



POSTAL BOOK PACKAGE 2027

INSTRUMENTATION ENGINEERING

OBJECTIVE PRACTICE SETS VOLUME - II

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ANALOG ELECTRONICS

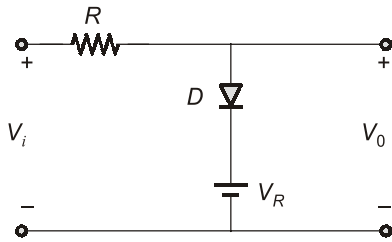
OBJECTIVE PRACTICE SETS

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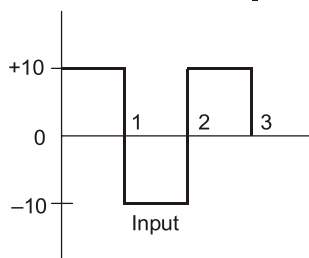
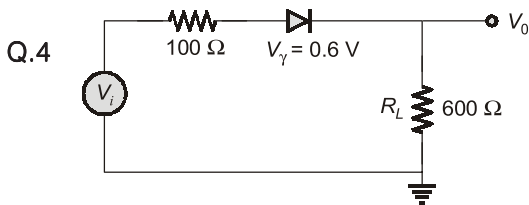
Diode Circuit and Power Supply

MCQ and NAT Questions

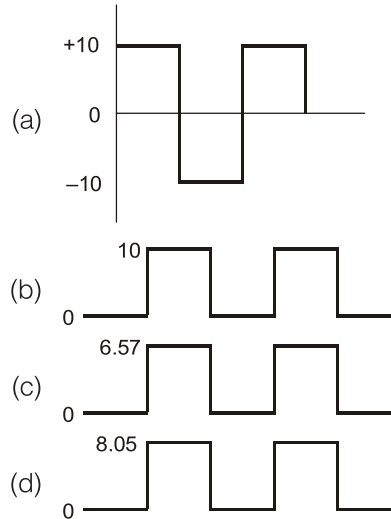
- Q.1** The voltage across diode at temperature T_1 is 0.76 V. If temperature is increased by 20°C at constant current the new voltage across diode is
 (a) 0.65 V (b) 0.81 V
 (c) 0.71 V (d) 0.7 V
- Q.2** A diode whose terminal characteristics are related as $i_D = I_s e^{V/V_T}$, where I_s is the reverse saturation current and V_T is thermal voltage ($V_T = 25 \text{ mV}$), is biased at $I_D = 4 \text{ mA}$. Its dynamic resistance is
 (a) 12.5Ω (b) 50Ω
 (c) 6.25Ω (d) 25Ω
- Q.3** In the circuit shown below the input V_i has positive and negative swings. V_o is the output.



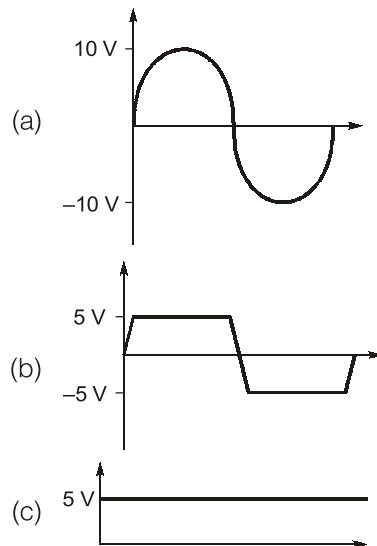
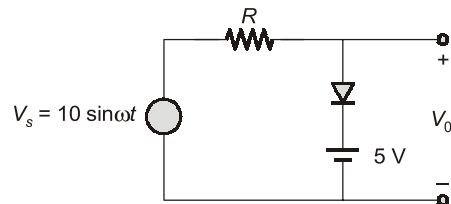
- (a) $V_o = 0$ for negative V_i
 (b) $V_o = V_R$ for positive V_i
 (c) $V_o = V_R$ for $V_i > V_R$
 (d) $V_o = V_R$ for all V_i

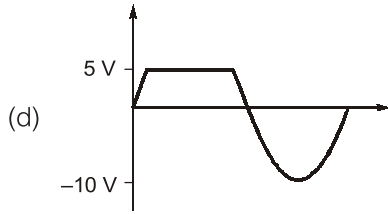


The output waveform is

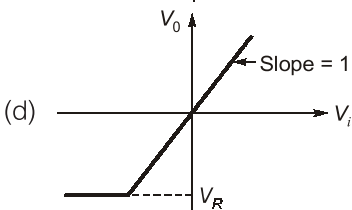
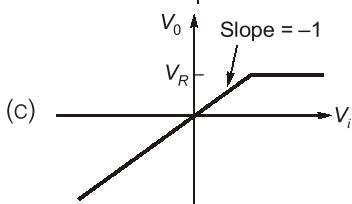
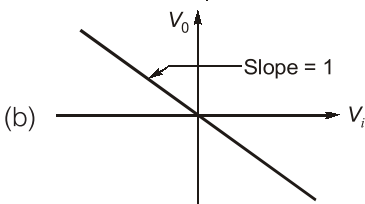
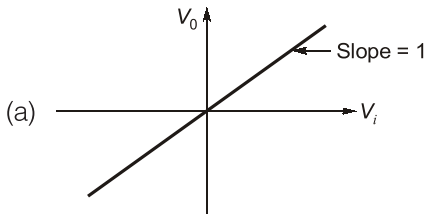
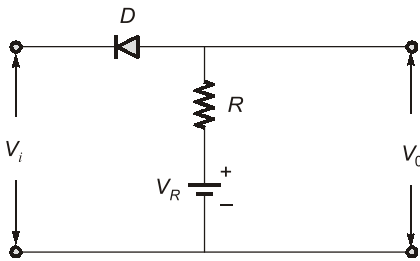


- Q.5** For the circuit shown below assuming ideal diode, the output waveform V_o is

