbers. However, the two output bits of a half-adder can also represent the result $A+B=3$ as sum and carry both being high.

102. The difference between half adder and full adder is _____

- a) Half adder has two inputs while full adder has four inputs
- b) Half adder has one output while full adder has two outputs
- c) Half adder has two inputs while full adder has three inputs
- d) All of the Mentioned

Answer: c

Explanation: Half adder has two inputs while full adder has three outputs; this is the difference between them, while both have two outputs SUM and CARRY.

103. If A, B and C are the inputs of a full adder then the sum is given by _____

- a) A AND B AND C
- b) A OR B AND C
- c) A XOR B XOR C
- d) A OR B OR C

Answer: c

Explanation: If A, B and C are the inputs of a full adder then the sum is given by A XOR B XOR C.

104. If A, B and C are the inputs of a full adder then the carry is given by _____

- a) A AND B OR (A OR B) AND C
- b) A OR B OR (A AND B) C
- c) (A AND B) OR (A AND B)C
- d) A XOR B XOR (A XOR B) AND C

Answer: a

Explanation: If A, B and C are the inputs of a full adder then the carry is given by A AND B OR (A OR B) AND C, which is equivalent to (A AND B) OR (B AND C) OR (C AND A).

105. How many AND, OR and EXOR gates are required for the configuration of full adder?

- a) 1, 2, 2
- b) 2, 1, 2
- c) 3, 1, 2
- d) 4, 0, 1

Answer: b

Explanation: There are 2 AND, 1 OR and 2 EXOR gates required for the configuration of full adder, provided using half adder. Otherwise, configuration of full adder would require 3 AND, 2 OR and 2 EXOR.

106. A code converter is a logic circuit that _____

- a) Inverts the given input
- b) Converts into decimal number
- c) Converts data of one type into another type
- d) Converts to octal

Answer: c

Explanation: A code converter is a logic circuit that changes data presented in one type of binary code to another type of binary code.

107. Use the weighting factors to convert the following BCD numbers to binary _____

0101 0011 & 0010 0110 1000

- a) 01010011 001001101000
- b) 11010100 100001100000
- c) 110101 100001100
- d) 101011 001100001

Answer: c

Explanation: Firstly, convert every 4 sets of binary to decimal from the given: 0101=5, 0011=3. Then convert 53 to binary, which will give 110101. Again, do the same with the next 4 set of binary digits.

108. The primary use for Gray code is _____

- a) Coded representation of a shaft's mechanical position
- b) Turning on/off software switches
- c) To represent the correct ASCII code to indicate the angular position of a shaft on rotating machinery
- d) To convert the angular position of a shaft on rotating machinery into hexadecimal code

Answer: a

Explanation: Gray code is useful because only one bit changes at a time, which is implemented easily in Coded representation of a shaft's mechanical position. In Gray Code, every sequence of successive bits differs by 1 bit only.

109. The primary use for Gray code is _____

- a) Coded representation of a shaft's mechanical position
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- c) To represent the correct ASCII code to indicate the angular position of a shaft on rotating machinery
- d) To convert the angular position of a shaft on rotating machinery into hexadecimal code

Answer: a

Explanation: Gray code is useful because only one bit changes at a time, which is implemented easily in Coded representation of a shaft's mechanical position. In Gray Code, every sequence of successive bits differs by 1 bit only.

110. Code is a symbolic representation of _____

- a) Discrete information
- b) Continuous information
- c) Decimal information into binary
- d) Binary information into decimal

Answer: a

Explanation: Code is a symbolic representation of discrete information. Codes can be anything like numbers, letter or words, written in terms of group of symbols.

111. One way to convert BCD to binary using the hardware approach is _____

- a) With MSI IC circuits
- b) With a keyboard encoder
- c) With an ALU
- d) UART

Answer: a

Explanation: One way to convert BCD to binary using the hardware approach is MSI IC (i.e. medium scale integration) circuits.

112. Why is the Gray code more practical to use when coding the position of a rotating shaft?

- a) All digits change between counts
- b) Two digits change between counts
- c) Only one digit changes between counts
- d) Alternate digit changes between counts

Answer: c

Explanation: The Gray code is more practical to use when coding the position of a rotating shaft because only one digit changes between counts that is reflected to the next count.

113. Reflected binary code is also known as _____

- a) BCD code
- b) Binary code
- c) ASCII code
- d) Gray Code

Answer: d

Explanation: The reflected binary code is also known as gray code because one digit reflected to the next bit. In Gray Code, every sequence of successive bits differs by 1 bit only.

114. Why do we use gray codes?

- a) To count the no of bits changes
- b) To rotate a shaft
- c) Error correction
- d) Error Detection

Answer: c

Explanation: Today, Gray codes are widely used to facilitate error correction in digital communications such as digital terrestrial television and some cable TV systems.

115. Earlier, reflected binary codes were applied to _____

- a) Binary addition
- b) 2's complement
- c) Mathematical puzzles
- d) Binary multiplication

Answer: c

Explanation: The reflected binary code is also known as gray code because one digit reflected to the next bit. In Gray Code, every sequence of successive bits differs by 1 bit only. Reflected binary codes were applied to mathematical puzzles before they became known to engineers.

116. The binary representation of BCD number 00101001 (decimal 29) is _____

- a) 0011101
- b) 0110101
- c) 1101001
- d) 0101011

Answer: a

Explanation: The given BCD number 00101001 has three 1s. So, it can be rewritten as 0000001-1, 0001000-8, 0010100-20 and after addition, we get 0011101 as output.

117. Convert binary number into gray code: 100101.

- a) 101101
- b) 001110
- c) 110111
- d) 111001

Answer: c

Explanation: Conversion from Binary To Gray Code:

1 (XOR) 0 (XOR) 0 (XOR) 1 (XOR) 0 (XOR) 1

↓ ↓ ↓ ↓ ↓

1 1 0 1 1 1

118. The decimal number system represents the decimal number in the form of _____

- a) Hexadecimal
- b) Binary coded
- c) Octal
- d) Decimal

Answer: b

Explanation: Binary-coded decimal (BCD) is a class of binary encodings of decimal numbers where each decimal digit is represented by a fixed number of bits, usually four or eight. Hexadecimal and Octal are number systems having base 16 and 8 respectively.

119. 29 input circuit will have total of _____

- a) 32 entries
- b) 128 entries
- c) 256 entries
- d) 512 entries

Answer: d

Explanation: 29 input circuit would have 2^{29} ($2 \times 2 = 512$) entries.

120. BCD adder can be constructed with 3 IC packages each of _____

- a) 2 bits

- b) 3 bits
- c) 4 bits
- d) 5 bits

Answer: c

Explanation: Binary-coded decimal (BCD) is a class of binary encodings of decimal numbers where each decimal digit is represented by a fixed number of bits, usually four or eight. BCD adder can be constructed with 3 IC packages. Each of 4-bit adders is an MSI(Medium scale Integration) function and 3 gates for the correction logic need one SSI (Small Scale Integration) package.

121. The output sum of two decimal digits can be represented in _____

- a) Gray Code
- b) Excess-3
- c) BCD
- d) Hexadecimal

Answer: c

Explanation: The output sum of two decimal digits can be represented in BCD(Binary-coded decimal). Binary-coded decimal (BCD) is a class of binary encodings of decimal numbers where each decimal digit is represented by a fixed number of bits, usually four or eight.

122. The addition of two decimal digits in BCD can be done through _____

- a) BCD adder
- b) Full adder
- c) Ripple carry adder
- d) Carry look ahead

Answer: a

Explanation: The addition of two decimal digits in BCD can be done through BCD adder. Every input inserted, in addition by the user converted into binary and then proceed for the addition. Whereas, Full Adder, Ripple Carry Adder and Carry Look Adder are for the addition of binary bits.

123. 3 bits full adder contains _____

- a) 3 combinational inputs
- b) 4 combinational inputs
- c) 6 combinational inputs
- d) 8 combinational inputs

Answer: d

Explanation: 3 bits full adder contains $2^3 = 8$ combinational inputs.

124. The simplified expression of full adder carry is _____

- a) $c = xy+xz+yz$
- b) $c = xy+xz$
- c) $c = xy+yz$
- d) $c = x+y+z$

Answer: a

Explanation: A full adder is a combinational circuit having 3 inputs and 2 outputs, namely SUM and CARRY. The simplified expression of full adder carry is $c = xy+xz+yz$.

125. Complement of F' gives back _____

- a) F'
- b) F
- c) FF
- d) FF'

Answer: b

Explanation: Complement means inversion. So, complement of F' gives back F , as per the Law of Involution.

126. Decimal digit in BCD can be represented by _____

- a) 1 input line
- b) 2 input lines
- c) 3 input lines
- d) 4 input lines

Answer: d

Explanation: Binary-coded decimal (BCD) is a class of binary encodings of decimal numbers where each decimal digit is represented by a fixed number of bits, usually four or eight. Decimal digit in BCD can be represented by 4 input lines. Since it is constructed with 4-bits.

127. The number of logic gates and the way of their interconnections can be classified as _____

- a) Logical network
- b) System network
- c) Circuit network
- d) Gate network

Answer: a

Explanation: The number of different levels of logic gates is represented in a fashion which is known as a logical network.

128. Half subtractor is used to perform subtraction of _____

- a) 2 bits
- b) 3 bits
- c) 4 bits
- d) 5 bits

Answer: a

Explanation: Half subtractor is a combinational circuit which is used to perform subtraction of two bits, namely minuend and subtrahend and produces two outputs, borrow and difference.

129. For subtracting 1 from 0, we use to take a _____ from neighbouring bits.

- a) Carry

- b) Borrow
- c) Input
- d) Output

Answer: b

Explanation: For subtracting 1 from 0, we use to take a borrow from neighbouring bits because carry is taken into consideration during addition process.

130. How many outputs are required for the implementation of a subtractor?

- a) 1
- b) 2
- c) 3
- d) 4

Answer: b

Explanation: There are two outputs required for the implementation of a subtractor. One for the difference and another for borrow.

131. Let the input of a subtractor is A and B then what the output will be if $A = B$?

- a) 0
- b) 1
- c) A
- d) B

Answer: a

Explanation: The output for $A = B$ will be 0. If $A = B$, it means that $A = B = 0$ or $A = B = 1$. In both of the situation subtractor gives 0 as the output.

132. Let A and B is the input of a subtractor then the output will be _____

- a) A XOR B
- b) A AND B
- c) A OR B
- d) A EXNOR B

Answer: a

Explanation: The subtractor has two outputs BORROW and DIFFERENCE. Since the difference output of a subtractor is given by $AB' + BA'$ and this is the output of a XOR gate. So, the final difference output is $AB' + BA'$.

133. Let A and B is the input of a subtractor then the borrow will be _____

- a) A AND B'
- b) A' AND B
- c) A OR B
- d) A AND B

Answer: b

Explanation: The borrow of a subtractor is received through AND gate whose one input is inverted. On that basis the borrow will be $(A' \text{ AND } B)$.

134. What does minuend and subtrahend denotes in a subtractor?

- a) Their corresponding bits of input
- b) Its outputs
- c) Its inputs
- d) Borrow bits

Answer: c

Explanation: Minuend and subtrahend are the two bits of input of a subtractor. If A and B are the two inputs of a subtractor then A is called minuend and B as subtrahend.

135. Full subtractor is used to perform subtraction of _____

- a) 2 bits
- b) 3 bits
- c) 4 bits
- d) 8 bits

Answer: b

Explanation: Full subtractor is used to perform subtraction of 3 bits, namely minuend bit, subtrahend bit and borrow from the previous stage. However, it also produces 2 outputs BORROW and DIFFERENCE.

136. The full subtractor can be implemented using _____

- a) Two XOR and an OR gates
- b) Two half subtractors and an OR gate
- c) Two multiplexers and an AND gate
- d) Two comparators and an AND gate

Answer: b

Explanation: A full subtractor has 3 input bits and two outputs bits BORROW and DIFFERENCE. The full subtractor can be implemented using two half subtractors and an OR gate.

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03 - Basics of microprocessor & microcontroller 8051

Marks:-16

Content of Chapter:-

- 1.1 Microprocessors, Microcontrollers and Microcomputers (Introduction and comparison)
- 1.2 Different types of buses: address, Data, and control bus
- 1.3 Harvard and Von-neumann architectures 8051 architecture, Pin description, stack, memory organization.
- 1.4 Boolean Processor, Power saving options- idle and power down mode
- 1.5 Derivatives of 8051(8951,8952,8031,8751)

1. A microcontroller at-least should consist of:

- a) RAM, ROM, I/O ports and timers
- b) CPU, RAM, I/O ports and timers
- c) CPU, RAM, ROM, I/O ports and timers
- d) CPU, ROM, I/O ports and timers

Answer: c

Explanation: A microcontroller at-least consists of a processor as its CPU with RAM, ROM, I/O ports and timers. It may contain some additional peripherals like ADC, PWM, etc.

2. Unlike microprocessors, microcontrollers make use of batteries because they have:

- a) high power dissipation
- b) low power consumption
- c) low voltage consumption
- d) low current consumption

Answer: b

Explanation: Micro Controllers are made by using the concept of VLSI technology. So here, CMOS based logic gates are coupled together by this technique that consumes low power.

3. What is the order decided by a processor or the CPU of a controller to execute an instruction?

- a) decode,fetch,execute
- b) execute,fetch,decode
- c) fetch,execute,decode
- d) fetch,decode,execute

Answer: d

Explanation: First instruction is fetched from Program Memory. After fetching, instruction is decoded to generate control signals to perform the intended task. After decoding, instruction is executed and the complete intended task of that particular instruction.

4. If we say microcontroller is 8-bit then here 8-bit denotes size of:

- a) Data Bus
- b) ALU
- c) Control Bus
- d) Address Bus

Answer: b

Explanation: If we say a microcontroller is 8-bit it means that it is capable of processing 8-bit data at a time. Data processing is the task of ALU and if ALU is able to process 8-bit data then the data bus should be 8-bit wide. In most books it tells that size of data bus but to be precise it is the size of ALU because in Harvard Architecture there are two sets of data bus which can be of same size but it is not mandatory.

5. How are the performance and the computer capability affected by increasing its internal bus width?

- a) it increases and turns better
- b) it decreases
- c) remains the same
- d) internal bus width doesn't affect the performance in any way

Answer: a

Explanation: As the bus width increases, the number of bits carried by bus at a time increases as a result of which the total performance and computer capability increases.

6. Abbreviate CISC and RISC.

- a) Complete Instruction Set Computer, Reduced Instruction Set Computer
- b) Complex Instruction Set Computer, Reduced Instruction Set Computer
- c) Complex Instruction Set Computer, Reliable Instruction Set Computer
- d) Complete Instruction Set Computer, Reliable Instruction Set Computer

Answer: b

Explanation: CISC means Complete Instruction Set Computer because in this a microcontroller has an instruction set that supports many addressing modes for the arithmetic and logical instructions, data transfer and memory accesses instructions. RISC means Reduced Instruction Set Computer because here a microcontroller has an instruction set that supports fewer addressing modes for the arithmetic and logical instructions and for data transfer instructions.

7. Give the names of the buses present in a controller for transferring data from one place to another?

- a) data bus, address bus
- b) data bus
- c) data bus, address bus, control bus
- d) address bus

Answer: c

Explanation: There are 3 buses present in a microcontroller they are data bus (for carrying data from one place to another), address bus (for carrying the address to which the data will flow) and the control bus (which tells the controller to execute which type of work at that address may be it read or write operation).

8. What is the file extension that is loaded in a microcontroller for executing any instruction?

- a) .doc
- b) .c
- c) .txt
- d) .hex

Answer: d

Explanation: Microcontrollers are loaded with .hex extension as they understand the language of 0's and 1's only.

9. What is the most appropriate criterion for choosing the right microcontroller of our choice?

- a) speed

- b) availability
- c) ease with the product
- d) all of the mentioned

Answer: d

Explanation: For choosing the right microcontroller for our product we must consider its speed so that the instructions may be executed in the least possible time. It also depends on the availability so that the particular product may be available in our neighboring regions or market in our need. It also depends on the compatibility with the product so that the best results may be obtained.

10. Why microcontrollers are not called general purpose computers?

- a) because they have built in RAM and ROM
- b) because they design to perform dedicated task
- c) because they are cheap
- d) because they consume low power

Answer: b

Explanation: Microcontrollers are designed to perform dedicated tasks. While designing general purpose computers end use is not known to designers.

