Lecture 2

Dr. Krishan Arora
Asstt. Prof. and Head

Practice Question

$If\ \sqrt{(41)_r} = (7)_{10} \quad find\ value\ of\ r$

$Hints: Convert\ LHS\ and\ RHS\ in\ same\ format$

$Square\ on\ both\ side$

$(41)_r = (49)_{10}$

$4r + 1 = 49$

$r = {}^{48}\!/_{4}$

$r = 12$

Example

$If\ \sqrt{(224)_r} = (13)_r \qquad find\ value\ of\ r$

$$(224)_r = 169_r$$

$$2r^2 + 2r + 4 = r^2 + 6r + 9$$

$$r^2 - 4r - 5 = 0$$

$$r = 5, -1$$

$$r = 5$$

Practice Question

- The representation of octal number (532.2)8 in decimal is _____

  a) (346.25)10
  b) (532.864)10
  c) (340.67)10
  d) (531.668)10

Explanation

- Answer: a
  Explanation: Octal to Decimal conversion is obtained by multiplying 8 to the power of base index along with the value at that index position.
  $(532.2)8 = 5 * 8^2 + 3 * 8^1 + 2 * 8^0 + 2 * 8^{-1} = (346.25)10$

Practice Question

- The decimal equivalent of the binary number (1011.011)2 is _____

  a) (11.375)10
  b) (10.123)10
  c) (11.175)10
  d) (9.23)10

Explanation

- Answer: a
  Explanation: Binary to Decimal conversion is obtained by multiplying 2 to the power of base index along with the value at that index position.
  $1 * 2^3 + 0 * 2^2 + 1 * 2^1 + 1 * 2^0 + 0 * 2^{-1} + 1 * 2^{-2} + 1 * 2^{-3} = (11.375)10$
  Hence, $(1011.011)2 = (11.375)10$

Practice Question

- The decimal equivalent of the octal number $(645)_8$ is _____

  a) $(450)_{10}$
  b) $(451)_{10}$
  c) $(421)_{10}$
  d) $(501)_{10}$

Explanation

- Answer: c
  Explanation: Octal to Decimal conversion is obtained by multiplying 8 to the power of base index along with the value at that index position.
  The decimal equivalent of the octal number $(645)_8$ is $6 * 8^2 + 4 * 8^1 + 5 * 8^0 = 6 * 64 + 4 * 8 + 5 = 384 + 32 + 5 = (421)_{10}$.

Practice Question

- Representation of hexadecimal number (6DE)H in decimal:

  a) $6 * 16^2 + 13 * 16^1 + 14 * 16^0$
  b) $6 * 16^2 + 12 * 16^1 + 13 * 16^0$
  c) $6 * 16^2 + 11 * 16^1 + 14 * 16^0$
  d) $6 * 16^2 + 14 * 16^1 + 15 * 16^0$

Explanation

- Answer: a
  Explanation: Hexadecimal to Decimal conversion is obtained by multiplying 16 to the power of base index along with the value at that index position.
  In hexadecimal number D & E represents 13 & 14 respectively.
  So, 6DE = $6 * 16^2 + 13 * 16^1 + 14 * 16^0$.

Practice Question

- The given hexadecimal number (1E.53)16 is equivalent to _____

  a) (35.684)8
  b) (36.246)8
  c) (34.340)8
  d) (35.599)8

Explanation

- Answer: b
  Explanation: First, the hexadecimal number is converted to it's equivalent binary form, by writing the binary equivalent of each digit in form of 4 bits. Then, the binary equivalent bits are grouped in terms of 3 bits and then for each of the 3-bits, the respective digit is written. Thus, the octal equivalent is obtained.
  (1E.53)16 = (0001 1110.0101 0011)2
  = (00011110.01010011)2
  = (011110.010100110)2
  = (011 110.010 100 110)2
  = (36.246)8.

Practice Question

- The octal number (651.124)8 is equivalent to _____

  a) (1A9.2A)16
  b) (1B0.10)16
  c) (1A8.A3)16
  d) (1B0.B0)16

Explanation

- Answer: a
  Explanation: First, the octal number is converted to it's equivalent binary form, by writing the binary equivalent of each digit in form of 3 bits. Then, the binary equivalent bits are grouped in terms of 4 bits and then for each of the 4-bits, the respective digit is written. Thus, the hexadecimal equivalent is obtained.
  $(651.124)8 = (110\ 101\ 001.001\ 010\ 100)2$
  $= (110101001.001010100)2$
  $= (0001\ 1010\ 1001.0010\ 1010)2$
  $= (1A9.2A)16.$

Practice Question

- The octal equivalent of the decimal number (417)10 is _____

  a) (641)8
  b) (619)8
  c) (640)8
  d) (598)8

Explanation

- Answer: a
  Explanation: Octal equivalent of decimal number is obtained by dividing the number by 8 and collecting the remainders in reverse order.
  8 | 417
  8 | 52 — 1
  8 | 6 – 4
  So, (417)10 = (641)8.

Practice Question

- Convert the hexadecimal number (1E2)16 to decimal.

  a) 480
  b) 483
  c) 482
  d) 484

Explanation

- Answer: c
  Explanation: Hexadecimal to Decimal conversion is obtained by multiplying 16 to the power of base index along with the value at that index position.
  $(1E2)16 = 1 * 16^2 + 14 * 16^1 + 2 * 16^0$ (Since, E = 14)
  $= 256 + 224 + 2 = (482)10.$

Practice Question

- (170)10 is equivalent to _____

  a) (FD)16
  b) (DF)16
  c) (AA)16
  d) (AF)16

Explanation

- Answer: c
  Explanation: Hexadecimal equivalent of decimal number is obtained by dividing the number by 16 and collecting the remainders in reverse order.
  16 | 170
  16 | 10 – 10
  Hence, (170)10 = (AA)16.

Practice Question

- Convert (0.345)10 into an octal number.

  a) (0.16050)8
  b) (0.26050)8
  c) (0.19450)8
  d) (0.24040)8

Explanation

- Answer: b
  Explanation: Converting decimal fraction into octal number is achieved by multiplying the fraction part by 8 everytime and collecting the integer part of the result, unless the result is 1.
  0.345*8 = 2.76 2
  0.760*8 = 6.08 6
  00.08*8 = 0.64 0
  0.640*8 = 5.12 5
  0.120*8 = 0.96 0
  So, (0.345)10 = (0.26050)8.

Practice Question

- Convert the binary number (01011.1011)2 into decimal.

  a) (11.6875)10
  b) (11.5874)10
  c) (10.9876)10
  d) (10.7893)10

Explanation

- Answer: a
  Explanation: Binary to Decimal conversion is obtained by multiplying 2 to the power of base index along with the value at that index position.
  $(01011)2 = 0 * 2^4 + 1 * 2^3 + 0 * 2^2 + 1 * 2^1 + 1 * 2^0 = 11$
  $(1011)2 = 1 * 2^{-1} + 0 * 2^{-2} + 1 * 2^{-3} + 1 * 2^{-4} = 0.6875$
  So, $(01011.1011)2 = (11.6875)10$.