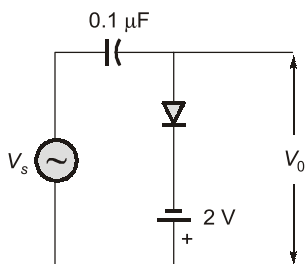




Q.6 The transfer characteristic of the network shown below is represented as

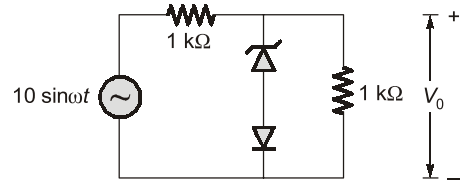


Q.7 For an input of $V_s = 5 \sin \omega t$, (assuming ideal diode), circuit shown below will behave as a



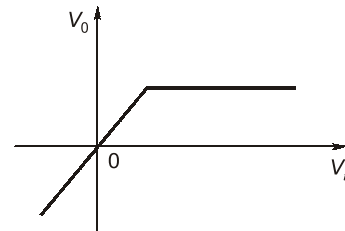
- (a) clipper, sine wave clipped at -2 V
- (b) clamper, sine wave clamped at -2 V
- (c) clamper, sine wave clamped at zero volt
- (d) clipper, sine wave clipped at 2 V

Q.8 The cut-in voltage of diode D shown in figure is 0.65 V , while breakdown voltage of the Zener Diode is 3 V . Diode is considered to be ideal. The value of peak output voltage V_o .



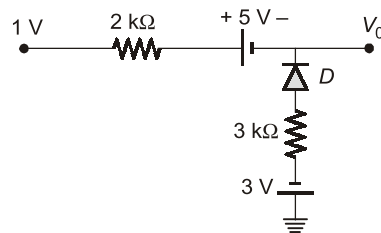
- (a) 3 V in the positive half cycle and 0.65 V in the negative half cycle.
- (b) 3.65 V in the positive half cycle and -5 V in the negative half cycle.
- (c) 3 V in positive half cycle and -5 V in the negative half cycle
- (d) -3.65 V in positive half cycle and 5 V in the negative half cycle

Q.9 The voltage transfer characteristic as shown in the figure will relate to a



1. voltage regulator
 2. half-wave rectifier
 3. full-wave rectifier
- Which of the above is/are correct?
- (a) 1 only
 - (b) 2 only
 - (c) 1 and 2
 - (d) 1 and 3

Q.10 What is the output voltage V_o for the circuit shown below assuming an ideal diode?



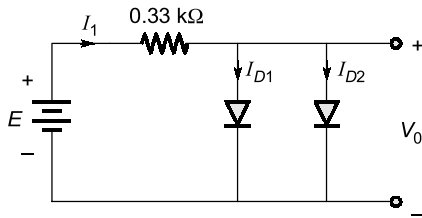
- (a) $-\frac{18}{5} \text{ V}$
- (b) $\frac{18}{5} \text{ V}$
- (c) $-\frac{13}{5} \text{ V}$
- (d) $\frac{13}{5} \text{ V}$

Q.35 A full wave rectifier delivers DC power of 50 W to a load of 200 Ω. If the ripple factor is 1%, the AC ripple voltage across the load is

- (a) $\frac{1}{2}$ V
- (b) 1 V
- (c) $\frac{2}{3}$ V
- (d) $\frac{3}{2}$ V

Multiple Select Questions (MSQs)

Q.36 For the circuit shown below :

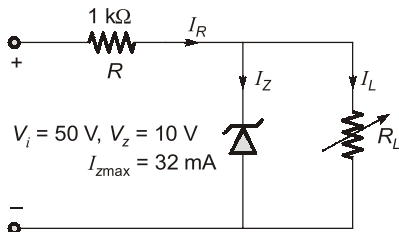


(where $E = 10$ V)

Which of the following statement is correct?

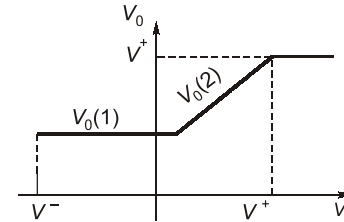
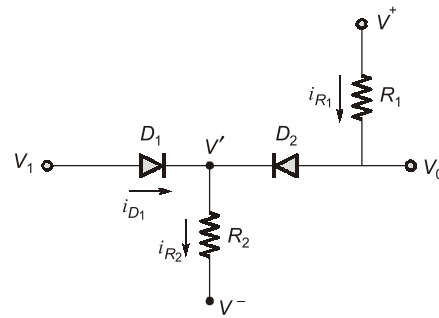
- (a) $I_1 > I_{D1} > I_{D2}$
- (b) $I_{D1} < I_{D2} < I_1$
- (c) $I_{D1} = I_{D2} = \frac{I_1}{2}$
- (d) $I_1 = 28.18$ mA

Q.37 For the network shown below, which of the following option(s) is/are correct regarding the range of R_L and I_L that will result in V_{R_L} being maintained at 10 V.



- (a) $R_{L \min} = 250$ Ω
- (b) $I_{L \min} = 8$ mA
- (c) $R_{L \max} = 1.25$ kΩ
- (d) $I_R = 40$ mA

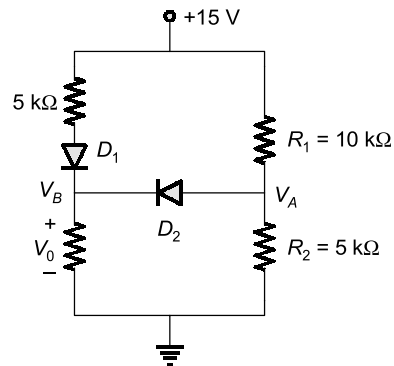
Q.38 For the circuit shown below :



Assume the circuit parameters are $R_1 = 5$ kΩ, $R_2 = 10$ kΩ, $V_f = 0.7$ V, $V^+ = +5$ V and $V^- = -5$ V

- (a) For $V_1 = 0$, $i_{R1} = 0.62$ mA
- (b) For $V_1 = 4$ V, $i_{R1} = 0.2$ mA
- (c) For $V_1 = 4$ V, $i_{R2} = 0.83$ mA
- (d) For $V_1 = 4$ V, $i_{D1} = 0.63$ mA

Q.39 For the circuit shown below :



Which of the following are correct?