11. How many types of architectures are available, for designing a device that is able to work on its own?

- a) 3
- b) 2
- c) 1
- d) 4

Answer: b

Explanation: There are basically two main types of architectures present, they are Von Neumann and Harvard architectures.

12. Which architecture is followed by general purpose microprocessors?

- a) Harvard architecture
- b) Von Neumann architecture
- c) None of the mentioned
- d) All of the mentioned

Answer: b

Explanation: General purpose microprocessors make use of Von Neumann architecture as here a simpler design is offered.

13. Which architecture involves both the volatile and the non volatile memory?

- a) Harvard architecture
- b) Von Neumann architecture
- c) None of the mentioned
- d) All of the mentioned

Answer: a

Explanation: In Harvard architecture, both the volatile and the non volatile memories are involved. This is done to increase its efficiency as both the memories are being used over here.

14. Which architecture provides separate buses for program and data memory?

- a) Harvard architecture

- b) Von Neumann architecture
- c) None of the mentioned
- d) All of the mentioned

Answer: a

Explanation: Harvard Architecture provides separated buses for data and program memory to fetch program and data simultaneously. By doing this access time is reduced and hence performance is increased.

15. Which microcontroller doesn't match with its architecture below?

- a) Microchip PIC- Harvard
- b) MSP430- Harvard
- c) ARM7- Von Neumann
- d) ARM9- Harvard

Answer: b

Explanation: MSP430 supports Von Neumann architecture.

16. Harvard architecture has _____

- a) dedicated buses for data and program memory
- b) pipeline technique
- c) complex architecture
- d) all of the mentioned

Answer: d

Explanation: Harvard Architecture has dedicated buses for data and program memory and pipeline technique because of this architecture is complex.

17. Which out of the following supports Harvard architecture?

- a) ARM7
- b) Pentium
- c) SHARC
- d) All of the mentioned

Answer: c

Explanation: SHARC supports harvard architecture for signal processing in DSP.

18. Why most of the DSPs use Harvard architecture?

- a) they provide greater bandwidth
- b) they provide more predictable bandwidth
- c) they provide greater bandwidth & also more predictable bandwidth
- d) none of the mentioned

Answer: c

Explanation: Most of the DSPs use harvard architecture because they provide a wider predictable bandwidth.

19. Which of the following supports CISC as well as Harvard architecture?

- a) ARM7
- b) ARM9
- c) SHARC
- d) None of the mentioned

Answer: c

Explanation: SHARC supports both the CISC and the Harvard architecture.

20. Which of the two architecture saves memory?

- a) Harvard
- b) Von Neumann
- c) Harvard & Von Neumann
- d) None of the mentioned

Answer: b

Explanation: As only one memory is present in the Von Neumann architecture so it saves a lot of memory.

21. 8051 microcontrollers are manufactured by which of the following companies?

- a) Atmel
- b) Philips
- c) Intel
- d) All of the mentioned

Answer: d

Explanation: 8051 microcontrollers are manufactured by Intel, Atmel, Philips/Signetics, Infineon, Dallas Semi/Maxim.

22. AT89C2051 has RAM of:

- a) 128 bytes
- b) 256 bytes
- c) 64 bytes
- d) 512 bytes

Answer: a

Explanation: It has 128 bytes of RAM in it.

23. 8051 series has how many 16 bit registers?

- a) 2
- b) 3
- c) 1
- d) 0

Answer: a

Explanation: It has two 16 bit registers DPTR and PC.

24. When 8051 wakes up then 0x00 is loaded to which register?

- a) PSW
- b) SP
- c) PC
- d) None of the mentioned

Answer: c

Explanation: When 8051 wakes up, Program Counter (PC) loaded with 0000H. Because of this in 8051 first opcode is stored in ROM address at 0000H.

25. When the microcontroller executes some arithmetic operations, then the flag bits of which register are affected?

- a) PSW
- b) SP
- c) DPTR
- d) PC

Answer: a

Explanation: It stands for program status word. It consists of carry, auxiliary carry, overflow, parity, register bank select bits etc which are affected during such operations.

26. How are the status of the carry, auxiliary carry and parity flag affected if the write instruction
MOV A,#9C
ADD A,#64H

- a) CY=0,AC=0,P=0
- b) CY=1,AC=1,P=0
- c) CY=0,AC=1,P=0
- d) CY=1,AC=1,P=1

Answer: b

Explanation: On adding 9C and 64, a carry is generated from D3 and from the D7 bit so CY and AC are set to 1. In the result, the number of 1's present are even so parity flag is set to zero.

27. How are the bits of the register PSW affected if we select Bank2 of 8051?

- a) PSW.5=0 and PSW.4=1
- b) PSW.2=0 and PSW.3=1
- c) PSW.3=1 and PSW.4=1
- d) PSW.3=0 and PSW.4=1

Answer: d

Explanation: Bits of PSW register are CY, AC, F0, RS1, RS0, OV, -, P so for selecting bank2 RS1=1 and RS0=0 which are fourth and third bit of the register respectively.

28. If we push data onto the stack then the stack pointer

- a) increases with every push
- b) decreases with every push
- c) increases & decreases with every push
- d) none of the mentioned

Answer: a

Explanation: If we push elements onto the stack then the stack pointer increases with every push of element.

29. On power up, the 8051 uses which RAM locations for register R0- R7

- a) 00-2F
- b) 00-07
- c) 00-7F
- d) 00-0F

Answer: b

Explanation: On power up register bank 0 is selected which has memory address from 00H-07H.

30. How many bytes of bit addressable memory is present in 8051 based microcontrollers?

- a) 8 bytes
- b) 32 bytes
- c) 16 bytes

d) 128 bytes

Answer: c

Explanation: 8051 microcontrollers have 16 bytes of bit addressable memory.

31. How many types of architectures are available, for designing a device that is able to work on its own?

a) 3

b) 2

c) 1

d) 4

Answer: b

Explanation: There are basically two main types of architectures present, they are Von Neumann and Harvard architectures.

32. Which architecture is followed by general purpose microprocessors?

a) Harvard architecture

b) Von Neumann architecture

c) None of the mentioned

d) All of the mentioned

Answer: b

Explanation: General purpose microprocessors make use of Von Neumann architecture as here a simpler design is offered.

33. Which architecture involves both the volatile and the non-volatile memory?

a) Harvard architecture

b) Von Neumann architecture

c) None of the mentioned

d) All of the mentioned

Answer: a

Explanation: In Harvard architecture, both the volatile and the nonvolatile memories are involved. This is done to increase its efficiency as both the memories are being used over here.

34. Which architecture provides separate buses for program and data memory?

a) Harvard architecture

b) Von Neumann architecture

c) None of the mentioned

d) All of the mentioned

Answer: a

Explanation: Harvard Architecture provides separated buses for data and program memory to fetch program and data simultaneously. By doing this access time is reduced and hence performance is increased.

35. Which microcontroller doesn't match with its architecture below?

a) Microchip PIC- Harvard

- b) MSP430- Harvard
- c) ARM7- Von Neumann
- d) ARM9- Harvard

Answer: b

Explanation: MSP430 supports Von Neumann architecture.

36. Harvard architecture has _____

- a) dedicated buses for data and program memory
- b) pipeline technique
- c) complex architecture
- d) all of the mentioned

Answer: d

Explanation: Harvard Architecture has dedicated buses for data and program memory and pipeline technique because of this architecture is complex.

37. Which out of the following supports Harvard architecture?

- a) ARM7
- b) Pentium
- c) SHARC
- d) All of the mentioned

Answer: c

Explanation: SHARC supports harvard architecture for signal processing in DSP.

38. Why most of the DSPs use Harvard architecture?

- a) they provide greater bandwidth
- b) they provide more predictable bandwidth
- c) they provide greater bandwidth & also more predictable bandwidth
- d) none of the mentioned

Answer: c

Explanation: Most of the DSPs use harvard architecture because they provide a wider predictable bandwidth.

39. Which of the following supports CISC as well as Harvard architecture?

- a) ARM7
- b) ARM9
- c) SHARC
- d) None of the mentioned

Answer: c

Explanation: SHARC supports both the CISC and the Harvard architecture.

40. Which of the two architecture saves memory?

- a) Harvard
- b) Von Neumann
- c) Harvard & Von Neumann
- d) None of the mentioned

Answer: b

Explanation: As only one memory is present in the Von Neumann architecture so it saves a lot of memory.

41. 8051 microcontrollers are manufactured by which of the following companies?

- a) Atmel
- b) Philips
- c) Intel
- d) All of the mentioned

Answer: d

Explanation: 8051 microcontrollers are manufactured by Intel, Atmel, Philips/Signetics, Infineon, Dallas Semi/Maxim.

42. AT89C2051 has RAM of:

- a) 128 bytes
- b) 256 bytes
- c) 64 bytes
- d) 512 bytes

Answer: a

Explanation: It has 128 bytes of RAM in it.

43. 8051 series has how many 16 bit registers?

- a) 2
- b) 3
- c) 1
- d) 0

Answer: a

Explanation: It has two 16 bit registers DPTR and PC.

44. When 8051 wakes up then 0x00 is loaded to which register?

- a) PSW
- b) SP
- c) PC
- d) None of the mentioned

Answer: c

Explanation: When 8051 wakes up, Program Counter (PC) loaded with 0000H. Because of this in 8051 first opcode is stored in ROM address at 0000H.

45. When the microcontroller executes some arithmetic operations, then the flag bits of which register are affected?

- a) PSW
- b) SP
- c) DPTR
- d) PC

Answer: a

Explanation: It stands for program status word. It consists of carry, auxiliary carry, overflow, parity, register bank select bits etc which are affected during such operations.

46. How are the status of the carry, auxiliary carry and parity flag affected if the write instruction MOV A,#9C

ADD A,#64H

- a) CY=0,AC=0,P=0
- b) CY=1,AC=1,P=0
- c) CY=0,AC=1,P=0
- d) CY=1,AC=1,P=1

Answer: b

Explanation: On adding 9C and 64, a carry is generated from D3 and from the D7 bit so CY and AC are set to 1. In the result, the number of 1's present are even so parity flag is set to zero.

47. How are the bits of the register PSW affected if we select Bank2 of 8051?

- a) PSW.5=0 and PSW.4=1
- b) PSW.2=0 and PSW.3=1
- c) PSW.3=1 and PSW.4=1
- d) PSW.3=0 and PSW.4=1

Answer: d

Explanation: Bits of PSW register are CY, AC, F0, RS1, RS0, OV, -, P so for selecting bank2 RS1=1 and RS0=0 which are fourth and third bit of the register respectively.

48. If we push data onto the stack then the stack pointer

- a) increases with every push
- b) decreases with every push
- c) increases & decreases with every push
- d) none of the mentioned

Answer: a

Explanation: If we push elements onto the stack then the stack pointer increases with every push of element.

49. On power up, the 8051 uses which RAM locations for register R0- R7

- a) 00-2F
- b) 00-07
- c) 00-7F
- d) 00-0F

Answer: b

Explanation: On power up register bank 0 is selected which has memory address from 00H-07H.

50. How many bytes of bit addressable memory is present in 8051 based microcontrollers?

- a) 8 bytes
- b) 32 bytes
- c) 16 bytes
- d) 128 bytes

Answer: c

Explanation: 8051 microcontrollers have 16 bytes of bit addressable memory.

51. Which of the following should a microcontroller at-least should consist of?

- a) CPU, ROM, I/O ports and timers
- b) RAM, ROM, I/O ports and timers
- c) CPU, RAM, I/O ports and timers
- d) CPU, RAM, ROM, I/O ports and timers

Answer: d

Explanation: A microcontroller at least consists of a processor as its CPU with RAM, ROM, I/O ports and timers. It may contain some additional peripherals like ADC, PWM, etc.

52. Which of the following buses are present in a microcontroller for transferring data from one place to another?

- a) data bus only
- b) data bus, address bus
- c) address bus only
- d) address bus, data bus, control bus

Answer: d

Explanation: There are 3 buses present in a microcontroller they are data bus (for carrying data from one place to another), address bus (for carrying the address to which the data will flow) and the control bus (which tells the controller to execute which type of work at that address may be it read or write operation).

53. Which of the following file extension that is loaded in a microcontroller for executing any instruction?

- a) .c
- b) .txt
- c) .hex
- d) .doc

Answer: c

Explanation: Microcontrollers are loaded with .hex extension as they understand the language of 0's and 1's only.

54. Which of the following architecture is followed by general-purpose microprocessors?

- a) Von Neumann architecture
- b) Harvard architecture
- c) None of the mentioned
- d) All of the mentioned

Answer: a

Explanation: General purpose microprocessors make use of Von Neumann architecture as here a simpler design is offered.

55. Which of the following microcontroller doesn't match with its architecture below?

- a) ARM7 – Von Neumann
- b) Microchip PIC – Harvard
- c) ARM9 – Harvard
- d) MSP430 – Harvard

Answer: d

Explanation: MSP430 supports Von Neumann architecture.

The following table contains multiple choice questions and answers on microcontroller basics, von neumann and harward architectures.

56. When the microcontroller executes some arithmetic operations, then the flag bits of which register are affected?

- a) DPTR
- b) PSW
- c) PC
- d) SP

Answer: b

Explanation: It stands for program status word. It consists of carry, auxiliary carry, overflow, parity, register bank select bits etc which are affected during such operations.

57. What steps have to be followed for interfacing a sensor to a microcontroller 8051?

- a) interface sensor with ADC and ADC with 8051
- b) interface sensor with the MAX232, send now to microcontroller, analyse the results
- c) make the appropriate connections with the controller, ADC conversion, analyse the results
- d) none of the mentioned

Answer: a

Explanation: For interfacing a sensor with an 8051 microcontroller, we need ADC in between because output of sensor is analog and microcontroller works on digital signals only. So whatever signal generated by the sensor is converted into its digital equivalent using ADC and equivalent digital signal is given to the microcontroller for processing.

58. Which out of the four ports of 8051 needs a pull-up resistor for using it is as an input or an output port?

- a) PORT 3
- b) PORT 2
- c) PORT 1
- d) PORT 0

Answer: d

Explanation: These pins are the open drain pins of the controller which means it needs a pull-up resistor for using it as an input or an output ports.

59. Which of the following instructions have no effect on the flags of PSW?

- a) XRL
- b) ANL
- c) ORL
- d) All of the mentioned

Answer: d

Explanation: These instructions are the arithmetic operations and the flags are affected by the data copy instructions, so all these instructions don't affect the bits of the flag.

60. Auto reload mode is allowed in which of the following mode of the timer?

- a) Mode 3
- b) Mode 2
- c) Mode 1
- d) Mode 0

Answer: b

Explanation: Auto reload is allowed in the Mode 2 of the timer because here in this mode, we don't need to load the count again and again in the register.

61. Which of the following devices are specifically being used for converting serial to parallel and from parallel to serial respectively?

- a) microcontroller
- b) timers
- c) counters
- d) registers

Answer: d

Explanation: Some registers like the parallel in serial out and serial in parallel out are used to convert serial data into parallel and vice versa respectively.

62. Which of the following is the logic level understood by the micro-controller/micro-processor?

- a) RS232 logic level
- b) TTL & RS232 logic level
- c) TTL logic level
- d) None of the mentioned

Answer: c

Explanation: TTL logic or the transistor logic level is the logic that is understood by the micro-controllers/microprocessors.

63. What is the correct order of priority that is set after a controller gets reset?

- a) INT0 > TF0 > INT1 > TF1 > RI/TI
- b) RI/TI > TF1 > TF0 > INT1 > INT0
- c) INT0 < TF0 < INT1 < TF1 < RI/TI
- d) RI/TI < TF1 < TF0 < INT1 < INT0

Answer: a

Explanation: On reset Interrupt Priorities are as INT0 > TF0 > INT1 > TF1 > RI/TI, where '>' is used to denote highest priority.

64. Which of the following step/s is/are correct to perform reading operation from an LCD?

- a) R/W pin is set high
- b) low to high pulse at E pin & R/W pin is set high
- c) low to high pulse at E pin
- d) none of the mentioned

Answer: b

Explanation: For reading operations, R/W pin should be made high and added to it, a low to high pulse is also generated at the E pin.

65. Which of the following steps detects the key in a 4*4 keyboard matrix about the key that is being pressed?

- a) checking that whether the key is actually pressed or not
- b) masking of bits
- c) ensuring that initially, all keys are open
- d) all of the mentioned

Answer: d

Explanation: For detecting that whether the key is actually pressed or not, firstly this must be ensured that initially all the keys are closed. Then we need to mask the bits individually to detect that which key is pressed. Then we need to check that is the key actually pressed or not, by checking that whether the key pressed for a time more than 20 micro seconds.