- (a) $V_A = 7.62$ V
- (b) $V_B = 6.92$ V
- (c) $V_A = 5$ V
- (d) $V_B = 9.53$ V



Answers Diode Circuit and Power Supply

- | | | | | | | |
|------------|------------------|------------------|------------|---------|---------|---------|
| 1. (c) | 2. (c) | 3. (c) | 4. (d) | 5. (d) | 6. (c) | 7. (b) |
| 8. (b) | 9. (a) | 10. (a) | 11. (a) | 12. (c) | 13. (d) | 14. (4) |
| 15. (0) | 16. (b) | 17. (a) | 18. (a) | 19. (c) | 20. (c) | 21. (a) |
| 22. (b) | 23. (b) | 24. (b) | 25. (a) | 26. (d) | 27. (c) | 28. (a) |
| 29. (c) | 30. (c) | 31. (d) | 32. (c) | 33. (d) | 34. (c) | 35. (b) |
| 36. (c, d) | 37. (a, b, c, d) | 38. (a, b, c, d) | 39. (c, d) | | | |



Explanations Diode Circuit and Power Supply

1. (c)

$$\frac{dV_D}{dT} = -2.5 \text{ mV}^\circ\text{C}$$

$$\Delta V_D = 20 \times (-2.5 \text{ mV}) = -0.05 \text{ V}$$

$$\therefore V_D + \Delta V_D = V_2 = 0.71 \text{ V}$$

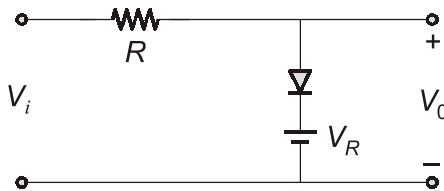
2. (c)

$$\frac{1}{r_d} = \frac{\partial I_D}{\partial V} = \frac{I_D}{V_T}$$

r_d : dynamic resistance.

$$\therefore r_d = \frac{V_T}{I_D} = \frac{25}{4} = 6.25 \Omega$$

3. (c)



Considering ideal diode :

for $V_i < V_R$, diode is OFF hence there is no current through R and $V_o = V_i$.

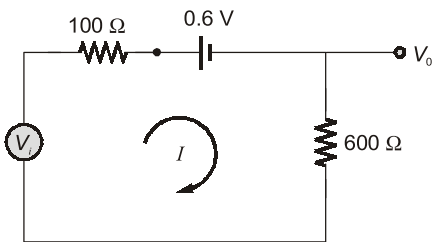
For $V_i > V_R$, diode is ON hence

$$V_o = V_R$$

(as diode will act as short circuit)

4. (d)

For $0 \leq t \leq 1$, diode is ON



$$I = \frac{V_i - 0.6}{100 + 600} = \frac{10 - 0.6}{700}$$

$$= 0.01343 \text{ A}$$

$$\therefore V_o = 600 \times 0.01343 = 8.058 \text{ V}$$

for $1 < t < 2$, diode is OFF, there will be no current in the circuit and hence

$$V_o = 0 \text{ V}$$

Hence output waveform can be given as shown below:

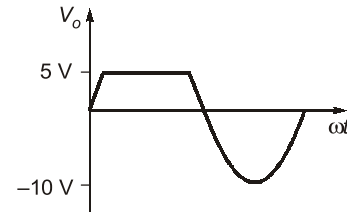


5. (d)

For $0 \leq V_i < V_R$ = diode is OFF $\Rightarrow V_o = V_i$

For $V_R \leq V_i \Rightarrow$ diode is ON $\Rightarrow V_o = 5 \text{ V}$

Hence output waveform can be as shown below

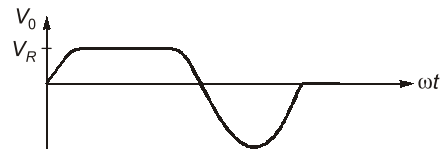
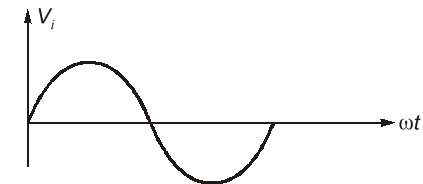


6. (c)

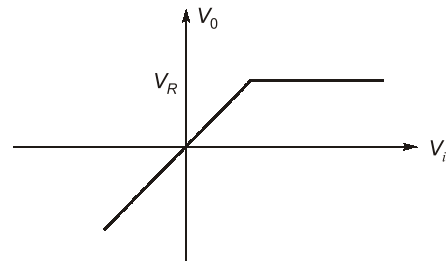
For $V_i < V_R$ = Diode is OFF $\Rightarrow V_o = V_i$

For $V_i > V_R$ = Diode is ON $\Rightarrow V_o \approx V_R$

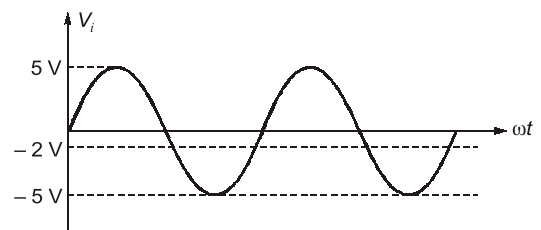
Hence for a sinusoidal input, output can be shown as below



Hence characteristic can be as shown below



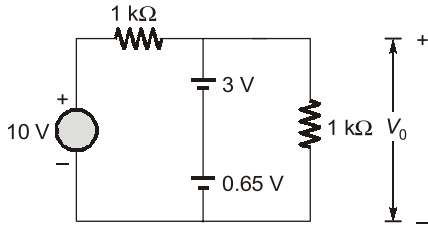
7. (b)



Hence given circuit acts as a clamper, sine wave clamped at -2 V .

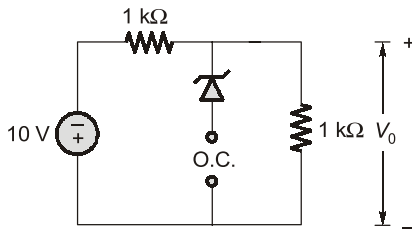
8. (b)

For positive half cycle:



So, $V_o = 3.65 \text{ V}$

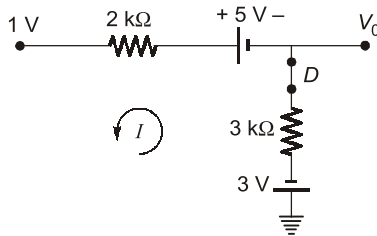
In negative half cycle:



So, $V_o = -5 \text{ V}$

10. (a)

∴ Diode is forward bias (short circuit)



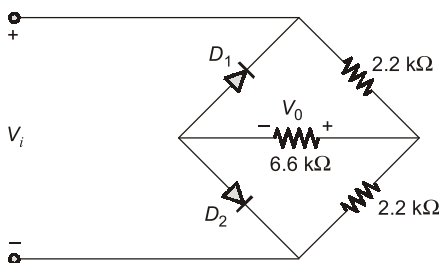
By applying KVL,

$$3 \text{ V} + 3 \text{ k}\Omega I - 5 \text{ V} + 2 \text{ k}\Omega I + 1 \text{ V} = 0$$

$$I = \frac{1 \text{ V}}{5 \text{ k}\Omega} = \frac{1}{5} \text{ mA}$$

$$\therefore V_o = -3 - 3 \times \frac{1}{5} = -\frac{18}{5} \text{ V}$$

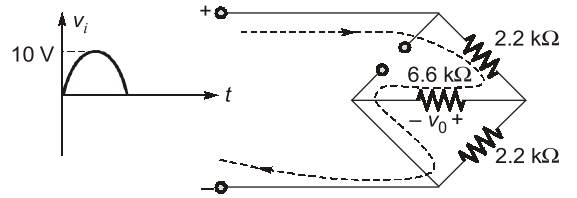
11. (a)



For positive half cycle of input voltage

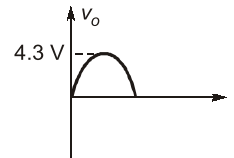
$D_1 \rightarrow \text{OFF}$

$D_2 \rightarrow \text{ON}$

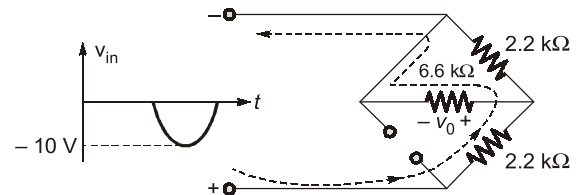


$$V_{o_{\max}} = \frac{[6.6 \text{ k}\Omega \parallel 2.2 \text{ k}\Omega]}{2.2 \text{ k}\Omega + [6.6 \text{ k}\Omega \parallel 2.2 \text{ k}\Omega]} V_{i_{\max}}$$

$$= \frac{0.75}{1+0.75} \times 10 \text{ V} = 4.3 \text{ V}$$

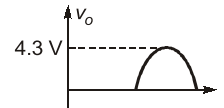


For negative half cycle of input voltage

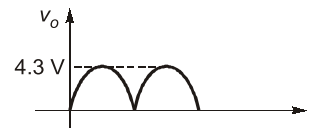


$$V_{o_{\max}} = \frac{[6.6 \text{ k}\Omega \parallel 2.2 \text{ k}\Omega]}{2.2 \text{ k}\Omega + [6.6 \text{ k}\Omega \parallel 2.2 \text{ k}\Omega]} V_{i_{\max}}$$

$$= \frac{0.75}{1+0.75} \times 10 \text{ V} = 4.3 \text{ V}$$



Still the polarity of output voltage is in the same direction. So, net output of the circuit will be a full rectified wave.



12. (c)

The given circuit is a voltage doubler. Hence,

$$V_o = 2 V_m$$

13. (d)

When D_2 is ON then the value of V_o will be

$$V_o = 3 - 0.7 \text{ V} = 2.3 \text{ V}$$

Hence, D_1 will be OFF.

DIGITAL ELECTRONICS

OBJECTIVE PRACTICE SETS

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Number Systems and Codes

MCQ and NAT Questions

- Q.1** "BAD" is the hexadecimal representation of a binary number. If the number represents only the magnitude, its decimal equivalent is
 (a) 2749 (b) 2989
 (c) 1213 (d) 111013
- Q.2** Which of the following is a self-complementary code?
 (a) 8421 code (b) Excess 3 code
 (c) Pure binary code (d) Gray code
- Q.3** A Gray code is a/an:
 (a) Binary weight code
 (b) Arithmetic code
 (c) Code which exhibits a single bit change between two successive codes
 (d) Alphanumeric code
- Q.4** If $(211)_x = (152)_8$, then the value of base 'x' is
 (a) 3 (b) 5
 (c) 7 (d) 9
- Q.5** The decimal number 4097 is represented in four forms as shown below. Match **List-I (Type of Representation)** with **List-II (Number)** and select the correct answer:
- | List I | List II |
|----------------|------------------------|
| A. Binary | 1. 0000 0000 0000 1001 |
| B. BCD | 2. 0000 0000 0001 0001 |
| C. Octal | 3. 0001 0000 0000 0001 |
| D. Hexadecimal | 4. 0100 0000 1001 0111 |
- Codes:**
- | A | B | C | D |
|-------|---|---|---|
| (a) 3 | 1 | 2 | 4 |
| (b) 2 | 4 | 3 | 1 |
| (c) 3 | 4 | 2 | 1 |
| (d) 2 | 1 | 3 | 4 |
- Q.6** The range of numbers that can be represented in two's complement mode with four binary digits is
 (a) -15 to +15 (b) -8 to +8
 (c) -8 to +7 (d) -7 to +7
- Q.7** $(24)_8$ is expressed in Gray code as which one of the following?
 (a) 11000 (b) 10100
 (c) 11110 (d) 11111
- Q.8** The 2's complement representation of -17 is
 (a) 101110 (b) 101111
 (c) 111110 (d) 110001
- Q.9** A number is expressed as 1023 with radix x . Given that the number uses all the symbols of the number system, which of the following is correct?
 (a) $x = 3$ and its decimal value is 37
 (b) $x = 2$ and its decimal value is 14
 (c) $x = 4$ and its decimal value is 15
 (d) $x = 4$ and its decimal value is 75
- Q.10 Statement 1:** The range of unsigned decimal values that can be represented (using binary system) in a byte is 256.
Statement 2: The range of signed decimal values that can be represented (by signed binary using 2's complement) in a byte is 256.
 (a) Statement 1 is TRUE
 (b) Statement 2 is TRUE
 (c) Statement 1 and Statement 2 both are TRUE
 (d) Both are FALSE
- Q.11 Statement 1:** 256 different signed decimal values can be represented in a byte.
Statement 2: In 2's complement system.
 $11110100_2 = -12_{10}$
 (a) statement 1 is TRUE
 (b) statement 2 is TRUE
 (c) both statements are TRUE
 (d) both statements are FALSE
- Q.12** For the given Grey code 10110 what will be the binary equivalent code?
 (a) 10110 (b) 11101
 (c) 11011 (d) None of these