66. Which of the following statements are true about DAC0808?

- a) it has current as an output
- b) parallel digital data to analog data conversion
- c) all of the mentioned
- d) none of the mentioned

Answer: b

Explanation: DAC0804 is used for parallel data to analog data conversion.

67. Which pins of a microcontroller are directly connected with 8255?

- a) WR
- b) D0-D7
- c) RD
- d) All of the mentioned

Answer: d

Explanation: RD, WR, D0-D7 all are directly connected to the 8051 for telling the chip about the control signals and also for transferring the data.

68. Which pins are used to select the ports and the control register?

- a) A0
- b) CS
- c) A1
- d) All of the mentioned

Answer: d

Explanation: CS pin is an active low input pin for 8255 and it is used for selecting a chip. A0 and A1 pins are used for select ports and the control register.

69. Why are solid-state relays advantageous over electromechanical relays?

- a) they need less voltage to be energised
- b) they need zero voltage circuit
- c) they need less current to be energised
- d) none of the mentioned

Answer: c

Explanation: Solid-state relays are advantageous over electromechanical relays because their switching response time is much faster than electromechanical relays as solid-state relays are made-up of semiconductor materials. Also, solid-state relays required low input current for operation and small packaging make them ideal for microcontrollers.

70. The total space for the data memory available in the AVR-based microcontroller is?

- a) FFFH
- b) FH
- c) FFFFH
- d) FFFFFFFFH

Answer: c

Explanation: The maximum value that can be loaded in the code memory of an AVR based microcontroller is FFFFH.

71. Which of the following is correct about BRNE instruction in avr microcontrollers?

- a) it is used to jump to the given mentioned label when the zero flag accounts to 0
- b) it is used to check the zero flag
- c) it is used to compare two registers
- d) it is used to compare two values

Answer: a

Explanation: BRNE label instruction is used to jump to that particular address denoted by label if condition (Z=0) is true or satisfied. If the condition is not satisfied then it will execute the next immediate instruction.

72. In AVR, which registers are there for the I/O programming of ports?

- a) PIN

- b) DDR
- c) PORT
- d) All of the mentioned

Answer: d

Explanation: For I/O programming of the ports in AVR microcontrollers, there are basically three main registers. They are PORT, PIN, DDR, so all of the mentioned is the right option.

73. Which of the following is correct about the MUL instruction?

- a) the product is stored in two registers R1 and R0
- b) it is a byte-by-byte multiplication instruction
- c) none of the mentioned
- d) all of the mentioned

Answer: d

Explanation: MUL instruction is a byte-by-byte multiplication instruction whose result is stored in two registers R1 and R0.

74. Which of the timer can operate in the 16 bit condition?

- a) timer2
- b) timer0
- c) timer1
- d) all of the mentioned

Answer: c

Explanation: Timer0 and Timer2 can operate in the 8 bit condition while only Timer 1 operates in the 16 bit condition.

75. What is the address in the interrupt service routine assigned for the timer0 overflow flag?

- a) 0016h
- b) 0012h
- c) 000Ah
- d) all of the mentioned

Answer: a

Explanation: 0016h is the address in the interrupt service routine assigned for the timer0 overflow flag.

76. What will happen in that condition, if an interrupt occurs while the microcontroller is serving any other interrupt?

- a) the interrupt that is more priority in the interrupt vector table will be served first
- b) both the interrupts will be handled simultaneously
- c) the interrupt having low priority in the interrupt vector table will be served first
- d) the interrupt which is being done first will be served first

Answer: a

Explanation: If two or more interrupts occur simultaneously then the interrupt that is having more priority in the interrupt vector table will be served first.

77. Which of the following bits are used for setting the data frame size?

- a) MPCM
- b) DOR
- c) U2X
- d) UCSZ0

Answer: d

Explanation: UCSZ0 and UCSZ1 bits of the UCSRB register and the UCSZ2 bit of the UCSRC register are used for setting the data frame size in AVR based microcontrollers.

78. Which of the following factors can affect the step size calculation?

- a) input current
- b) output current
- c) number of bits
- d) all of the mentioned

Answer: c

Explanation: There are mainly two factors that can affect the step size calculation of an ADC converter, they are the number of bits and the Vref voltage.

79. What is the internal Vref of an Atmega32 series?

- a) 3.3V
- b) 2.56V
- c) 5V
- d) all of the mentioned

Answer: b

Explanation: 2.56V is the internal Vref selected for an Atmega32 series based microcontrollers.

80. The 8255 is a _____ chip.

- a) Digital to analog
- b) Input/Output
- c) Analog to Digital
- d) None of the mentioned

Answer: b

Explanation: The 8255 is Input/Output (I/O) chip. It has three separate accessible ports. The 8255 chip is used to expand the I/O ports of microcontrollers.

81. Which pins of a microcontroller are directly connected with 8255?

- a) WR
- b) D0-D7
- c) RD
- d) All of the mentioned

Answer: d

Explanation: RD, WR, D0-D7 all are directly connected to the 8051 for telling the chip about the control signals and also for transferring the data.

82. Does 8255 have handshaking capability?

- a) depends on the conditions
- b) cant be said
- c) yes
- d) no

Answer: c

Explanation: 8255 is a device that with the help of its handshaking property gets interfaced with any microcontroller.

83. Why are ULN2803 normally used between the microcontrollers and the relays?

- a) for increasing the voltage capability required by a relay

- b) for switching purposes
- c) for increasing the current capability required by a relay
- d) all of the mentioned

Answer: c

Explanation: More current is desired for driving a motor with the help of a relay, so a ULN2803 is used for increasing the current as per the requirement of the relay.

84. Why are optoisolators normally used between the microcontrollers and the ULN2803?

- a) to reduce the back emf
- b) to increase the current
- c) to increase the voltage
- d) to optimize the current

Answer: a

Explanation: Opto isolators are used between the microcontrollers and the ULN2803 chips in order to decrease the back emf from the ULN2803 and to save the microcontrollers for a long time.

85. Which of the following bit/s of the status register that allows the microcontroller to operate in its low power mode?

- a) CPU off
- b) Z
- c) N
- d) Reserved

Answer a

Explanation: The CPU off bit, OSC off bit, SCG0 bit, SCG1 bit of the status register are used to allow the microcontroller to operate in its low power mode.

86. To improve the efficiency of an MSP430 based microcontroller, for one register

- a) there are two values for each addressing mode
- b) there is only one value for all addressing modes
- c) there are 4 values for four addressing modes
- d) there are 2 values for four addressing modes

Answer: c

Explanation: In MSP430, there are namely 4 addressing modes. So the main advantage of this controller(which basically increases its efficiency)is that for one register their exists 4 different values for 4 different addressing modes of the controller.

87. Which of the following instruction is used to call functions?

- a) GO
- b) CALL
- c) MOV
- d) All of the mentioned

Answer: b

Explanation: CALL instruction is used for going to a particular address in MSP430. It actually causes the pointer to jump at a particular address and push the current address of the PC to the stack.

88. Which of the following can generate a nonmaskable interrupt?

- a) timer_A interrupt
- b) compare / capture interrupt
- c) access violation to flash memory, ACCVIFG
- d) all of the mentioned

Answer: c

Explanation: A nonmaskable interrupt is generated by an access violation to flash memory, ACCVIFG.

89. Which of the following modes is also known as the RAM retention mode?

- a) LPM4
- b) LPM0
- c) LPM3
- d) All of the mentioned

Answer: a

Explanation: LPM4 is known as the RAM retention mode. Here, the CPU and all clocks are disabled, $I \approx 0.1A$. The device can be woken only by an external signal.

90. What are the basic functions of a timer?

- a) it can control the compare, capture mode
- b) it provided a time delay
- c) it can act as a counter
- d) all of the mentioned

Answer: d

Explanation: Timers are used to provide a time delay, they can even act as a counter and control the compare capture mode of a microcontroller.

91. Which of the following is correct about WDTCTL?

- a) it is guarded against accidental writes that require a password
- b) a reset will occur if a value with an incorrect password is written to WDTCTL
- c) it is a 16 bit register
- d) all of the mentioned

Answer: d

Explanation: WDTCTL is a 16 bit register that is used for protecting the microcontroller. It actually resets the value when an incorrect password is written to WDTCTL.

91. What is the function of this instruction “WDTCTL = WDTPW | WDTCONFIG”, where `##define WDTCONFIG (WDTCNTCL|WDTSSSEL)**`

- a) it configures and sets the watchdog timer
- b) it stops the watchdog timer
- c) it sets the watchdog timer
- d) it configures and clears the watchdog timer

Answer: d

Explanation: WDTCTL = WDTPW | WDTCONFIG instruction is used to clear and configure the watchdog timer of a microcontroller.

92. Which of the following is the analog to digital converter that is present in the MSP430 based processors?

- a) sigma delta ADC
- b) comparator
- c) successive approximation ADC
- d) all of the mentioned

Answer: d

Explanation: A comparator module, a successive approximation ADC module and a sigma delta ADC converters are found in the MSP based processors.

93. Which bit is used for exchanging the two inputs of the comparator and invert its output to compensate?

- a) CASHORT
- b) CAEX
- c) CAIFG
- d) CAPD

Answer: b

Explanation: CAEX is used for exchanging the two inputs of the comparator and invert its output to compensate.

94. SPI needs _____ wires than I2C?

- a) depends on the conditions
- b) more
- c) less
- d) same

Answer: b

Explanation: In SPI, there is no control of transmission in software—no addresses or acknowledgment, that's why it requires more amount of wires.

95. Which of the following is the slave to be addressed when a device acts as a master?

- a) UCB0I2CIE
- b) UCB0I2COA
- c) UCB0I2CSA
- d) All of the mentioned

Answer: c

Explanation: UCB0I2CSA is the slave to be addressed when a device acts as a master.

96. Which of the following is an issue while programming I2C using the software?

- a) open-drain output
- b) totem pole output
- c) open-collector output
- d) all of the mentioned

Answer: a

Explanation: There are two main issues while programming I2C using software, they are the open-drain output and the detection of start and stop conditions.

97. Which of the following conditions is more difficult to attain?

- a) synchronous masters
- b) asynchronous slaves
- c) asynchronous masters
- d) synchronous slaves

Answer: b

Explanation: Synchronous slaves are the most difficult to attain because the problem is that the slave must react quickly when a clock transition arrives from the master.

98. What do you mean by micro in microcontroller?

- a) Distance between 2 IC's
- b) Distance between 2 transistors
- c) Size of a controller
- d) Distance between 2 pins

Answer: b

Explanation: Micro means 10^{-6} which gives the distance between 2 element transistors which is called as Micron Technology.

99. What is the bit size of the 8051 microcontroller?

- a) 8-bit
- b) 4-bit
- c) 16-bit
- d) 32-bit

Answer: a

Explanation: It is an 8-bit microcontroller which means most of the operations are limited to 8 bit only.

100. Name the architecture and the instruction set for microcontroller?

- a) Van- Neumann Architecture with CISC Instruction Set
- b) Harvard Architecture with CISC Instruction Set
- c) Van- Neumann Architecture with RISC Instruction Set
- d) Harvard Architecture with RISC Instruction Set

Answer: b

Explanation: Harvard architecture has different memory spaces for both program memory and data memory with Complex Instruction Set Computer(CISC). The difference between CISC and RISC is RISC has few instructions than CISC. Where as in Van- Neumann, program and data memory are same. Van- Neumann is also called as Princeton architecture.

101. Number of I/O ports in the 8051 microcontroller?

- a) 3 ports
- b) 4 ports
- c) 5 ports
- d) 4 ports with last port having 5 pins

Answer: b

Explanation: It has 4 ports with port0 act as I/O port and also multiplexing of address and data bus. Port1act as I/O port. Port 2 act as I/O and also like address lines. Port 3 act as I/O and also for external peripherals.

102. Is ROM is used for storing data storage?

- a) True
- b) False

Answer: b

Explanation: RAM is used for storing data storage and ROM is used for storing program memory.

103. SCON in serial port is used for which operation?

- a) Transferring data
- b) Receiving data
- c) Controlling
- d) Controlling and transferring

Answer: c

Explanation: There are 2 pins available in serial port. One is used for transmission and other is used for receiving data. SCON is the bit in the serial port which is used for controlling the operation.

104. Program counter stores what?

- a) Address of before instruction

- b) Address of the next instruction
- c) Data of the before execution to be executed
- d) Data of the execution instruction

Answer: b

Explanation: Points to the address of the next instruction to be executed from ROM. It is 16 bit register means the 8051 can access program address from 0000H to FFFFH. Total 64KB of code.

105. Auxiliary carry is set during which condition?

- a) When carry is generated from D3 to D4
- b) When carry is generated from D7
- c) When carry is generated from both D3 to D4 and D7
- d) When carry is generated at either D3 to D4 or D7

Answer: a

Explanation: When carry is generated from D3 to D4, it is set to 1, it is used in BCD arithmetic.

106. What is order of the assembly and running 8051 program?

- i) Myfile.asm
 - ii) Myfile.lst
 - iii) Myfile.obj
 - iv) Myfile.hex
- a) i,ii,iii,iv
 - b) ii,iii,i,iv
 - c) iv,ii,i,iii
 - d) iii,ii,i,iv

Answer: a

Explanation: After writing the program in editor and compilation first .asm, .lst, .obj, .hex are created.

107. The use of Address Latch Enable is to multiplex address and data memory.

- a) True
- b) False

Answer: a

Explanation: That is used for multiplexing address and data i.e., the same line carries address and data. To indicate when it carries address, ALE is emitted by 8051.

108. Which pin provides a reset option in 8051?

- a) Pin 1
- b) Pin 8
- c) Pin 11
- d) Pin 9

Answer: d

Explanation: Reset pin is utilized to set the micro controller 8051 to its primary values, whereas the micro controller is functioning or at the early beginning of application. The reset pin has to be set elevated for two machine rotations.

109. External Access is used to permit _____

- a) Peripherals
- b) Power supply
- c) ALE
- d) Memory interfacing

Answer: d

Explanation: External Access input is employed to permit or prohibit outer memory interfacing. If there is no outer memory needed, this pin is dragged by linking it to Vcc.

110. What is the address range of SFRs?

- a) 80h to feh
- b) 00h to fff
- c) 80h to fff
- d) 70h to 80h

Answer: c

Explanation: In 8051 there certain registers which uses the RAM addresses from 80h to fff. These are called as Special Function Registers. Some of the SFRs are I/O ports and control operations as TCON, SCON, PCON.

111. How many interrupts are there in micro controller?

- a) 3
- b) 6
- c) 4
- d) 5

Answer: d

Explanation: An interrupt is an external or internal event that disturbs the microcontroller to inform if that needs its services. There are 5 interrupts :

Timer 0 overflow interrupt

Timer 1 overflow interrupt

External Interrupt 0

External Interrupt 1

Serial port events.

112. Timer 0 is a _____ bit register.

- a) 32-bit
- b) 8-bit
- c) 16-bit
- d) 10-bit

Answer: c

Explanation: The Timer 0 is a 16-bit register and can be treated as two 8-bit registers and these can be accessed similarly to any other registers.

IOT Questions and Answers – Microcontroller (8051- Pin, Registers, Timers)

This set of IOT Multiple Choice Questions & Answers (MCQs) focuses on “Microcontroller (8051- Pin, Registers, Timers)”.

113. Number of pins in 8051 microcontroller with _____ package.

- a) 40 pin with LLC
- b) 60 Pin with QFP
- c) 40 pin with DIP
- d) 60 pin with QFP

Answer: c

Explanation: The 8051 family members have different packages, such as DIP(Dual In Line), QFP(Quad Flap Package), LLC(Leadless Chip Carrier) they all have 40 pins that are dedicated to different functions. Especially 8051 have a Dual in Line package.

114. Does an 8051 microcontroller need external oscillator to run?

- a) True
- b) False

Answer: a

Explanation: The 8051 has an on chip oscillator but requires an external oscillator clock to run it. Most often a quartz crystal oscillator is connected to inputs XTAL1 and XTAL2.

115. We use any other frequency source other than crystal oscillator.

- a) True
- b) False

Answer: a

Explanation: A frequency source other than crystal oscillator is used. It can be a TTL oscillator, it should be connected to XTAL1 and XTAL2 and left unconnected.

116. Reset work is _____

- a) To make program counter zero but values in registers values are made as zero
- b) Program counter is not zero but values in registers values are made as Zero
- c) Program counter not zero but values in registers values remain same
- d) To make program counter zero but values in registers values remain same

Answer: d

Explanation: It is an input pin and active high. When we apply a high pulse it terminates all activities and it cost all the values in the register to be zero. It will also set program counter to zero.

117. What is the minimum no of cycles required for reset operation?

- a) 3 cycle
- b) 2 cycles
- c) 1 cycles
- d) 4 cycles

Answer: c

Explanation: When power is turned on, the circuit holds the RST pin high for an amount of time that depends on the capacitor value and the rate at which it changes. To ensure a valid reset the RST pin must be held high long enough to allow the oscillator to start up plus two machine cycles.

118. PSEN stands for _____

- a) Program Select Enable
- b) Peripheral Store Enable
- c) Program Store Enable
- d) Peripheral Select Enable

Answer: c

Explanation: This is an output pin. In an 8031-based system in which an external ROM holds the program code, this pin is connected to the OE pin of the ROM.

119. Find the machine cycle for AT89C51 if XTAL = 11.0592MHz.

- a) 90.42us
- b) 361.68us
- c) 1.085us
- d) 150.145us

Answer: b

Explanation: Machine cycle = No.of cycles/frequency

Time = 1/frequency
Time(ns) = 1/11.0592MHz
= 90.42ns
Machine cycles = 12*90.42
= 1.085us.

120. What is the operation for mode 0?

- a) 13-bit timer mode, 8-bit timer/counter THx and TLx as 5-bit prescaler
- b) 16-bit timer mode, 16-bit timer/counter THx and TLx are cascaded, no prescaler
- c) 8-bit auto reload mode, 8-bit auto reload time/counter; THx holds a value which is to be reloaded into TLx each time it overflows
- d) Split timer mode

Answer: a

Explanation: Mode 0 is exactly same like mode 1 except that it is a 13-bit timer instead of 16-bit. The 13-bit counter can hold values between 0000 to 1FFH in Th-Tl.

121. What is the operation for mode 1?

- a) 13-bit timer mode, 8-bit timer/counter THx and TLx as 5-bit prescaler
- b) 16-bit timer mode, 16-bit timer/counter THx and TLx are cascaded, no prescaler
- c) 8-bit auto reload mode, 8-bit auto reload time/counter; THx holds a value which is to be reloaded into TLx each time it overflows
- d) Split timer mode

Answer: b

Explanation: It is a 16-bit timer; therefore it allows value from 0000 to FFFFH to be loaded into the timer's register TL and TH. After TH and TL are loaded with a 16-bit initial value, the timer must be started.

122. Which is the operation for mode 2?

- a) 13-bit timer mode, 8-bit timer/counter THx and TLx as 5-bit prescaler
- b) 16-bit timer mode, 16-bit timer/counter THx and TLx are cascaded, no prescaler
- c) 8-bit auto reload mode, 8-bit auto reload time/counter; THx holds a value which is to be reloaded into TLx each time it overflows
- d) Split timer mode

Answer: c

Explanation: It is an 8-bit timer that allows only values of 00 to FFH to be loaded into the timer's register TH. After TH is loaded with 8-bit value, 8051 gives a copy of it to TL.

123. Which is the operation for mode 3?

- a) 13-bit timer mode, 8-bit timer/counter THx and TLx as 5-bit prescaler
- b) 16-bit timer mode, 16-bit timer/counter THx and TLx are cascaded, no prescaler
- c) 8-bit auto reload mode, 8-bit auto reload time/counter; THx holds a value which is to be reloaded into TLx each time it overflows
- d) Split timer mode

Answer: d

Explanation: Mode 3 is also known as a split timer mode. Timer 0 and 1 may be programmed to be in mode 0, 1 and 2 independently of similar mode for other time.

124. Function of IE1 in TCON register?

- a) External interrupt 1 Edge flag. Not related to timer operations
- b) External interrupt 1 Edge flag. Not related to timer operations
- c) External interrupt 0 single type control bit

d) External interrupt 1 to be triggered by a falling edge signal

Answer: a

Explanation: TCON register has 8 bits. 3rd bit has an IE1 register. This is an external interrupt.

125. 8051 controller contains how many registers?

a) 5

b) 3

c) 1

d) 2

Answer: d

Explanation: 8051 microcontroller has 2 types of registers. They are Special Function Registers and the other is General purpose register. Each of having 128KB of memory. And GPR is a Byte addressable register and SFR is a Bit addressable register.

126. General purpose memory is called as _____

a) ROM memory

b) RAM memory

c) SRAM memory

d) EPROM memory

Answer: b

Explanation: The general purpose memory is called as the RAM memory of the 8051 microcontroller, which is divided into 3 areas such as banks, bit-addressable area, and scratch-pad area.

127. Which timer register has both timers in it?

a) TMOD

b) TCON

c) Both TMOD and TCON

d) Neither TMOD nor TCON

Answer: a

Explanation: In the TMOD register, lower 4 bits are set for timer0 and the upper 4 bits are set aside for timer1. In each case, the lower 2 bits are used to set the timer mode and upper 2 bits to specify the operation.

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04-8051 instruction set & programming	Marks:-12
Content of Chapter:- 2.1 Addressing modes 2.2 Instruction set 2.3 Assembly language programming 2.4 "Software development cycle- Editor, Assembler, cross compiler, linker, locater, compiler" 2.5 Assembler directive- ORG, DB, EQU, END, CODE, DATA	

1. "DJNZ R0, label" is _____ byte instruction.

- a) 2
- b) 3
- c) 1
- d) Can't be determined

Answer: a

Explanation: DJNZ is 2-byte instruction. This means jump can be of -128 to +127 locations with respect to PC. Here -128 means upward or backward jump and +127 means downward or forward jump.

2. JZ, JNZ, instructions checked content of _____ register.

- a) DPTR
- b) B
- c) A
- d) PSW

Answer: c

Explanation: JZ and JNZ instructions checked the content of A register and if condition was satisfied or true then jump to target address.

3. Calculate the jump code for again and here if code starts at 0000H

```
MOV R1,#0
MOV A,#0
MOV R0,#25H
AGAIN:ADD A,#0ECH
JNC HERE
HERE: INC R1
DJNZ R0,AGAIN
MOV R0,A
END
```

- a) F3,02
- b) F9,01

c) E9,01

d) E3,02

Answer: c

Explanation: Loop address is calculated by subtracting destination address and the address next to the source address. So here if we start with 0000H then source address is 0008H and the destination address is 0004H So loop address is $04-0A=E9$

4. When the call instruction is executed the topmost element of stack comes out to be

a) the address where stack pointer starts

b) the address next to the call instruction

c) address of the call instruction

d) next address of the stack pointer

Answer: b

Explanation: The topmost element of the stack is the address of the instruction next to the call instruction so that when RET is executed then PC is filled with that address and so the pointer moves to the main program and continue with its routine task.

5. LCALL instruction takes

a) 2 bytes

b) 4 bytes

c) 3 bytes

d) 1 byte

Answer: c

Explanation: LCALL instruction moves the pointer to a 16 bit address so it is a 3 byte instruction.

6. Are PUSH and POP instructions are a type of CALL instructions?

a) yes

b) no

c) none of the mentioned

d) cant be determined

Answer: b

Explanation: PUSH and POP instructions are not CALL instructions because in POP and PUSH instructions the pointer does not move to any location specified by its address which is the fundamental of CALL instruction, so it is not a type of CALL instruction.

7. What is the time taken by one machine cycle if crystal frequency is 20MHz?

a) 1.085 micro seconds

b) 0.60 micro seconds

c) 0.75 micro seconds

d) 1 micro seconds

Answer: b

Explanation: Time taken by one machine cycle is calculated by the inverse of a (crystal frequency) /12

8. Find the number of times the following loop will be executed

```
MOV R6,#200
BACK:MOV R5,#100
HERE:DJNZ R5, HERE
DJNZ R6,BACK
END
```

- a) 100
- b) 200
- c) 20000
- d) 2000

Answer: c

Explanation: It will be executed 200×100 times.

9. What is the meaning of the instruction MOV A,05H?

- a) data 05H is stored in the accumulator
- b) fifth bit of accumulator is set to one
- c) address 05H is stored in the accumulator
- d) none of the mentioned

Answer: c

Explanation: If we need to store the address in the accumulator, then directly the address is moved to it unlikely of using # used for storing data in any register.

10. Do the two instructions mean the same?

- 1) BACK: DEC R0
JZ BACK
 - 2) BACK: DJNZ R0, BACK
- a) yes
 - b) no
 - c) cant be determined
 - d) yes and the second one is preferred

Answer: b

Explanation: In the first statement, when the decrements approach zero then the jump moves back and in the second statement, when the result after decrements is not zero, then it jumps back.

11. To initialize any port as an output port what value is to be given to it?

- a) 0xFF
- b) 0x00
- c) 0x01
- d) A port is by default an output port

Answer: d

Explanation: In 8051, a port is initialized by default in its output mode no need to pass any value to it.

12. Which out of the four ports of 8051 needs a pull-up resistor for using it is as an input or an output port?

- a) PORT 0
- b) PORT 1

- c) PORT 2
- d) PORT 3

Answer: a

Explanation: These pins are the open drain pins of the controller which means it needs a pull-up resistor for using it as an input or an output ports.

13. Which of the ports act as the 16 bit address lines for transferring data through it?

- a) PORT 0 and PORT 1
- b) PORT 1 and PORT 2
- c) PORT 0 and PORT 2
- d) PORT 1 and PORT 3

Answer: c

Explanation: PORT 0 and PORT 2 are used as the 16 bit address lines where PORT0 act as lower bit address lines and PORT 2 as higher bit address lines.

14. Which of the following registers are not bit addressable?

- a) SCON
- b) PCON
- c) A
- d) PSW

Answer: b

Explanation: PCON register is not a bit addressable register.

15. Which instruction is used to check the status of a single bit?

- a) MOV A,P0
- b) ADD A,#05H
- c) JNB P0.0, label
- d) CLR P0.05H

Answer: c

Explanation: JNB which stands for Jump if no bit checks the status of the bit P0.0 and jumps if the bit is 0.

16. Which addressing mode is used in pushing or popping any element on or from the stack?

- a) immediate
- b) direct
- c) indirect
- d) register

Answer: b

Explanation: If we want to push or pop any element on or from the stack then direct addressing mode has to be used in it, as the other way is not accepted.

17. Which operator is the most important while assigning any instruction as register indirect instruction?

- a) \$
- b) #
- c) @

d) &

Answer: c

Explanation: In register, indirect mode data is copied at that location where R0 or R1 are present, so @ operator is used ex. MOV @R0,A

18. What is the advantage of register indirect addressing mode?

- a) it makes use of registers R0 and R1
- b) it uses the data dynamically
- c) it makes use of operator @
- d) it is easy

Answer: b

Explanation: Register indirect addressing mode is useful if a series of data is to be assigned to that address, with the help of this quality the number of instructions decreases as a result of which performance increases.

19. Which of the following comes under the indexed addressing mode?

- a) MOVX A, @DPTR
- b) MOVC @A+DPTR,A
- c) MOV A,R0
- d) MOV @R0,A

Answer: b

Explanation: Indexed addressing mode stands for that instruction where the bits of the accumulator is also indexed with the 16 bit registers.

20. Is this a valid statement?

SETB A

- a) yes
- b) no
- c) cant be determined
- d) none of the mentioned

Answer: b

Explanation: SETB is used to set a bit of a register. A stands for accumulator which is an 8 bit register, so it is an invalid instruction.

21. When we add two numbers the destination address must always be.

- a) some immediate data
- b) any register
- c) accumulator
- d) memory

Answer: c

Explanation: For addition purposes, the destination address must always be an accumulator. Example- ADD A,R0; ADD A, @R1; ADD A,@ DPTR

22. Unlike microprocessors, microcontrollers make use of batteries because they have:

- a) high power dissipation
- b) low power consumption
- c) low voltage consumption
- d) low current consumption

Answer: b

Explanation: Micro Controllers are made by using the concept of VLSI technology. So here, CMOS based logic gates are coupled together by this technique that consumes low power.

23. What is the order decided by a processor or the CPU of a controller to execute an instruction?

- a) decode,fetch,execute
- b) execute,fetch,decode
- c) fetch,execute,decode
- d) fetch,decode,execute

Answer: d

Explanation: First instruction is fetched from Program Memory. After fetching, instruction is decoded to generate control signals to perform the intended task. After decoding, instruction is executed and the complete intended task of that particular instruction.

24. If we say microcontroller is 8-bit then here 8-bit denotes size of:

- a) Data Bus
- b) ALU
- c) Control Bus
- d) Address Bus

Answer: b

Explanation: If we say a microcontroller is 8-bit it means that it is capable of processing 8-bit data at a time. Data processing is the task of ALU and if ALU is able to process 8-bit data then the data bus should be 8-bit wide. In most books it tells that size of data bus but to be precise it is the size of ALU because in Harvard Architecture there are two sets of data bus which can be of same size but it is not mandatory

25. How are the performance and the computer capability affected by increasing its internal bus width?

- a) it increases and turns better
- b) it decreases
- c) remains the same
- d) internal bus width doesn't affect the performance in any way

Answer: a

Explanation: As the bus width increases, the number of bits carried by bus at a time increases as a result of which the total performance and computer capability increases.

26. Abbreviate CISC and RISC.

- a) Complete Instruction Set Computer, Reduced Instruction Set Computer
- b) Complex Instruction Set Computer, Reduced Instruction Set Computer
- c) Complex Instruction Set Computer, Reliable Instruction Set Computer
- d) Complete Instruction Set Computer, Reliable Instruction Set Computer

Answer: b

Explanation: CISC means Complete Instruction Set Computer because in this a microcontroller has an instruction set that supports many addressing modes for the arithmetic and logical instructions, data transfer and memory accesses instructions. RISC means Reduced Instruction Set Computer because here a microcontroller has an instruction set that supports fewer addressing modes for the arithmetic and logical instructions and for data transfer instructions.

27. Give the names of the buses present in a controller for transferring data from one place to another?

- a) data bus, address bus
- b) data bus
- c) data bus, address bus, control bus
- d) address bus

Answer: c

Explanation: There are 3 buses present in a microcontroller they are data bus (for carrying data from one place to another), address bus (for carrying the address to which the data will flow) and the control bus (which tells the controller to execute which type of work at that address may be it read or write operation).

28. What is the file extension that is loaded in a microcontroller for executing any instruction?

- a) .doc
- b) .c
- c) .txt
- d) .hex

Answer: d

Explanation: Microcontrollers are loaded with .hex extension as they understand the language of 0's and 1's only.

29. What is the most appropriate criterion for choosing the right microcontroller of our choice?

- a) speed
- b) availability
- c) ease with the product
- d) all of the mentioned

Answer: d

Explanation: For choosing the right microcontroller for our product we must consider its speed so that the instructions may be executed in the least possible time. It also depends on the availability so that the particular product may be available in our neighboring regions or market in our need. It also depends on the compatibility with the product so that the best results may be obtained.

30. Why microcontrollers are not called general purpose computers?

- a) because they have built in RAM and ROM
- b) because they design to perform dedicated task
- c) because they are cheap
- d) because they consume low power

Answer: b

Explanation: Microcontrollers are designed to perform dedicated tasks. While designing general purpose computers end use is not known to designers

31. "DJNZ R0, label" is _____ byte instruction.

- a) 2
- b) 3
- c) 1
- d) Can't be determined

Answer: a

Explanation: DJNZ is 2-byte instruction. This means jump can be of -128 to +127 locations with respect to PC. Here -128 means upward or backward jump and +127 means downward or forward jump.

32. JZ, JNZ, instructions checked content of _____ register.

- a) DPTR
- b) B
- c) A
- d) PSW

Answer: c

Explanation: JZ and JNZ instructions checked the content of A register and if condition was satisfied or true then jump to target address.

33. Calculate the jump code for again and here if code starts at 0000H

```
MOV R1,#0
MOV A,#0
MOV R0,#25H
AGAIN:ADD A,#0ECH
JNC HERE
HERE: INC R1
DJNZ R0,AGAIN
MOV R0,A
END
F3,02
```

- a) F3,02
- b) F9,01
- c) E9,01
- d) E3,02

Answer: c

Explanation: Loop address is calculated by subtracting destination address and the address next to the source address.