- Q.13** Which of the following represents seven bit code?
 1. ASCII 2. BCD
 3. EBCDIC 4. Selectric
 Select the correct answer using the codes given below :
 (a) 1 and 4 (b) 1 and 2
 (c) 1 and 3 (d) 2 and 3
- Q.14** With 2's complement representation, the range of values that can be represented on the data bus of an 8 bit microprocessor is given by
 (a) -128 to $+127$ (b) -128 to $+128$
 (c) -127 to $+128$ (d) -256 to $+256$
- Q.15** The binary number 00001011 when represented in BCD format, is given by
 (a) 00001011 (b) 10111011
 (c) 00010001 (d) 10001000
- Q.16** Hamming codes are used for error detection and correction. If the minimum Hamming distance is m , then the number of errors correctable is
 (a) equal to m (b) less than $m/2$
 (c) equal to $2m$ (d) greater than m
- Q.17** In signed magnitude representation, the binary equivalent of 22.5625 is (the bit before comma represents the sign)
 (a) 0, 10110.1011 (b) 0, 10110.1001
 (c) 1, 10101.1001 (d) 1, 10110.1001
- Q.18 Assertion (A):** A 16-bit data contained in a certain location of a computer memory can be expressed in terms of four hexadecimal digits only.
Reason (R): The hexadecimal number system has a base that is four times the base of binary number system.
 (a) Both A and R are true, and R is the correct explanation of A.
 (b) Both A and R are true, but R is not a correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.
- Q.19** What will be the excess-3 code representation of the number $(64)_{10}$?
 (a) 01000011 (b) 01110011
 (c) 01000000 (d) 10010111
- Q.20** The addition of two number $(-64)_{10}$ and $(80)_{16}$ is
 (a) $(-16)_{10}$ (b) $(16)_{10}$
 (c) $(1100000)_2$ (d) $(01000000)_2$
- Q.21** Given that the largest n -bit binary number requires d digits in decimal representation. Which one of the following relations between n and d is approximately correct?
 (a) $d = 2^n$ (b) $n = 2^d$
 (c) $d < n \log_{10} 2$ (d) $d > n \log_{10} 2$
- Q.22** A signed integer has been stored in a byte using the 2's complement format. We wish to store the same integer in a 16 bit word. We should
 (a) copy the original byte to the less significant byte of the word and fill the more significant byte with zeros.
 (b) copy the original byte to the more significant byte of the word and fill the less significant byte with zeros.
 (c) copy the original byte to the less significant byte of the word and make each bit of the more significant byte equal to the most significant bit of the original byte.
 (d) copy the original byte to the less significant bytes well as the more significant byte of the word.
- Q.23** Consider the following operation
 $(23)_x + (21)_x = (y)_x$
 What is the minimum value of 'y' that is possible?
 (a) $(17)_{10}$ (b) $(20)_{10}$
 (c) $(44)_{10}$ (d) $(110)_{10}$
- Q.24** Consider the following statements:
 1. When two unsigned numbers are added, an overflow is detected from the carry into the most significant position.
 2. An overflow does not occur if the two numbers added are both negative.
 3. If the carry into the sign bit position and carry out of the sign bit position are not equal, an overflow condition is produced.
 Which of the above statement(s) is/are correct?
 (a) 1, 2 and 3 (b) 1 only
 (c) 2 only (d) 3 only
- Q.25** 2's complement representation of a 16-bit signed number is FFFFH. Its magnitude in decimal representation is
 (a) 0 (b) 1
 (c) 32767 (d) 65535

Q.26 If a particular number system having base B , such that

$$(\sqrt{21})_B = 3_{10}$$

Then the value of 'B' is _____ .

Q.27 4-bit 2's complement representation of a decimal number is 1000. The number will be _____?

Q.28 If $(11 \times 1Y)_8 = (12C9)_{16}$, then the value of $X - Y$ will be _____.

Q.29 The number 1's present in the binary representation of $15 \times 256 + 5 \times 16 + 3$ are _____.

Q.30 The number of bytes required to represent the decimal number 1856357 in packed BCD (Binary Coded Decimal) form is _____.

Q.31 In a particular number system the cubic equation $x^3 + bx^2 + Cx - 190 = 0$ has roots $x = 5$, $x = 8$ and $x = 9$. Then the base of the number system is _____.

Multiple Select Questions (MSQs)

Q.32 $(1010.011)_2$ is equal to

- (a) $(10.75)_{10}$ (b) $(22.12)_4$
(c) $(12.3)_8$ (d) $(A.C)_{16}$

Q.33 If $(23)_x = (47)_y$, then the possible values of radix x and y could be

- (a) $x = 2, y = 1$ (b) $x = 3, y = 1$
(c) $x = 4, y = 1$ (d) $x = 6, y = 2$

Q.34 $(-64)_{10} + (80)_{16}$ is equal to

- (a) 0100 0000 in binary number system.
(b) 0110 0100 in BCD code.
(c) 80 in octal number system.
(d) 64 in hexadecimal number system.

Q.35 Which of the following are the self-complementing codes?

- (a) BCD codes
(b) Excess-3 code
(c) 2-4-2-1 binary weighted code
(d) 4-2-2-1 binary weighted code

Q.36 Consider the signed binary number $A = 0100\ 0110$ and $B = 1101\ 0011$, where B is in 2's complement and MSB is the sign bit. Which of the below statement(s) is/are correct?

- (a) $A + B = 1000\ 1001$
(b) $A - B = 0111\ 0011$
(c) $B - A = 0100\ 1101$
(d) $-A - B = 1110\ 0111$

Q.37 Which of the following represents $(AB)_{16}$?