So here if we start with 0000H

then source address is 0008H and the destination address is 0004H So loop address is 04-0A=E9

34. When the call instruction is executed the topmost element of stack comes out to be

- a) the address where stack pointer starts
- b) the address next to the call instruction
- c) address of the call instruction

d) next address of the stack pointer

Answer: b

Explanation: The topmost element of the stack is the address of the instruction next to the call instruction so that when RET is executed then PC is filled with that address and so the pointer moves to the main program and continue with its routine task.

35. LCALL instruction takes

a) 2 bytes

b) 4 bytes

c) 3 bytes

d) 1 byte

Answer: c

Explanation: LCALL instruction moves the pointer to a 16 bit address so it is a 3 byte instruction.

36. Are PUSH and POP instructions are a type of CALL instructions?

a) yes

b) no

c) none of the mentioned

d) cant be determined

Answer: b

Explanation: PUSH and POP instructions are not CALL instructions because in POP and PUSH instructions the pointer does not move to any location specified by its address which is the fundamental of CALL instruction, so it is not a type of CALL instruction.

37. What is the time taken by one machine cycle if crystal frequency is 20MHz?

a) 1.085 micro seconds

b) 0.60 micro seconds

c) 0.75 micro seconds

d) 1 micro seconds

Answer: b

Explanation: Time taken by one machine cycle is calculated by the inverse of a (crystal frequency) /12

38. Find the number of times the following loop will be executed

```
MOV R6,#200
```

```
BACK:MOV R5,#100
```

```
HERE:DJNZ R5, HERE
```

```
DJNZ R6,BACK
```

```
END
```

a) 100

b) 200

c) 20000

d) 2000

Answer: c

Explanation: It will be executed 200*100 times.

39. What is the meaning of the instruction MOV A,05H?

- a) data 05H is stored in the accumulator
- b) fifth bit of accumulator is set to one
- c) address 05H is stored in the accumulator
- d) none of the mentioned

Answer: c

Explanation: If we need to store the address in the accumulator, then directly the address is moved to it unlikely of using # used for storing data in any register.

40. Do the two instructions mean the same?

- 1) BACK: DEC R0
JZ BACK
- 2) BACK: DJNZ R0, BACK

- a) yes
- b) no
- c) cant be determined
- d) yes and the second one is preferred

Answer: b

Explanation: In the first statement, when the decrements approach zero then the jump moves back and in the second statement, when the result after decrements is not zero, then it jumps back.

41. When we add two numbers the destination address must always be.

- a) some immediate data
- b) any register
- c) accumulator
- d) memory

Answer: c

Explanation: For addition purposes, the destination address must always be an accumulator. Example- ADD A,R0; ADD A, @R1; ADD A,@ DPTR

42. DAA command adds 6 to the nibble if:

- a) CY and AC are necessarily 1
- b) either CY or AC is 1
- c) no relation with CY or AC
- d) CY is 1

Answer: b

Explanation: DAA command adds 6 to the nibble if any of the nibbles becomes greater than 9.

43. If SUBB A,R4 is executed, then actually what operation is being applied?

- a) R4+A
- b) R4-A
- c) A-R4

d) R4+A

Answer: c

Explanation: SUBB command subtracts with borrow the contents of an accumulator with that of the register or some immediate value. So A-R4 is being executed.

44. A valid division instruction always makes:

a) CY=0,AC=1

b) CY=1,AC=1

c) CY=0,AC=0

d) no relation with AC and CY

Answer: c

Explanation: When we divide two numbers then AC and CY become zero.

45. In 8 bit signed number operations, OV flag is set to 1 if:

a) a carry is generated from D7 bit

b) a carry is generated from D3 bit

c) a carry is generated from D7 or D3 bit

d) a carry is generated from D7 or D6 bit

Answer: d

Explanation: In 8 bit operations, if a carry is generated from D6 or D7 bit, then OV flag is set to 1.

46. In unsigned number addition, the status of which bit is important?

a) OV

b) CY

c) AC

d) PSW

Answer: b

Explanation: If unsigned numbers operations are involved, then the status of CY flag is important and in signed number operation the status of OV flag is important.

47. Which instructions have no effect on the flags of PSW?

a) ANL

b) ORL

c) XRL

d) All of the mentioned

Answer: d

Explanation: These instructions are the arithmetic operations and the flags are affected by the data copy instructions, so all these instructions don't affect the bits of the flag.

48. ANL instruction is used _____

a) to AND the contents of the two registers

b) to mask the status of the bits

c) all of the mentioned

d) none of the mentioned

Answer: c

Explanation: ANL instruction is used to AND the contents of the two registers and is also used to mask the status of the bits of the register.

49. CJNE instruction makes _____

- a) the pointer to jump if the values of the destination and the source address are equal
- b) sets CY=1, if the contents of the destination register are greater than that of the source register
- c) sets CY=0, if the contents of the destination register are smaller than that of the source register
- d) none of the mentioned

Answer: d

Explanation: In CJNE command, the pointer jumps if the values of the two registers are not equal and it resets CY if the destination address is larger than the source address and sets CY if the destination address is smaller than the source address.

50. XRL, ORL, ANL commands have _____

- a) accumulator as the destination address and any register, memory or any immediate data as the source address
- b) accumulator as the destination address and any immediate data as the source address
- c) any register as the destination address and accumulator, memory or any immediate data as the source address
- d) any register as the destination address and any immediate data as the source address

Answer: a

Explanation: These commands have accumulator as the destination address and any register, memory or any immediate data as the source address.

51. When we add two numbers the destination address must always be.

- a) some immediate data
- b) any register
- c) accumulator
- d) memory

Answer: c

Explanation: For addition purposes, the destination address must always be an accumulator. Example- ADD A,R0; ADD A, @R1; ADD A,@ DPTR

52. DAA command adds 6 to the nibble if:

- a) CY and AC are necessarily 1
- b) either CY or AC is 1
- c) no relation with CY or AC
- d) CY is 1

Answer: b

Explanation: DAA command adds 6 to the nibble if any of the nibbles becomes greater than 9.

53. If SUBB A,R4 is executed, then actually what operation is being applied?

- a) R4+A
- b) R4-A
- c) A-R4
- d) R4+A

Answer: c

Explanation: SUBB command subtracts with borrow the contents of an accumulator with that of the register or some immediate value. So A-R4 is being executed.

54. A valid division instruction always makes:

- a) CY=0,AC=1
- b) CY=1,AC=1
- c) CY=0,AC=0
- d) no relation with AC and CY

Answer: c

Explanation: When we divide two numbers then AC and CY become zero.

55. In 8 bit signed number operations, OV flag is set to 1 if:

- a) a carry is generated from D7 bit
- b) a carry is generated from D3 bit
- c) a carry is generated from D7 or D3 bit
- d) a carry is generated from D7 or D6 bit

Answer: d

Explanation: In 8 bit operations, if a carry is generated from D6 or D7 bit, then OV flag is set to 1.

56. In unsigned number addition, the status of which bit is important?

- a) OV
- b) CY
- c) AC
- d) PSW

Answer: b

Explanation: If unsigned numbers operations are involved, then the status of CY flag is important and in signed number operation the status of OV flag is important.

57. Which instructions have no effect on the flags of PSW?

- a) ANL
- b) ORL
- c) XRL
- d) All of the mentioned

Answer: d

Explanation: These instructions are the arithmetic operations and the flags are affected by the data copy instructions, so all these instructions don't affect the bits of the flag.

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- a) to AND the contents of the two registers

- b) to mask the status of the bits
- c) all of the mentioned
- d) none of the mentioned

Answer: c

Explanation: ANL instruction is used to AND the contents of the two registers and is also used to mask the status of the bits of the register.

59. CJNE instruction makes _____

- a) the pointer to jump if the values of the destination and the source address are equal
- b) sets CY=1, if the contents of the destination register are greater than that of the source register
- c) sets CY=0, if the contents of the destination register are smaller than that of the source register
- d) none of the mentioned

Answer: d

Explanation: In CJNE command, the pointer jumps if the values of the two registers are not equal and it resets CY if the destination address is larger than the source address and sets CY if the destination address is smaller than the source address.

60. XRL, ORL, ANL commands have _____

- a) accumulator as the destination address and any register, memory or any immediate data as the source address
- b) accumulator as the destination address and any immediate data as the source address
- c) any register as the destination address and accumulator, memory or any immediate data as the source address
- d) any register as the destination address and any immediate data as the source address

Answer: a

Explanation: These commands have accumulator as the destination address and any register, memory or any immediate data as the source address.

61. What are the pipelining stages include?

- a) Fetch, Decode, Write
- b) Fetch, Decode, Execute
- c) Fetch, Execute, Write
- d) Fetch, Decode, Execute, Write

Answer: a

Explanation: ARM7 core has 3-stage pipeline that increases instruction flow through processor up to three times. So each instruction is executed in 3 stages:

Fetch – instruction is fetched from memory and placed in pipeline

Decode – instruction is fetched and data-path signals prepared for next cycle

Execute – instruction from prepared data-path reads from registry bank, shifts operand to ALU and writes generated result to dominant register.

62. What is pipe lining?

- a) Non linear
- b) Linear

- c) Linear and Non linear
- d) Sometimes both

Answer: b

Explanation: Pipeline is linear, which means that in simple data processing processor executes one instruction in single clock cycle which while individual instruction takes three clock cycles.

63. What are the no of pins that are in the ARM7 processors?

- a) 65 pin with QFP
- b) 45 Pin with QFP
- c) 45 pin with LLC
- d) 65 pin with DIP

Answer: d

Explanation: The ARM7 family members have different packages, such as DIP(Dual In Line), QFP(Quad Flap Package), LLC(Leadless Chip Carrier) they all have 40 pins that are dedicated to different functions. Especially 8051 has a Quad Flap Package.

64. Using what the processor wake-up from power-down?

- a) External Interrupts
- b) Internal interrupts
- c) Serial Programming
- d) Program Counter

Answer: a

Explanation: The AVR7 processor wakes up from power down mode via external interrupt or BOD.

65. What is the flash memory for LPC2141?

- a) 34kB
- b) 32kB
- c) 128kB
- d) 256kB

Answer: b

Explanation: It is the first series of ARM7. This memory is used for both code and data storage. Programming of the flash memory may be accomplished in several ways. It can also be programmed in system via serial port.

66. What are the categories in the vectored interrupt controller?

- a) Fast interrupt request
- b) Non vectored interrupt request
- c) Non-vectored IQR
- d) Fast interrupt request, Non vectored interrupt request and Non-vectored IQR

Answer: d

Explanation: The vectored Interrupt controller accepts all the interrupts request inputs and categorizes them as Fast Interrupt Request, Vectored Interrupt Request, and Non Vectored IQR as defined by programmable settings. The programmable assignment scheme means that priorities of interrupts from the various peripherals can be dynamically assigned and adjusted.

67. Each peripheral has an interrupt line?

- a) True
- b) False

Answer: a

Explanation: Each peripheral device has one interrupt line connected to the Vectored Interrupt Controller, but may have several internal interrupt flags. Individual interrupt flags may also represent more than one interrupt source.

68. What is pin connect block?

- a) All pins are having a function without reserved
- b) Some pins are Reserved
- c) Pins have more than one function
- d) Multiplexing of some pins

Answer: c

Explanation: The pin connect block allows selected pins of the microcontroller to have more than one function. Configuration registers control the multiplexers to allow connection between the pin and the on chip peripherals.

69. What is the size of ADC and DAC?

- a) 16 bit
- b) 10 bit
- c) 8 bit
- d) 32 bit

Answer: b

Explanation: The converters are single 10-bit successive approximation analog to digital converters. While ADC0 has 6 channels, ADC1 has 8 channels. And DAC output voltage is the vref voltage.

70. How many processors are used in the Instruction pipelining?

- a) One
- b) Two
- c) Three
- d) Four

Answer: a

Explanation: Pipelining is a technique for implementing instruction level parallelism within a single processor. Pipelining attempts to keep every part of the processor busy with some instructions, by dividing incoming instructions into the series of sequential steps.

71. Which signal is used for pipelining on bis cycle in ARM710T?

- a) BWAIT
- b) BTRAN
- c) BLOK

d) BCLK

Answer: b

Explanation: The signal BTAN[1:0] is placed by one bus cycle. This pipelining should be taken into account when these signals are being decoded. The value of BTRAN[1:0] indicates whether the next bus cycle is a data cycle or an address cycle.

72. _____ pin can be used to extend memory access in whole cycle increments.

a) BTRAN

b) BLOK

c) BWAIT

d) BCLK

Answer: c

Explanation: BWAIT pin can be used to extend memory access in whole cycle increments. BWAIT is driven by the selected slave during the low phase of BCLK.

73. How many DC-DC converters interfaces in ARM7100?

a) 5

b) 3

c) 4

d) 2

Answer: d

Explanation: ARM7100 has two programmable duty ratio 96KHz clock output which is intended to be used as drivers for DC to DC converter in the PSU subsystems.

74. The ARM7TDMI-S uses which pipelining?

a) 2-Stage

b) 3-Stage

c) 4-Stage

d) 5-Stage

Answer: b

Explanation: A 3-stage pipelining is used, so instructions are executed in three stages: Fetch, Decode, Execute.

75. The ARM7TDMI-S processor has _____ types of memory cycle.

a) 5

b) 3

c) 4

d) 2

Answer: c

Explanation: The ARM7TDMI-S processor has 4 types of memory cycle: Non sequential cycle, Sequential cycle, cp processor register transfer cycle, internal cycle

76. How many types of arduinos do we have?

- a) 5
- b) 6
- c) 8
- d) 6

Answer: c

Explanation: There are 4 Arduino boards and 4 Arduino shields that fit on top of Arduino compatible boards to provide additional capability like connecting to the internet, motor controller, LCD screen controlling etc.,.

77. What is the microcontroller used in Arduino UNO?

- a) ATmega328p
- b) ATmega2560
- c) ATmega32114
- d) AT91SAM3x8E

Answer: a

Explanation: ATmega328p is a microcontroller which is 32KB of flash ROM and 8-bit microcontroller.

78. What does p refer to in ATmega328p?

- a) Production
- b) Pico-Power
- c) Power-Pico
- d) Programmable on chip

Answer: b

Explanation: Picopower technology employs advanced features like multiple clock domains, DMA and event systems to minimize power consumption.

79. Arduino shields are also called as _____

- a) Extra peripherals
- b) Add on modules
- c) Connectivity modules
- d) Another Arduinos

Answer: b

Explanation: The Arduino boards can connect with add- on modules termed as shields. Multiple, and possibly stacked shields may be individually addressable via an I2C serial bus.

80. What is the default bootloader of the Arduino UNO?

- a) Optiboot bootloader
- b) AIR-boot
- c) Bare box
- d) GAG

Answer: a

Explanation: The optiboot bootloader will take 512 bytes, leaving 32256 bytes for application code. Due to its small size larger up-loadable sketch size is achieved.

81. Does the level shifter converts the voltage levels between RS-232 and transistor-transistor logic.

- a) True
- b) False

Answer: a

Explanation: Level shifters are used in multi-design, different blocks work on different voltage levels. So when a signal passes from one voltage domain to another voltage this is needed particularly when a signal passes from low level to high level.

82. Which is the software or a programming language used for controlling of Arduino?

- a) Assembly Language
- b) C Languages
- c) JAVA
- d) Any Language

Answer: d

Explanation: A program for Arduino can be written in any programming language for a compiler that produces binary machine code for the target processor.

83. Do Arduino provides IDE Environment?

- a) True
- b) False

Answer: a

Explanation: It includes a code editor with features as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, syntax highlighting, and provides simple one-click mechanism to compile and upload programs to an Arduino board.

84. A program written with the IDE for Arduino is called _____

- a) IDE source
- b) Sketch
- c) Cryptography
- d) Source code

Answer: b

Explanation: Sketches are saved on the development computer as text files with the file extension .ino. Arduino software (IDE) pre-1.0 saved sketches with the extension file .pde.

85. Arduino IDE consists of 2 functions. What are they?

- a) Build() and loop()
- b) Setup() and build()
- c) Setup() and loop()
- d) Loop() and build() and setup()

Answer: c

Explanation: Setup() is called once in the program when a sketch starts after power-up. It is used to initialize variables, input and output pin modes, and other libraries needed in the sketch.

Loop() is used after setup() been called, function loop() is executed repeatedly in the main program. It controls the board until the board is powered off or is reset.

86. How many digital pins are there on the UNO board?

- a) 14
- b) 12
- c) 16
- d) 20

Answer: a

Explanation: It has 14 digital pins input/output pins of which 6 can be used as PWM output, 6 analog inputs, a USB connection, a power jack, a reset button and more.

87. _____ board allows sewn into clothing.

- a) UNO
- b) RedBoard
- c) LilyPad
- d) Mega

Answer: c

Explanation: LilyPad was creatively designed with large connecting pads and a flat back to allow them to be sewn into clothing with conductive thread.

88. How many analog pins are used in Arduino Mega board?

- a) 16
- b) 14
- c) 12
- d) 8

Answer: a

Explanation: It has lots of digital input/output pins, 14 can be used as PWM output 16 analog inputs, a USB connection, a power jack, and a reset button.

89. Which board is first to use microcontroller within build USB?

- a) LilyPad
- b) UNO
- c) RedBoard
- d) Leonardo

Answer: d

Explanation: The Leonard is Arduino's first development board to use one microcontroller with built-in USB. This means that it can be cheaper and simple, And also, code libraries are available which allow the board to emulate a computer keyboard etc.

90. _____ are pre built circuit boards that fit on top of Android.

- a) Sensor
- b) Data types
- c) Breadboard
- d) Shields

Answer: d

Explanation: Shields are pre- built circuit boards that fit on top of board and provide additional capabilities like controlling motors, connecting to internet, providing cellular etc.

91. Does Raspberry Pi need external hardware?

- a) True
- b) False

Answer: b

Explanation: The RPi can be used without additional hardware (except perhaps a power supply of some kind), it won't be much use as a general computer. As with any normal PC, it is likely you need some additional hardware.

92. Does RPi have an internal memory?

- a) True
- b) False

Answer: a

Explanation: The RPi has no internal storage or built-in operating system it requires an SD-card that is set up to boot the RPi.

93. What do we use to connect TV to RPi?

- a) Male HDMI
- b) Female HDMI
- c) Male HDMI and Adapter
- d) Female HDMI and Adapter

Answer: c

Explanation: HD TV's and most LCD Monitors can be connected using a full-size male HDMI cable, and with an inexpensive adapter if DVI is used. HDMI version 1.4 cable is recommended.

94. How power supply is done to RPi?

- a) USB connection
- b) Internal battery
- c) Charger
- d) Adapter

Answer: a

Explanation: The unit uses a Micro USB connection to power itself (only the power pins are connected so it will not transfer data over the connection). A standard modern phone charger with a micro USB connector will do, but needs at least 700 mA at 5 volts.

95. What is the Ethernet/LAN cable used in RPi?

- a) Cat5
- b) Cat5e
- c) Cat6
- d) RJ45

Answer: d

Explanation: We can use an Ethernet cable or a USB Wifi adapter. The RPi ethernet port is auto-sensing which means that it may be connected to a router or directly to another computer (without the need for a crossover cable).

96. What are the parameters that are default values?

- a) Port_Name and Bits
- b) Speed and Port_Names
- c) Speed and Parity
- d) Stop bit and Flow Control

Answer: b

Explanation: Port_Name: Linux automatically assigns different names for different types of serial connectors. For Standard Serial Port: ttyS0 ... ttySn
USB Serial Port Adapter: ttyUSB0 ... ttyUSBn
Speed: 115200.

97. What is the command used for easy using of GNU screen?

- a) \$useradd -G {dialout} your_name
- b) Screen Port_Name115200
- c) Minicom -b 115200 -o -D Port_Name
- d) Prompt> # help

Answer: b

Explanation: This command is used to open and write or modify data on GNU screen and we should write in the terminal window.

98. Which instruction set architecture is used in Raspberry Pi?

- a) X86
- b) MSP
- c) AVR
- d) ARM

Answer: d

Explanation: ARM assembler is used in Raspberry Pi. Machine language is built up from discrete statements or instructions implemented by a particular processor.

99. What is the default user in Debain on Raspberry Pi?

- a) Default
- b) User
- c) Pi
- d) Root

Answer: c

Explanation: Linux users. User management in Raspberry is done on the command line. The default user is Pi, and the password is raspberry. You can add users and change each user's password.

100. What are the distributions are supported by raspberry Pi?

- a) Arch Linux
- b) Debain
- c) Fedora Remix
- d) Arch Linux, Debain, and Fedora Remix

Answer: d

Explanation: These all are the distributors that have Linux operating system which has default GUI for Fedora as Xfce, Mate, None-depends on spin.

101. What bit processor is used in Pi 3?

- a) 64-bit
- b) 32-bit
- c) 128-bit
- d) Both 64 and 32 bit

Answer: a

Explanation: The first is a next generation Quad Core Broadcom BCM2837 64-bit ARMv8 processor, making the processor speed increase from 900MHz on the Pi 2 to up to 1.2GHz on the Pi 3.

102. What is the speed of operation in Pi 3?

- a) 900MHz
- b) 1.2GHz
- c) 1GHz
- d) 500MHz

Answer: b

Explanation: The first is a next generation Quad Core Broadcom BCM2837 64-bit ARMv8 processor, making the processor speed increase from 900MHz on the Pi 2 to up to 1.2GHz on the Pi 3.

103. WiFi is not present in which of the following models?

- a) Raspberry Pi3
- b) Raspberry Pi Zero WH
- c) Raspberry Pi Zero W
- d) Raspberry Pi Zero

Answer: d

Explanation: All the 3 has an inbuilt Wifi in which all of them works on 802.11 n. For Raspberry Pi Zero an external ESP2866 should be connected.

104. Does micro SD card present in all modules?

- a) True
- b) False

Answer: a

Explanation: All the products have an inbuilt memory as well as an extended memory.

105. How many USB ports are present in Raspberry Pi 3?

- a) 5
- b) 2

c) 4

d) 3

Answer: c

Explanation: In Raspberry Pi3 there is an upgraded switched power source that goes up to 2.5 Amps instead of just 2 Amps, allowing pi to power even more powerful devices over USB ports

106. Which of the following is correct about the word sensors?

a) that senses something

b) it is a type of a transducer that converts one form of energy to another

c) it can produce output in the form of electrical pulses, current or voltage

d) all of the mentioned

Answer: d

Explanation: Sensors are the devices that are used to sense a particular thing by converting one form of energy into another, this converted form can be in the form of some analog output, or in the form of current or the voltage as the case may be.

107. Why do we need to apply the concept of signal conditioning to a sensor?

a) in order to convert it into a desirable form of energy

b) for testing

c) for sensing something

d) all of the mentioned

Answer: a

Explanation: Signal Conditioning is the concept that is used for data acquisition of the signal. For measuring and analyzing this value at a practical stage, by converting it into a desirable form of energy.

108. Which of the following is correct about LM35 based sensors?

a) its output voltage is directly proportional to the Celsius scale

b) its output voltage is directly proportional to the Fahrenheit scale

c) none of the mentioned

d) all of the mentioned

Answer: a

Explanation: LM35 based sensors are those sensors whose output voltage is directly proportional to the Celsius scale.

109. What is the difference between the LM34 and the LM35 based sensors?

a) one requires external calibration while other does not

b) one has output voltage proportional to the Celsius scale while others have to the Fahrenheit scale

c) one is fast other is slow

d) all of the mentioned

Answer: b

Explanation: LM35 has the output voltage proportional to the Celsius scale while the LM35 based sensors have output voltage proportional to the Fahrenheit scale.

110. Every transducer must be connected with the signal conditioning circuit?

- a) true
- b) false
- c) can't say
- d) depends on the conditions

Answer: a

Explanation: For analyzing purposes, every transducer must be connected to a signal conditioning circuit in order to measure its value as a practical platform.

111. LM35 provides _____ V for each degree count?

- a) 1
- b) 0.1
- c) 0.001
- d) 10

Answer: c

Explanation: LM35 provides 10mV for every degree change of the Celsius scale.

112. Why for the 8 bit analog input we select Vref as the 2.56V?

- a) to obtain each degree count as the 2.56V
- b) to get 2.56V at the output
- c) to obtain each degree count as the 10mV
- d) to get 10mV as the output

Answer: c

Explanation: For an 8 bit analog input, each degree count is calculated as the $V_{ref}/256$, so if Vref is selected as 2.56V then we can obtain 10mV for each degree count of the scale.

113. What is the temperature for LM35 sensor if the analog output is 0011 1001?

- a) 3
- b) 9
- c) 57
- d) 41

Answer: c

Explanation: The binary for the above output is 57, so in case of LM35 sensors we obtain the output as 57 C.

114. In an external hardware, there are how many pins available for the LM35 and the LM34 based sensors?

- a) 2
- b) 3
- c) 10
- d) 1

Answer: b

Explanation: LM35 consists of mainly 3 pins, they are Vcc, Gnd, analog output.

115. Do LM34 and LM35 based sensors have linear output?

- a) yes
- b) no
- c) depends on the conditions
- d) can't say

Answer: a

Explanation: LM34 and the LM35 based sensors are linearly proportional to their corresponding Fahrenheit and the Celsius scale, so they are linear by nature.

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05 Unit 04: 8051 memory & i/o device interfacing

Marks:-12

Content of Chapter:-

- 5.1 Memory Interfacing
- 5.2 "I/O Interfacing: LED, keys, Relays, Seven segment display, Stepper motor."
- 5.3 Interfacing DAC 0808 with 8051, simple programmes
- 5.4 Interfacing DAC 0808/0809 with 8051, simple programmes

1. How many rows and columns are present in a 16*2 alphanumeric LCD?

- a) rows=2, columns=32
- b) rows=16, columns=2
- c) rows=16, columns=16
- d) rows=2, columns=16

Answer: d

Explanation: 16*2 alphanumeric LCD has 2 rows and 16 columns.

2. How many data lines are there in a 16*2 alphanumeric LCD?

- a) 16
- b) 8
- c) 1
- d) 0

Answer: b

Explanation: There are eight data lines from pin no 7 to pin no 14 in an LCD.

3. Which pin of the LCD is used for adjusting its contrast?

- a) pin no 1
- b) pin no 2
- c) pin no 3
- d) pin no 4

Answer: c

Explanation: Pin no 3 is used for controlling the contrast of the LCD.

4. For writing commands on an LCD, RS bit is

- a) set
- b) reset
- c) set & reset
- d) none of the mentioned

Answer: b

Explanation: For writing commands on an LCD, RS pin is reset.

5. Which command of an LCD is used to shift the entire display to the right?

- a) 0x1C
- b) 0x18
- c) 0x05
- d) 0x07

Answer: a

Explanation: 0x1C is used to shift the entire display to the right.

6. Which command is used to select the 2 lines and 5*7 matrix of an LCD?

- a) 0x01
- b) 0x06
- c) 0x0e
- d) 0x38

Answer: d

Explanation: 0x38 is used to select the 2 lines and 5*7 matrix of an LCD.

7. Which of the following step/s is/are correct for sending data to an LCD?

- a) set the R/W bit
- b) set the E bit
- c) set the RS bit
- d) all of the mentioned

Answer: d

Explanation: To send data to an LCD, RS pin should be set so that LCD will come to know that it will receive data which has to display on the screen. R/W pin should be reset as data has to be displayed (i.e. write to the LCD). High to low pulse must be applied to the E pin when data is supplied to data pins of the LCD.

8. Which of the following step/s is/are correct to perform reading operation from an LCD?

- a) low to high pulse at E pin
- b) R/W pin is set high
- c) low to high pulse at E pin & R/W pin is set high
- d) none of the mentioned

Answer: c

Explanation: For reading operations, R/W pin should be made high and added to it, a low to high pulse is also generated at the E pin.

9. Which instruction is used to select the first row first column of an LCD?

- a) 0x08
- b) 0x0c
- c) 0x80
- d) 0xc0

Answer: c

Explanation: 0x80 is used to select the first row first column of an LCD.

10. The RS pin is _____ for an LCD.

- a) input
- b) output
- c) input & output
- d) none of the mentioned

Answer: a

Explanation: The RS pin is an input pin for an LCD.

11. Which of the following steps detects the key in a 4*4 keyboard matrix about the key that is being pressed?

- a) masking of bits
- b) ensuring that initially, all keys are open
- c) checking that whether the key is actually pressed or not
- d) all of the mentioned

Answer: d

Explanation: For detecting that whether the key is actually pressed or not, firstly this must be ensured that initially all the keys are closed. Then we need to mask the bits individually to detect that which key is pressed. Then we need to check that is the key actually pressed or not, by checking that whether the key pressed for a time more than 20 micro seconds.

12. What is described by this command: CJNE A,#00001111b, ROW1

- a) it masks the bit and then jumps to the label where ROW1 is written
- b) it makes the value of the accumulator 0FH and then jumps at the address where ROW1 label is written
- c) it compares the value of the accumulator with 0FH and jumps to the location where ROW1 label is there if the value becomes equal
- d) it compares the value of the accumulator with 0FH and jumps to the location where ROW1 label is there if the value is not equal

Answer: d

Explanation: This particular command CJNE A,#00001111b, ROW1 compares the value of the accumulator with 0FH and jumps to ROW1 address if the value is not equal.

13. To detect that in which column, the key is placed?

- a) we can mask the bits and then check it
- b) we can rotate the bits and then check that particular bit which is set or reset(according to the particular condition)
- c) none of the mentioned
- d) all of the mentioned

Answer: d

Explanation: We can mask or we can even rotate the bits to check that particularly in which column is the key placed.

14. In reading the columns of a matrix, if no key is pressed we should get all in binary notation

- a) 0

- b) 1
- c) F
- d) 7

Answer: b

Explanation: If no key is pressed, then all the keys show 1 as they are all connected to power supply

15. If we need to operate a key of a keyboard in an interrupt mode, then it will generate what kind of interrupt?

- a) ES
- b) EX0/EX1
- c) T0/T1
- d) RESET

Answer: b

Explanation: If a key is to operate in an interrupt mode then it will generate an external hardware interrupt.

16. To identify that which key is being pressed, we need to:

- a) ground all the pins of the port at a time
- b) ground pins of the port one at a time
- c) connect all the pins of the port to the main supply at a time
- d) none of the mentioned

Answer: b

Explanation: To detect that which key is being pressed, we need to ground the pins one by one.

17. Key press detection and Key identification are:

- a) the same processes
- b) two different works are done in Keyboard Interfacing
- c) none of the mentioned
- d) any of the mentioned

Answer: b

Explanation: They are two different works that are involved in Keyboard Interfacing. One is used for checking that which key is being actually pressed and the other is used to check that is the key actually pressed or not.

18. Why two pins for ground are available in ADC0804?

- a) for controlling the ADCON0 and ADCON1 register of the controller
- b) for controlling the analog and the digital pins of the controller
- c) for both parts of the chip respectively
- d) for isolate analog and digital signal

Answer: d

Explanation: Two grounds are available in ADC0804 to isolate analog signal from digital signal. This isolation provides accuracy in digital output.

19. What is the function of the WR pin?

- a) its active high input used to inform ADC0804 to the end of conversion

- b) its active low input used to inform ADC0804 to the end of conversion
- c) its active low input used to inform ADC0804 to the start of conversion
- d) its active high input used to inform ADC0804 to the start of conversion

Answer: c

Explanation: WR is active low input used to inform the ADC0804 to start the conversion process.

20. State which of the following statements are false?

- a) CLK IN pin used for External Clock Input or Internal Clock with external RC element
- b) INTR pin tells about the end of the conversion
- c) ADC0804 IC is an 8 bit parallel ADC in the family of the ADC0800 series
- d) None of the mentioned

Answer: d

Explanation: CLK IN pin is used to tell about the conversion time, INTR pin tells about the end of the conversion and ADC0804 has a resolution of 8 bits only so all three statements are true.

21. While programming the ADC0808/0809 IC what steps are followed?

- a) select the analog channel, start the conversion, monitor the conversion, display the digital results
- b) select the analog channel, activate the ALE signal (L to H pulse), start the conversion, monitor the conversion, read the digital results
- c) select the analog channel, activate the ALE signal (H to L pulse), start the conversion, monitor the conversion, read the digital results
- d) select the channel, start the conversion, end the conversion

Answer: b

Explanation: While programming the ADC0808/0809 IC firstly we need to select the channel from the A, B, C pins. Then we need to activate the ALE signal, this is needed to latch the address. Then we start the conversion from the WR pin. After monitoring the INTR pin we get to know about the end of the conversion. Then we activate the OE enable to read out data out of the ADC chip.