- (a) $(0110\ 0010)_2 + (0100\ 0001)_2$
(b) $(1100\ 0011)_2 - (0001\ 1000)_2$
(c) $(96)_{16} + (15)_{16}$
(d) $(D3)_{16} - (28)_{16}$

Q.38 If in a particular number system, the cubic equation $x^3 - ax^2 + bx - 190 = 0$ has roots $x = 5$, $x = 8$ and $x = 9$, then

- (a) The base of the number system is 13.
(b) $a = 19$ in the given number system.
(c) $b = A7$ in the given number system.
(d) The equivalent equation in the hexadecimal system is $x^3 - 16x^2 + 9Dx - 168 = 0$.

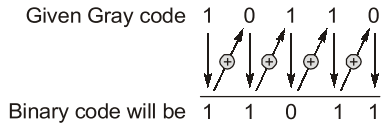


11. (c)

$$\begin{array}{r} 2\text{'s complement of } (11110100)_2 \\ = \quad 0001011 \\ \quad \quad \quad 1 \\ \hline \quad 00011100 = 12 \\ \hline \end{array}$$

But in 2's complement representation, MSB is '1' i.e. number is negative.

12. (c)



13. (a)

Seven bit code : ASCII, selectric
EBCDIC : 8-bit code
BCD : 4-bit code

14. (a)

For 8-bit 2's complement : - 128 to 127

15. (c)

Convert binary into decimal

$$0001011 \rightarrow 2^3 \cdot 1 + 2^1 \cdot 1 + 2^0 \cdot 1 = 11$$

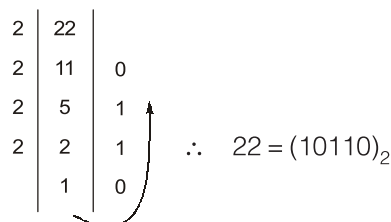
$$(11)_{10} = (0001011)_2$$

16. (b)

No. of errors correctable in hamming code for m hamming distance < m/2.

17. (b)

$$\begin{array}{l} \therefore + 22.5625 \\ + \rightarrow 0 \\ - \rightarrow 1 \end{array}$$



$$\begin{array}{l} 0.5625 \times 2 = 1.1250 \rightarrow 1 \\ 0.1250 \times 2 = 0.2500 \rightarrow 0 \\ 0.2500 \times 2 = 0.5 \rightarrow 0 \\ 0.5 \times 2 = 1 \rightarrow 1 \end{array}$$

$$\begin{array}{l} \therefore (1001)_2 \\ \therefore (22.5625) = (10110.1001)_2 \end{array}$$

18. (c)

Hexadecimal, decimal, binary number system has a base 16, 10, 2 respectively.

19. (d)

Given, $(64)_{10} = (01000000)_2$
To convert into excess 3, first convert into BCD code.

$$\begin{array}{l} (64)_{10} \xrightarrow{BCD} \overset{6}{0110} \overset{4}{0100} \\ \text{Now add } (3)_{10} = 0011 \text{ into each Nibble.} \\ \text{So, } (64)_{10} \xrightarrow{\text{Excess 3}} \begin{array}{r} 0110 \ 0100 \\ + 0011 \ 0011 \\ \hline 1001 \ 0111 \end{array} \end{array}$$

20. (d)

$$\begin{array}{l} (80)_{16} = (128)_{10} \\ (128)_{10} + (-64)_{10} = (64)_{10} \\ (64)_{10} = (01000000)_2 \end{array}$$

21. (d)

For n-bit number

$$d > n \log_{10} 2$$

For $n = 1, 2, 3 \quad d = 1$
For $n = 4, 5, 6 \quad d = 2$
For $n = 7, 8, 9 \quad d = 3$
For $n = 10, 11, 12, 13 \quad d = 4$
For any $n, d > n \log_{10} 2$ is correct.

22. (c)

The MSB of the integer in 8 bit format should be repeated to expand the representation of 2's complement form to 16 bit.

23. (b)

For minimum value of 'y' the value of 'x' should be minimum
 \therefore minimum value of $x = 4$
 $\therefore (23)_4 + (21)_4 = (110)_4 = (4^2 + 4 + 0)_{10} = (20)_{10}$

24. (d)

1. When two unsigned numbers are added, an overflow is detected from the carry out of most significant bit. (not into most significant bit)
2. Overflow does not occur if the numbers are of opposite sign otherwise it may occur.
3. In signed operation, if carry into sign bit and carryout of the sign bit are not equal, overflow occurs else overflow does not occur.

MICROPROCESSORS

OBJECTIVE PRACTICE SETS

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Introduction to 8085 and its Functional Organisation

MCQ and NAT Questions

- Q.1** Microprocessor 8085 is the enhanced version of ____ with essentially the same construction set.
- (a) 6800 (b) 68000
(c) 8080 (d) 8000
- Q.2** The data bus in 8080A / 8085 microprocessor is a group of
- (a) eight bit bidirectional lines that are used to transfer 8 bits data between the microprocessor and its I/O and memory
(b) eight lines used to transfer data among the registers
(c) eight unidirectional lines that are used for I/O devices
(d) sixteen bidirectional lines that are used for data transfer between the microprocessor and memory
- Q.3** Three devices A, B and C are connected to an Intel 8085 A microprocessor. Device A has the highest priority and device C has the lowest priority. The correct assignment of interrupt inputs is
- (a) A uses RST 5.5, B uses RST 6.5 and C uses TRAP
(b) A uses RST 5.5, B uses RST 6.5 and C uses RST 7.5
(c) A uses TRAP, B uses RST 6.5 and C uses RST 5.5
(d) A uses TRAP, B uses RST 5.5 and C uses RST 7.5
- Q.4** The output data lines of microprocessors and memories are usually tristated, because
- (a) More than one device can transmit information over the data bus by enabling only one device at a time
(b) More than one device can transmit information over the data bus at the same time
(c) The data lines can be multiplexed for both input and output
(d) It increases the speed of data transfers over the data bus
- Q.5** Machine instructions are written using which of the following?
- (a) Bits 0 and 1 only
(b) Digits 0 to 9 only
(c) Digits 0 to 9 and the capital alphabets A to Z only
(d) Digits 0 to 9, the capital alphabets A to Z and certain special characters
- Q.6** An 8085 μ p based system drives a multiplexed 5-digits 7-segment display. The digits are refreshed at a rate of 500 Hz. The ON time for each digit is
- (a) 4 ms (b) 0.4 ms
(c) 10 ms (d) 25 ms
- Q.7** A memory chip can be represented as 8192×32 . If there are p number of address lines and q number of data lines for the memory chip, then $q-p$ will be equal to _____.
- Q.8** What is the function of a program counter in an 8-bit microprocessor?
- (a) To store the op-code of the instruction being executed
(b) To store the op-code of the next instruction
(c) To store the address of the instruction being executed
(d) To store the address of the next instruction
- Q.9** When an application is designed using a microcontroller it has the following advantages over a design based on a microprocessor :
1. Its chip count is less.
 2. It is more fault tolerant.
 3. It is cheaper.
- Which of these are correct?
- (a) 1, 2 and 3 (b) 1 and 2 only
(c) 1 and 3 only (d) 2 and 3 only
- Q.10** An 'Assembler' in a microprocessor is used for
- (a) assembly of processors in a production line
(b) creation of new programs using different modules