22. In ADC0808/0809 IC which pin is used to select Step Size?

- a) Vref
- b) Vin
- c) Vref/2 & Vin
- d) None of the mentioned

Answer: a

Explanation: Step Size is calculated by formula $V_{ref}/(2^n)$. As ADC0808/0809 8-bit ADC value of $n=8$. Therefore formula becomes $V_{ref}/(2^8) = V_{ref}/256$. If $V_{ref} = 5V$ then Step Size will be $5/256$ i.e. $19.53mV$

23. Which of the following statements are true about DAC0808?

- a) parallel digital data to analog data conversion
- b) it has current as an output
- c) all of the mentioned
- d) none of the mentioned

Answer: a

Explanation: DAC0804 is used for parallel data to analog data conversion.

24. 8 input DAC has _____

- a) 8 discrete voltage levels
- b) 64 discrete voltage levels
- c) 124 discrete voltage levels
- d) 256 discrete voltage levels

Answer: d

Explanation: For n input DAC has 2^n discrete voltage levels.

25. INTR, WR signal is an input/output signal pin?

- a) both are output
- b) both are input
- c) one is input and the other is output
- d) none of the mentioned

Answer: c

Explanation: INTR pin tells about the end of the conversion (output) and WR pin tells us to start the conversion (input).

26. What is the function of the SCLK pin in MAX1112?

- a) It is used to bring data in
- b) It is used to bring data out and send in the control byte, one at a time
- c) It is used to get output clock
- d) It is used to get serial output

Answer: b

Explanation: SCLK is used to bring data out and send in the control byte.

27. A thermistor is a _____

- a) sensor
- b) adc
- c) transducer
- d) micro controller

Answer: c

Explanation: A thermistor is a device which is used to convert the temperature into electrical signals, so it acts as a transducer.

28. What is the difference between LM 34 and LM 35 sensors?

- a) one is a sensor and the other is a transducer
- b) one's output voltage corresponds to the Fahrenheit temperature and the other corresponds to the Celsius temperature
- c) one is of low precision and the other is of higher precision
- d) one requires external calibration and the other doesn't require it

Answer: b

Explanation: LM 34's output voltage corresponds to the Fahrenheit temperature and LM 35 corresponds to the Celsius temperature.

29. An electronic device which converts physical quantity or energy from one form to another is called

- a) Sensor
- b) Transistor
- c) Transducer
- d) Thyristor

Answer: c

Explanation: An electronic device that converts physical quantity or energy from one form to another is called Transducer. Examples: Sensor, Speaker, Microphone, etc.

30. What is signal conditioning?

- a) to analyse any signal
- b) conversion or modification is referred to as conditioning
- c) conversion from analog to digital is signal conditioning
- d) conversion from digital to analog is signal conditioning

Answer: b

Explanation: Signal Conditioning is referred to as the conversion of a signal from one form to other, now this may be from analog to digital conditioning or digital to analog conditioning.

31. What steps have to be followed for interfacing a sensor to a microcontroller 8051?

- a) make the appropriate connections with the controller, ADC conversion, analyse the results
- b) interface sensor with ADC and ADC with 8051
- c) interface sensor with the MAX232, send now to microcontroller, analyse the results
- d) none of the mentioned

Answer: b

Explanation: For interfacing a sensor with an 8051 microcontroller, we need ADC in between because output of sensor is analog and microcontroller works on digital signals only. So whatever signal generated by the sensor is converted into its digital equivalent using ADC and equivalent digital signal is given to the microcontroller for processing.

32. LM35 has how many pins?

- a) 2
- b) 1
- c) 3
- d) 4

Answer: c

Explanation: LM35 has 3 pins.

- 1.Power(+5 Volts)
- 2.Output analog voltage
- 3.Ground(0 Volts)

33. Why Vref is set of ADC0848 to 2.56 V if analog input is connected to the LM35?

- a) to set the step size of the sampled input
- b) to set the ground for the chip

- c) to provide supply to the chip
- d) all of the mentioned

Answer: a

Explanation: Vref is used to set the step size of the ADC conversion, if it is selected to 2.56 then the step size will be selected to 10mV, so for every step increase of the analog voltage an increase of 10 mV will be there.

34. The 8255 is a _____ chip.

- a) Input/Output
- b) Analog to Digital
- c) Digital to analog
- d) None of the mentioned

Answer: a

Explanation: The 8255 is Input/Output (I/O) chip. It has three separate accessible ports. The 8255 chip is used to expand the I/O ports of microcontrollers.

35. Which pins of a microcontroller are directly connected with 8255?

- a) RD
- b) WR
- c) D0-D7
- d) All of the mentioned

Answer: d

Explanation: RD, WR, D0-D7 all are directly connected to the 8051 for telling the chip about the control signals and also for transferring the data.

36. Find the control word for PA = out, PB = in, PCL = out, PCH = out (Mode0)?

- a) 0x02H
- b) 0x82H
- c) 0x83H
- d) 0x03H

Answer: b

Explanation: The value that is being loaded in the control word is 10000010b for PB as an input port and all others as the output ports being operated in mode0. The hex equivalent of 10000010b → 0x82H.

37. Which pins are used to select the ports and the control register?

- a) CS
- b) A1
- c) A0
- d) All of the mentioned

Answer: d

Explanation: CS pin is an active low input pin for 8255 and it is used for selecting a chip. A0 and A1 pins are used for select ports and the control register.

38. What is the value of the control register when RESET button is set to zero?

- a) 0x00H
- b) 0xFFH
- c) 0x11H
- d) value remains the same

Answer: d

Explanation: RESET is active-high signal input into the 8255 used to clear the control register. When RESET is activated (i.e. set to high), all ports are initialized as input mode. Hence the value of the control register remains the same as it is even when the RESET button is set to zero.

39. Why MOVX instruction is being used to access the ports of the 8255?

- a) because 8255 is connecting a microcontroller in memory mapped I/O configuration
- b) because 8255 is used to access the external communication
- c) because 8255 is used to access the data transfer
- d) because 8255 is used to access the interfacing of LCD, motor etc

Answer: a

Explanation: As 8255 is connecting a microcontroller in memory mapped I/O configuration. This means that memory space used to access 8255 (i.e. 8255 is treated as external memory). MOVX instruction is used to access external memory locations.

40. What is correct about the BSR mode from below?

- a) In BSR mode, only the individual bits of PORT A can be programmed
- b) In BSR mode, only the individual bits of PORT B can be programmed
- c) In BSR mode, only the individual bits of PORT C can be programmed
- d) none of the mentioned

Answer: c

Explanation: BSR (Bit Set/Rest) mode is used to program individual bits of PORT C only.

41. How many pins of the 8255 can be used as the I/O ports?

- a) 8
- b) 16
- c) 24
- d) 32

Answer: c

Explanation: There are 3 ports available in the 8255 so 24 pins are available for the I/O ports pins

42. DS12887 is a _____

- a) Timer IC
- b) Serial communication IC
- c) RTC IC
- d) Motor

Answer: c

Explanation: DS12887 is a real time clock that is widely used to provide accurate time and date for many applications.

43. DS12887 has _____ amount of RAM.

- a) 14 bytes
- b) 114 bytes
- c) 128 bytes
- d) 64 bytes

Answer: c

Explanation: DS12887 has 128 bytes of non-volatile RAM.

44. DS12887 has _____ amount of RAM for general purpose applications.

- a) 9 bytes
- b) 114 bytes
- c) 128 bytes
- d) 14 bytes

Answer: b

Explanation: DS12887 has 128 bytes of non-volatile RAM. Out of 128 bytes, 14 bytes of RAM for clock/calendar and control registers, and another 114 bytes of RAM for general purpose data storage.

45. In DS12887, which bits of the Register A are used to turn on the oscillator?

- a) D4
- b) D5
- c) D6
- d) All of the mentioned

Answer: d

Explanation: In DS12887, D4-D6 bits of register A are used to turn on the oscillator. A specific value of 010 of D4-D6 is desirable for turning on the oscillator.

46. In DS12887, which out of the following is correct about the SQW pin?

- a) it is an output pin
- b) it can provide up to 15 different square waves
- c) the frequency of the square wave is set by the register A
- d) all of the mentioned are correct

Answer: d

Explanation: In DS12887, SQW pin stands for SQuare Wave. It is an output pin that can provide us with 15 different square waves. The frequency of the square wave is selected by programming register A.

47. In DS12887, what is correct about the UIP bit of the register A?

- a) it is a read only bit
- b) it is used to know about the result
- c) it is used to select the DS12887 datasheet
- d) all of the mentioned

Answer: a

Explanation: In DS12887, UIP bit of register A stands for Update In Progress. The update-in-progress (UIP) bit is a status flag i.e. read-only bit.

48. Is DS12887 has non-volatile RAM?

- a) Yes
- b) No
- c) Can't be determined
- d) None of the mentioned

Answer: a

Explanation: Yes, DS12887 has non-volatile RAM.

49. Name the read only registers are present in the DS12887?

- a) register A, register B
- b) register B, register C
- c) register C, register D
- d) register D, register A

Answer: c

Explanation: Register C and D are the read only registers in the DS12887 found at memory locations 0C-0DH.

50. In DS12887, when the external source is turned-off, how does DS12887 get power to retain its data?

- a) Internal Lithium Battery
- b) Internal Lead Battery
- c) Additional external Alkaline Battery
- d) Additional external Lithium Battery

Answer: a

Explanation: When Vcc falls below 3V or external voltage source is switched-off, internal lithium battery provides power to DS12887. And this will prevent loss of data.

51. What is the principle on which electromagnetic relays operate?

- a) electromagnetic induction
- b) motor control
- c) switching
- d) none of the mentioned

Answer: a

Explanation: Electromagnetic relays work on the principle of electromagnetic induction. It is used as a switch in industrial controls, automobile and appliances. It allows the isolation of the sections of a system with two different voltage sources.

52. What are DPDT relays?

- a) Single pole, single throw
- b) Single pole, double throw
- c) Double pole, double throw
- d) None of the mentioned

Answer: c

Explanation: In DPDT relay, there are two poles and two throws (i.e.contacts). For each pole there are two contacts i.e. normally open (NO) and normally closed (NC). The contacts can be NO or NC. Generally, contact is NC when the coil is not energized. When the coil is energized both poles become NC.

53. Why do we need a ULN2803 in driving a relay?

- a) for switching a motor
- b) for increasing the current
- c) for increasing the power
- d) for switching the voltage

Answer: b

Explanation: We need a ULN2803 for driving a relay because the relay coil requires 10mA or more current to be energized. If microcontroller pins are not able to provide sufficient current to drive relays then we need ULN2803 for driving relays.

54. Why are solid-state relays advantageous over electromechanical relays?

- a) they need zero voltage circuit
- b) they need less current to be energised
- c) they need less voltage to be energised
- d) none of the mentioned

Answer: b

Explanation: Solid-state relays are advantageous over electromechanical relays because their switching response time is much faster than electromechanical relays as solid-state relays are made-up of semiconductor materials. Also, solid-state relays required low input current for operation and small packaging make them ideal for microcontrollers.

55. What are optoisolators?

- a) it is a driver
- b) it is a thing isolated from the entire world
- c) it is a device that can be used as an electromagnetic relay without a driver
- d) none of the mentioned

Answer: c

Explanation: Optoisolators are devices that can be used as an electromagnetic relay without a driver. It usually consists of a led (transmitter) and a photoresistive receiver.

56. How can we control the speed of a stepper motor?

- a) by controlling its switching rate
- b) by controlling its torque
- c) by controlling its wave drive 4 step sequence
- d) cant be controlled

Answer: a

Explanation: Speed of a stepper motor can be controlled by changing its switching speed or by changing the length of the time delay loop.

57. Which of the following can be a unit for torque?

- a) kg/m²
- b) ounce-inch
- c) kg-m³
- d) g/m

Answer: b

Explanation: Torque is equal to the force applied at a particular distance. So its unit can be ounce-inch.

58. The RPM rating given for the DC motor is for?

- a) no-loaded
- b) loaded
- c) none of the mentioned
- d) all of the mentioned

Answer: a

Explanation: RPM rating given for a DC motor is for a no-loaded condition.

59. How can we change the speed of a DC motor using PWM?

- a) By changing amplitude of PWM
- b) By keeping fixed duty cycle
- c) By changing duty cycle of PWM
- d) By increasing power of PWM

Answer: c

Explanation: We can change the speed of a DC motor using PWM by changing the duty cycle of PWM. Changing duty cycle means changing ON and OFF timing of PWM. Even if amplitude of PWM is fixed by increasing the ON time of PWM increases the speed of the DC motor.

60. How can the direction of the DC motor be changed?

- a) by changing the torque
- b) by changing the switching speed
- c) by changing the polarity of voltages connected to the leads
- d) by changing the RPM rating

Answer: c

Explanation: The direction of the DC motor can be changed by changing the polarity of the voltages connected to its leads.

61. The 8255 is a _____ chip.

- a) Input/output
- b) Analog to Digital
- c) Digital to analog
- d) None of the mentioned

Answer: a

Explanation: The 8255 is Input/Output (I/O) chip. It has three separate accessible ports. The 8255 chip is used to expand the I/O ports of microcontrollers.

62. Which pins of a microcontroller are directly connected with 8255?

- a) RD
- b) WR
- c) D0-D7
- d) All of the mentioned

Answer: d

Explanation: RD, WR, D0-D7 all are directly connected to the 8051 for telling the chip about the control signals and also for transferring the data.

63. Find the control word for PA= out, PB= in, PCL=out, PCH=out (Mode0)?

- a) 0x02H
- b) 0x82H
- c) 0x83H
- d) 0x03H

Answer: b

Explanation: The value that is being loaded in the control word is 10000010b for PB as an input port and all others as the output ports being operated in mode0. The hex equivalent of 10000010b → 0x82H.

64. Which pins are used to select the ports and the control register?

- a) CS
- b) A1
- c) A0
- d) All of the mentioned

Answer: d

Explanation: CS pin is an active low input pin for 8255 and it is used for selecting a chip. A0 and A1 pins are used for select ports and the control register.

65. What is the value of the control register when RESET button is set to zero?

- a) 0x00H
- b) 0xFFH
- c) 0x11H
- d) value remains the same

Answer: d

Explanation: RESET is active-high signal input into the 8255 used to clear the control register. When RESET is activated (i.e. set to high), all ports are initialized as input mode. Hence the value of the control register remains the same as it is even when the RESET button is set to zero.

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- b) because 8255 is used to access the external communication
- c) because 8255 is used to access the data transfer
- d) because 8255 is used to access the interfacing of LCD, motor etc

Answer: a

Explanation: As 8255 is connecting a microcontroller in memory mapped I/O configuration. This means that memory space used to access 8255 (i.e. 8255 is treated as external memory). MOVX instruction is used to access external memory locations.

67. What is correct about the BSR mode from below?

- a) In BSR mode, only the individual bits of PORT A can be programmed
- b) In BSR mode, only the individual bits of PORT B can be programmed
- c) In BSR mode, only the individual bits of PORT C can be programmed
- d) none of the mentioned

Answer: c

Explanation: BSR (Bit Set/Rest) mode is used to program individual bits of PORT C only.

68. How many pins of the 8255 can be used as the I/O ports?

- a) 8
- b) 16
- c) 24
- d) 32

Answer: c

Explanation: They are 3 ports available in the 8255 so 24 pins are available for the I/O ports pins.

69. 8255 is a ____ pin IC.

- a) 16
- b) 8
- c) 40
- d) 60

Answer: c

Explanation: 8255 is a 40 pin IC.

70. 8255 has handshaking capability?

- a) yes
- b) no
- c) cant be said
- d) depends on the conditions

Answer: a

Explanation: 8255 is a device that with the help of its handshaking property gets interfaced with any microcontroller.

71. The 8255 can be programmed in any of the _____

- a) 2 modes
- b) 3 modes
- c) 4 modes
- d) 5 modes

Answer: c

Explanation: 8255 can be programmed in any of the 4 modes.

72. RTC is used for _____

- a) conversion
- b) communication
- c) real time and clock measurement
- d) memory management

Answer: c

Explanation: RTC is a device that is basically used for all the real time clock related issues.

73. RTC chips use _____ to compute time, date when the power is off.

- a) ac supply
- b) generators
- c) rectifiers
- d) battery

Answer: d

Explanation: RTC chips require batteries in order to calculate the time and date when the power of the device is off.

74. DS12887 is known for as a _____

- a) Communication device
- b) Good battery device
- c) RTC chip
- d) All of the mentioned

Answer: c

Explanation: DS12887 is known as an RTC chip.