- (c) translation of a program from assembly language to machine language
(d) translation of a higher level language into English text
- Q.11** What is the direction of control bus?
(a) Unidirectional into microprocessor
(b) Unidirectional out of microprocessor
(c) Bidirectional
(d) Mixed direction i.e. some lines into microprocessor and some lines out of microprocessor
- Q.12** Which one of the following statements is correct?
A microprocessor program written in assembly language is translated into machine language. The number of instructions in the machine language when compared with the number of instructions in assembly language is
(a) More only (b) Same
(c) Less only (d) Either more or less
- Q.13** The synchronisation between microprocessor and memory is done by
(a) ALE signal (b) HOLD signal
(c) READY signal (d) None of these
- Q.14** The stack pointer in the 8085 microprocessor is a
(a) 16 bit register that point to stack memory locations
(b) 16 bit accumulator
(c) memory location in the stack
(d) flag register used for the stack
- Q.15** In 8085 microprocessor, RST- n instruction is executed. If the vector address location corresponding to the RST- n instruction is 0038 H, then the value of n is _____.
- Q.16** In 8085 microprocessor, the value of the most significant bit of the result following the execution of any arithmetic or Boolean instruction is stored in the
(a) carry status flag
(b) auxiliary carry status flag
(c) sign status flag
(d) zero status flag
- Q.17** An 8085 microprocessor is using a crystal frequency of 5 MHz. The duration of one T-state would be _____ ns.
- Q.18** In 8085 microprocessor, the interrupt which is both edge as well as level sensitive has vector address of (_____) ₁₀.
- Q.19** Match List-I with List-II and select the correct answer using the codes given below the lists:
- List-I**
A. Monitor program
B. Assembler
C. Mnemonic
D. Program counter
- List-II**
1. Used to indicate memory location
2. A combination of letters, symbols and numerals
3. A program that translates symbolic instructions into binary equivalent
4. An operating system
- Codes:**
- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 4 | 3 | 2 | 1 |
| (b) | 4 | 3 | 1 | 2 |
| (c) | 3 | 4 | 1 | 2 |
| (d) | 3 | 4 | 2 | 1 |
- Q.20** Which of the following statement is false ?
1. The 8085 has two 16-bit registers, the PC and SP. The PC is used to sequence the execution of a program and the stack pointer is used as a memory pointer for the stack memory.
2. 8085 responds to four externally initiated operations-reset, interrupt, ready and hold.
3. The interconnection of peripherals with the 8085 MPU, additional logic circuits, called interfacing devices are necessary.
(a) only 1 is false (b) only 2 is false
(c) only 3 is false (d) None of these
- Q.21** In a microprocessor, the service routine for a certain interrupt starts from a fixed location of memory which cannot be externally set, but the interrupt can be delayed or rejected. Such an interrupt is
(a) non-maskable and non-vectorized
(b) maskable and non-vectorized
(c) non-maskable and vectorized
(d) maskable and vectorized
- Q.22** In a microprocessor when a CPU is interrupted, it
(a) Stops execution of instructions
(b) Acknowledges interrupt and branches of subroutine
(c) Acknowledges interrupt and continues
(d) Acknowledges interrupt and waits for the next instruction from the interrupting device

Q.23 Match **List-I** with **List-II** and select the correct answer using the codes given below the lists:

List-I

- A. TRAP
- B. RST 7.5
- C. RST 6.5
- D. RST 5.5

List-II

- 1. Level - sensitive
- 2. Edge - sensitive
- 3. Both Level and Edge - sensitive

Codes:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 3 | 1 | 1 |
| (b) | 3 | 2 | 1 | 1 |
| (c) | 3 | 1 | 2 | 2 |
| (d) | 1 | 3 | 2 | 2 |

Q.24 Consider the following statements regarding RESET instruction of 8085 microprocessor:

- 1. PC contents become 0000H.
- 2. All interrupts are enabled.
- 3. RESET OUT pin is at logic 0.

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) 1 and 2
- (d) 2 and 3

Q.25 Consider the following features in an 8085 microprocessor system with memory mapped I/O:

- 1. I/O devices have 16-bit addresses.
- 2. I/O devices are accessed using IN and OUT instructions.
- 3. There can be maximum of 256 input devices and 256 output devices.
- 4. Arithmetic and logic operations can be directly performed with the I/O data.

Select the correct answer using the codes given below:

Codes:

- (a) 1, 2 and 4
- (b) 1, 3 and 4
- (c) 2 and 3
- (d) 1 and 4

Q.26 Match **List-I** (Pre terminals) with **List-II** (Applications) and select the correct answer using the code given below the lists:

List-I

- A. SID, SOD
- B. Ready
- C. TRAP
- D. ALE

List-II

- 1. Wait state
- 2. Interrupt
- 3. Serial data transfer
- 4. Memory or I/O read/ write
- 5. Address latch control

Codes:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 1 | 5 | 2 |
| (b) | 3 | 1 | 2 | 5 |
| (c) | 4 | 3 | 2 | 5 |
| (d) | 4 | 3 | 1 | 2 |

Q.27 In 8085 microprocessor, the RST 6.5 instruction transfers the program execution to the following location

- (a) 34 H
- (b) 24 H
- (c) 48 H
- (d) 60 H

Multiple Select Questions (MSQs)

Q.28 Which one of the following statement(s) is/are not correct?

A microcontroller differs from a microprocessor in that it has

- (a) both on-chip memory and on-chip ports.
- (b) only on-chip memory but not on-chip ports.
- (c) only on-chip ports but not on-chip memory.
- (d) neither on-chip memory nor on-chip ports.

Q.29 Which of these 8-bit registers of 8085 μ P can be paired together to make a 16-bit register?

- (a) Accumulator and B register
- (b) B and C registers
- (c) D and E registers
- (d) H and L registers



Answers Introduction to 8085 and its Functional Organisation

- | | | | | | | |
|---------------|---------|-----------|----------|---------|---------|---------------|
| 1. (c) | 2. (a) | 3. (c) | 4. (a) | 5. (a) | 6. (b) | 7. (19) |
| 8. (d) | 9. (a) | 10. (c) | 11. (d) | 12. (b) | 13. (c) | 14. (a) |
| 15. (7) | 16. (c) | 17. (400) | 18. (36) | 19. (a) | 20. (d) | 21. (d) |
| 22. (d) | 23. (b) | 24. (a) | 25. (d) | 26. (b) | 27. (a) | 28. (b, c, d) |
| 29. (b, c, d) | | | | | | |

Explanations Introduction to 8085 and its Functional Organisation**1. (c)**

8085 is advanced version of Intel 8080.

2. (a)

Data bus is of 8-bits and bidirectional and transfer data between microprocessor and memory/IO.

3. (c)

Priority order:

TRAP > RST 7.5 > RST 6.5 > RST 5.5 > INTR

4. (a)

The output data lines of microprocessor and memories are tristate because more than one device can transmit information over the data bus by enabling only one device at a time.

5. (a)

A programme written with 0's and 1's is called machine language programme. However sometime to facilitate programmer, machine code can be written in hexadecimal numbers.

6. (b)

At a time 8085 can drive only a digit. In a second, each digit is refreshed 500 times. Thus time given to each digit

$$= \frac{1}{(5 \times 500)} = 0.4 \text{ ms}$$

7. (19)

Given: Memory chip $8192 \times 32 = 2^{13} \times 32$

\therefore 13 address lines and 32 data lines

$\therefore q - p = 32 - 13 = 19$

8. (d)

It is used to store 16-bit address of the next byte to be fetched from memory or address of the next instruction to be executed.

9. (a)

A microcontroller is an embedded system with some specific functions like vending machine, electronic parking meters. The processor has to perform simple and low grade computational functions. So the process is simple and cheaper. Its chip count i.e. number of chips circuitry is less. A microcontroller is put into function once and the system where it is used is rugged. No changes or complexities are required. It is immune to virus attacks. So it is more to be fault tolerant.

10. (c)

An 'Assembler' is used for translation of a program from assembly language to machine language.

11. (d)

Control bus have some lines into microprocessor and some out of microprocessor.

12. (b)

A program written in assembly language is translated into machine language. Number of instructions in assembly and machine language is same.

13. (c)

READY is an active high pin used to interface slow peripheral devices with 8085.

14. (a)

Stack pointer is of 16-bit register and it points to the stack memory locations and generally used in case of interrupt or PUSH, POP instructions.

15. (7)

$$\begin{aligned} 0038 \text{ H} &= (56)_{10} \\ n \times 8 &= 56 \\ n &= 7 \end{aligned}$$

16. (c)

MSB is stored in sign flag.

17. (400)

$$f_{\text{Clock}} = \frac{1}{2} \times \text{Crystal frequency}$$

$$= \frac{1}{2} \times 5 = 2.5 \text{ MHz}$$

$$T = \frac{1}{f_{\text{Clock}}} = \frac{1}{2.5} \mu\text{s}$$

$$= 0.4 \mu\text{s} = 400 \text{ ns}$$

18. (36)

TRAP (RST 4.5) is both edge as well as level sensitive. Its vector address is $(36)_{10}$.

19. (a)

Program counter: Indicates memory location to which next instruction to be fetched.

Monitor program: An operating system.

Assembler: Converts machine language to binary equivalent.

20. (d)

All the statements are true.

21. (d)

Interrupt which has fixed address location is said to be vectored and which can be delayed or rejected is known as maskable.

22. (d)

In a microprocessor when a CPU is interrupted, it acknowledges interrupt by INTA signal and then waits for the next instruction to be fetched by interrupting device.

23. (b)

- TRAP ⇒ Both Level and Edge - sensitive
- RST 7.5 ⇒ Edge - sensitive
- RST 6.5 ⇒ Level - sensitive
- RST 5.5 ⇒ Level - sensitive

24. (a)

The following actions are performed by 8085 RESET instruction.

- PC contents become 0000 H
- IR contents become 00 H
- All interrupts are disabled except TRAP.

25. (d)

In memory mapped I/O: I/O devices have 16-bit addresses and arithmetic and logic operations can be directly performed in I/O data for memory mapped I/O.

While I/O mapped I/O: I/O devices can be accessed using IN-OUT instruction and maximum 256 input devices and 256 output devices can be there.

26. (b)

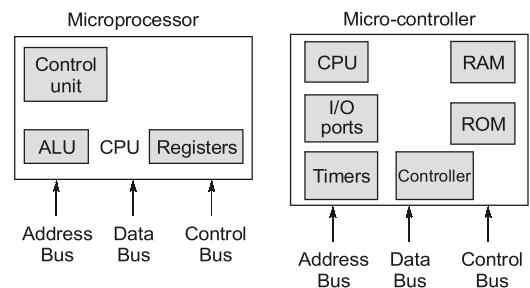
- A. SID - Serial input data } Serial data transfer
- SOD - Serial output data }
- B. Ready - Wait state
- C. TRAP - Hardware interrupt
- D. ALE - Address latch enable control

27. (a)

- RST 7.5 → 003CH
- RST 6.5 → 0034H
- RST 5.5 → 002CH

28. (b, c, d)

Microcontroller has on-chip memory as well as on chip ports.



29. (b, c, d)

Register pairs are BC, DE and HL,