75. DS1307 is a parallel RTC with I2C bus.

- a) true
- b) false
- c) cant be said
- d) depends on the conditions

Answer: b

Explanation: DS1307 is a serial RTC with I2C bus.

76. DS1307 is a _____ pin IC and operates on _____ clock frequency.

- a) 16, 8Mhz
- b) 8, 16Mhz
- c) 16, 32Mhz
- d) 8, 32Khz

Answer: d

Explanation: DS1307 is a 8 pin IC and operates on a 32KHz clock frequency.

77. Vbat requires a positive signal of

- a) 3V
- b) 5V
- c) 9V

d) 12V

Answer: a

Explanation: Vbat requires a positive signal of 3V which can be obtained through a battery.

78. In DS1307, which out of the following is correct about the SQW pin?

a) input pin

b) output pin

c) i/o pin

d) none of the mentioned

Answer: b

Explanation: In DS1307, SQW pin is an output pin. It provides a clock of frequency 1khz, 4khz, 8khz, 32khz if the pin is enabled.

79. DS1307 has a total of _____ bytes of RAM space.

a) 32

b) 64

c) 128

d) 256

Answer: b

Explanation: DS1307 has a total of 64 bytes(00-3F) of RAM space.

80. DS1307 control register has an address of _____

a) 00H

b) 03H

c) 07H

d) 10H

Answer: c

Explanation: DS1307 control register has an address of 07H.

81. What does the CH bit of the DS1307 demonstrate?

a) clock high

b) clock halt

c) clear high

d) clear halt

Answer: b

Explanation: CH bit means clock halt bit. If it is set to 1, then the oscillator gets disabled and vice versa.

82. Why are relays used for driving the motors?

a) they can be used as switch as well as they provide isolation

b) they increase the current capability required by the motors

c) they are used to reduce the back emf from the motors

d) all of the mentioned

Answer: a

Explanation: Relay is the electrically controlled switch and it allows isolation of two separate sections of the system. It has three main components: the coil, the common pole and the contacts. When an electric field is applied to the coil; it gets energized and generates a magnetic field which will force the common pole to change contact from Normally Closed to Normally Open.

83. Why are ULN2803 normally used between the microcontrollers and the relays?

- a) for switching purposes
- b) for increasing the current capability required by a relay
- c) for increasing the voltage capability required by a relay
- d) all of the mentioned

Answer: b

Explanation: More current is desired for driving a motor with the help of a relay, so a ULN2803 is used for increasing the current as per the requirement of the relay.

84. Why are opto isolators normally used between the microcontrollers and the ULN2803?

- a) to optimize the current
- b) to reduce the back emf
- c) to increase the current
- d) to increase the voltage

Answer: b

Explanation: Opto isolators are used between the microcontrollers and the ULN2803 chips in order to decrease the back emf from the ULN2803 and to save the microcontrollers for a long time.

85. Which of the following is a type of an electromagnetic relay?

- a) SPST
- b) SPDT
- c) DPDT
- d) All of the mentioned

Answer: d

Explanation: There are normally three kinds of electromagnetic relays. They are SPST(single pole single throw), SPDT(single pole double throw) and the DPDT(double pole double throw) relays.

86. Reed switches show connectivity whenever they are in the presence of an electrical field?

- a) true
- b) false
- c) can't say
- d) depends on the conditions

Answer: b

Explanation: Reed switches are the devices that show connectivity whenever they are in the presence of some magnetic field.

87. Which of the following is an application of stepper motors?

- a) in printers
- b) in robots

- c) in vehicles
- d) all of the mentioned

Answer: d

Explanation: Stepper motors are used wherever there is a need of a movement at an angle, maybe it in printers, in motors or in vehicles stepper motors are used everywhere.

88. What are normal 4 step sequence of a stepper motor if we start to move in clockwise direction with 0110 value?

- a) 1100,1001,0011,0110
- b) 0011,1001,1100,0110
- c) 1001,1100,0110,0011
- d) 0101,1010,0101,1010

Answer: b

Explanation: For a normal 4 step sequence of a stepper motor, if we start to move in a clockwise direction then we rotate towards right direction with every rotation.

89. What is the meaning of a step angle?

- a) angle which a stepper motor has
- b) angle between the two windings of the stator in a stepper motor
- c) minimum degree of rotation associated with a single step
- d) angle between the stator and the rotor

Answer: c

Explanation: Step angle is the minimum degree of rotation associated with a single step.

90. For a normal 4 step sequence, what are the number of teeth required to accomplish a 2 degree step angle?

- a) 180
- b) 90
- c) 360
- d) 45

Answer: d

Explanation: For a 2 degree step angle there will be 180 step per rotation, so the total number of rotor teeth are $(180/4=45)$.

91. Ounch-inch is a unit of a torque.

- a) true
- b) false
- c) can't say
- d) depends on the situation

Answer: a

Explanation: Torque is a quantity which is obtained by multiplying the amount of force that is applied at a particular angle. It is measured in terms of ouch-inch.

92. How many rows and columns are present in a 16*2 alphanumeric LCD?

- a) rows=2, columns=32
- b) rows=16, columns=2
- c) rows=16, columns=16
- d) rows=2, columns=16

Answer: d

Explanation: 16*2 alphanumeric LCD has 2 rows and 16 columns.

93. How many data lines are there in a 16*2 alphanumeric LCD?

- a) 16
- b) 8
- c) 1
- d) 0

Answer: b

Explanation: There are eight data lines from pin no 7 to pin no 14 in an LCD.

94. Which pin of the LCD is used for adjusting its contrast?

- a) pin no 1
- b) pin no 2
- c) pin no 3
- d) pin no 4

Answer: c

Explanation: Pin no 3 is used for controlling the contrast of the LCD.

95. For writing commands on an LCD, RS bit is

- a) set
- b) reset
- c) set & reset
- d) none of the mentioned

Answer: b

Explanation: For writing commands on an LCD, RS pin is reset.

96. Which command of an LCD is used to shift the entire display to the right?

- a) 0x1C
- b) 0x18
- c) 0x05
- d) 0x07

Answer: a

Explanation: 0x1C is used to shift the entire display to the right.

97. Which command is used to select the 2 lines and 5*7 matrix of an LCD?

- a) 0x01
- b) 0x06
- c) 0x0e

d) 0x38

Answer: d

Explanation: 0x38 is used to select the 2 lines and 5*7 matrix of an LCD.

98. Which of the following step/s is/are correct for sending data to an LCD?

- a) set the R/W bit
- b) set the E bit
- c) set the RS bit
- d) all of the mentioned

Answer: d

Explanation: To send data to an LCD, RS pin should be set so that LCD will come to know that it will receive data which has to display on the screen. R/W pin should be reset as data has to be displayed (i.e. write to the LCD). High to low pulse must be applied to the E pin when data is supplied to data pins of the LCD.

99. Which of the following step/s is/are correct to perform reading operation from an LCD?

- a) low to high pulse at E pin
- b) R/W pin is set high
- c) low to high pulse at E pin & R/W pin is set high
- d) none of the mentioned

Answer: c

Explanation: For reading operations, R/W pin should be made high and added to it, a low to high pulse is also generated at the E pin.

100. Which instruction is used to select the first row first column of an LCD?

- a) 0x08
- b) 0x0c
- c) 0x80
- d) 0xc0

Answer: c

Explanation: 0x80 is used to select the first row first column of an LCD.

101. The RS pin is _____ for an LCD.

- a) input
- b) output
- c) input & output
- d) none of the mentioned

Answer: a

Explanation: The RS pin is an input pin for an LCD.

102. Which of the following steps detects the key in a 4*4 keyboard matrix about the key that is being pressed?

- a) masking of bits
- b) ensuring that initially, all keys are open

- c) checking that whether the key is actually pressed or not
- d) all of the mentioned

Answer: d

Explanation: For detecting that whether the key is actually pressed or not, firstly this must be ensured that initially all the keys are closed. Then we need to mask the bits individually to detect that which key is pressed. Then we need to check that is the key actually pressed or not, by checking that whether the key pressed for a time more than 20 micro seconds.

103. What is described by this command: CJNE A,#00001111b, ROW1

- a) it masks the bit and then jumps to the label where ROW1 is written
- b) it makes the value of the accumulator 0FH and then jumps at the address where ROW1 label is written
- c) it compares the value of the accumulator with 0FH and jumps to the location where ROW1 label is there if the value becomes equal
- d) it compares the value of the accumulator with 0FH and jumps to the location where ROW1 label is there if the value is not equal

Answer: d

Explanation: This particular command CJNE A,#00001111b, ROW1 compares the value of the accumulator with 0FH and jumps to ROW1 address if the value is not equal.

104. To detect that in which column, the key is placed?

- a) we can mask the bits and then check it
- b) we can rotate the bits and then check that particular bit which is set or reset(according to the particular condition)
- c) none of the mentioned
- d) all of the mentioned

Answer: d

Explanation: We can mask or we can even rotate the bits to check that particularly in which column is the key placed.

105. In reading the columns of a matrix, if no key is pressed we should get all in binary notation

- a) 0
- b) 1
- c) F
- d) 7

Answer: b

Explanation: If no key is pressed, then all the keys show 1 as they are all connected to power supply.

106. If we need to operate a key of a keyboard in an interrupt mode, then it will generate what kind of interrupt?

- a) ES
- b) EX0/EX1
- c) T0/T1
- d) RESET

Answer: b

Explanation: If a key is to operate in an interrupt mode then it will generate an external hardware interrupt.

107. To identify that which key is being pressed, we need to:

- a) ground all the pins of the port at a time
- b) ground pins of the port one at a time
- c) connect all the pins of the port to the main supply at a time
- d) none of the mentioned

Answer: b

Explanation: To detect that which key is being pressed, we need to ground the pins one by one.

108. Key press detection and Key identification are:

- a) the same processes
- b) two different works are done in Keyboard Interfacing
- c) none of the mentioned
- d) any of the mentioned

Answer: b

Explanation: They are two different works that are involved in Keyboard Interfacing. One is used for checking that which key is being actually pressed and the other is used to check that is the key actually pressed or not.

109. Why two pins for ground are available in ADC0804?

- a) for controlling the ADCON0 and ADCON1 register of the controller
- b) for controlling the analog and the digital pins of the controller
- c) for both parts of the chip respectively
- d) for isolate analog and digital signal

Answer: d

Explanation: Two grounds are available in ADC0804 to isolate analog signal from digital signal. This isolation provides accuracy in digital output.

110. What is the function of the WR pin?

- a) its active high input used to inform ADC0804 to the end of conversion
- b) its active low input used to inform ADC0804 to the end of conversion
- c) its active low input used to inform ADC0804 to the start of conversion
- d) its active high input used to inform ADC0804 to the start of conversion

Answer: c

Explanation: WR is active low input used to inform the ADC0804 to start the conversion process.

110. State which of the following statements are false?

- a) CLK IN pin used for External Clock Input or Internal Clock with external RC element
- b) INTR pin tells about the end of the conversion
- c) ADC0804 IC is an 8 bit parallel ADC in the family of the ADC0800 series
- d) None of the mentioned

Answer: d

Explanation: CLK IN pin is used to tell about the conversion time, INTR pin tells about the end of the conversion and ADC0804 has a resolution of 8 bits only so all three statements are true.

111. While programming the ADC0808/0809 IC what steps are followed?

- a) select the analog channel, start the conversion, monitor the conversion, display the digital results
- b) select the analog channel, activate the ALE signal (L to H pulse), start the conversion, monitor the conversion, read the digital results
- c) select the analog channel, activate the ALE signal (H to L pulse), start the conversion, monitor the conversion, read the digital results
- d) select the channel, start the conversion, end the conversion

Answer: b

Explanation: While programming the ADC0808/0809 IC firstly we need to select the channel from the A, B, C pins. Then we need to activate the ALE signal, this is needed to latch the address. Then we start the conversion from the WR pin. After monitoring the INTR pin we get to know about the end of the conversion. Then we activate the OE enable to read out data out of the ADC chip.

112. In ADC0808/0809 IC which pin is used to select Step Size?

- a) Vref
- b) Vin
- c) Vref/2 & Vin
- d) None of the mentioned

Answer: a

Explanation: Step Size is calculated by formula $V_{ref}/(2^n)$. As ADC0808/0809 8-bit ADC value of $n=8$. Therefore formula becomes $V_{ref}/(2^8) = V_{ref}/256$. If $V_{ref} = 5V$ then Step Size will be $5/256$ i.e. 19.53mV.

113. What is the difference between ADC0804 and MAX1112?

- a) ADC0804 has 8 bits and MAX1112 has 1 bit for data output
- b) ADC0804 is used for adc and dac conversions whereas MAX1112 is used for serial data transmissions
- c) ADC0804 has 32 bits and MAX1112 has 3 bit for data output
- d) None of the mentioned

Answer: a

Explanation: ADC0804 is used for parallel ADC and MAX1112 is used for serial ADC.

114. Which of the following statements are true about DAC0808?

- a) parallel digital data to analog data conversion
- b) it has current as an output
- c) all of the mentioned
- d) none of the mentioned

Answer: a

Explanation: DAC0804 is used for parallel data to analog data conversion.

115. 8 input DAC has _____

- a) 8 discrete voltage levels
- b) 64 discrete voltage levels

- c) 124 discrete voltage levels
- d) 256 discrete voltage levels

Answer: d

Explanation: For n input DAC has 2^n discrete voltage levels.

116. INTR, WR signal is an input/output signal pin?

- a) both are output
- b) both are input
- c) one is input and the other is output
- d) none of the mentioned

Answer: c

Explanation: INTR pin tells about the end of the conversion (output) and WR pin tells us to start the conversion (input).

117. What is the function of the SCLK pin in MAX1112?

- a) It is used to bring data in
- b) It is used to bring data out and send in the control byte, one at a time
- c) It is used to get output clock
- d) It is used to get serial output

Answer: b

Explanation: SCLK is used to bring data out and send in the control byte.

118. A thermistor is a _____

- a) sensor
- b) adc
- c) transducer
- d) micro controller

Answer: c

Explanation: A thermistor is a device which is used to convert the temperature into electrical signals, so it acts as a transducer.

119. What is the difference between LM 34 and LM 35 sensors?

- a) one is a sensor and the other is a transducer
- b) one's output voltage corresponds to the Fahrenheit temperature and the other corresponds to the Celsius temperature
- c) one is of low precision and the other is of higher precision
- d) one requires external calibration and the other doesn't require it

Answer: b

Explanation: LM 34's output voltage corresponds to the Fahrenheit temperature and LM 35 corresponds to the Celsius temperature.

120. An electronic device which converts physical quantity or energy from one form to another is called _____

- a) Sensor
- b) Transistor

c) Transducer

d) Thyristor

Answer: c

Explanation: An electronic device that converts physical quantity or energy from one form to another is called Transducer. Examples: Sensor, Speaker, Microphone, etc.

121. What is signal conditioning?

a) to analyse any signal

b) conversion or modification is referred to as conditioning

c) conversion from analog to digital is signal conditioning

d) conversion from digital to analog is signal conditioning

Answer: b

Explanation: Signal Conditioning is referred to as the conversion of a signal from one form to other, now this may be from analog to digital conditioning or digital to analog conditioning.

122. What steps have to be followed for interfacing a sensor to a microcontroller 8051?

a) make the appropriate connections with the controller, ADC conversion, analyse the results

b) interface sensor with ADC and ADC with 8051

c) interface sensor with the MAX232, send now to microcontroller, analyse the results

d) none of the mentioned

Answer: b

Explanation: For interfacing a sensor with an 8051 microcontroller, we need ADC in between because output of sensor is analog and microcontroller works on digital signals only. So whatever signal generated by the sensor is converted into its digital equivalent using ADC and equivalent digital signal is given to the microcontroller for processing.

123. LM35 has how many pins?

a) 2

b) 1

c) 3

d) 4

Answer: c

Explanation: LM35 has 3 pins.

1.Power(+5 Volts)

2.Output analog voltage

3.Ground(0 Volts)

124. Why Vref is set of ADC0848 to 2.56 V if analog input is connected to the LM35?

a) to set the step size of the sampled input

b) to set the ground for the chip

c) to provide supply to the chip

d) all of the mentioned

Answer: a

Explanation: V_{ref} is used to set the step size of the ADC conversion, if it is selected to 2.56 then the step size will be selected to 10mV, so for every step increase of the analog voltage an increase of 10 mV will be there.

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