KIITEE MCA
Solved Paper 2006

Part-A

1. Which set is the subset of all given sets?
   (a) {1, 2, 3, 4, ...} (b) {1}
   (c) {0} (d) { }

2. When the length of the shadow of a pole is equal to a height of the pole, then the elevation of source of light is
   (a) 30° (b) 45°
   (c) 60° (d) 75°

3. The distance of the point (x, y) from y-axis is
   (a) x (b) y
   (c) $|x|$ (d) $|y|$

4. $1+3+5+\ldots+(2n-1)$ is
   (a) $2n$ (b) n^2
   (c) n^2+1 (d) None of these

5. If $(1-p)$ is a root of quadratic equation $x^2+px+(1-p)=0$, then its roots are
   (a) 0, −1 (b) −1, 1
   (c) 0, 1 (d) −1, 2

6. In a Pascal triangle, each row is bounded by
   (a) 2 (b) 1
   (c) −1 (d) None of these

7. If A is a square matrix, then $A+A'$ is
   (a) unit matrix (b) null matrix
   (c) A (d) symmetric matrix

8. If A is a square matrix of order 3 and entries of A are positive integers, then $|A|$ is
   (a) different from zero
   (b) 0
   (c) positive
   (d) an arbitrary integer

9. In how many different ways can the letters of the word DISTANCE be arranged so that all the vowels come together ?
   (a) 720 (b) 4320
   (c) 4200 (d) 3400

10. The probabilities that a husband and wife will be alive 20 yr from now are given by 0.8 and 0.9 respectively. What is the probability that in 20 yr atleast one, will be alive?
   (a) 0.98 (b) 0.02
   (c) 0.72 (d) 0.28

11. A collection of 4-bits is called
   (a) Nibble
   (b) Byte
   (c) Word
   (d) Double word

12. Which of the following is the internal memory of the computer?
   (a) CPU register (b) Cache
   (c) Main memory (d) All of these

13. The excess −3 code is also known as
   (a) cyclic redundancy code
   (b) algebraic code
   (c) ASCII code
   (d) self complementing code

14. Using 11 bits the maximum number which can be represented is
   (a) 2048 (b) 2047
   (c) 2049 (d) 2046

15. Floating point numbers are normally used to represent
   (a) only negative numbers
   (b) only positive numbers
   (c) very large or small numbers
   (d) None of the above

16. The person who contributed the idea of the stored program concept was
   (a) Pascal
   (b) Charles Babbage
   (c) John Van Newman
   (d) Vannevar Bush

17. Bar codes stores information using
   (a) punch holes (b) thick and thin lines
   (c) dots (d) None of these

18. Which of the following is not an operating system?
   (a) Windows (b) Linux
   (c) Macintosh (d) Ada

19. The sum of first four prime numbers is
   (a) 10 (b) 11
   (c) 16 (d) 17

20. A distance is covered in 2 h 45 min at 4 km/h. How much time will be taken to cover it at 16.5 km/h?
   (a) 42 min (b) 40 min
   (c) 54 min (d) 28 min

21. The ratio between two numbers is 3 : 4 and their sum is 420. The greater of the two numbers is
(a) 175 (b) 210
(c) 240 (d) 278

22. Unicode is a
(a) 8-bit code (b) 10-bit code
(c) 12-bit code (d) 16-bit code

23. The value of $\log_{0.1} 100$ is
(a) -2 (b) 2
(c) 1 (d) -1

24. If the vectors $\mathbf{a} \equiv (1, -2, 3)$ and $\mathbf{b} \equiv (-2, \lambda, 4)$ are orthogonal, then the value of λ is
(a) 12 (b) 10
(c) 5 (d) -5

25. A sum of money amounts to ₹ 850 in 3 yr and ₹ 925 in 4 yr. The sum is
(a) ₹ 625 (b) ₹ 600
(c) ₹ 675 (d) Data Insufficient

26. If A means 'plus', B means 'minus', C means 'divided by', and D means 'multiplied by', then 18 A 12 C 6 D 2 B 5 is equal to
(a) 15 (b) 27
(c) 17 (d) 35

27. In an examination, a student scores 4 marks for every correct answer and loses 1 mark for every wrong answer. If he attempts all 75 questions and secures 125 marks, the number of questions he attempts correctly is
(a) 38 (b) 40
(c) 42 (d) 44

28. If 12 boys can earn ₹ 240 in 5 days, how many boys can earn ₹ 420 in 21 days?
(a) 9 boys (b) 5 boys
(c) 12 boys (d) 6 boys

29. How many times do the hands of a clock coincide in a day?
(a) 24 (b) 20
(c) 21 (d) 22

30. If 40% of the people read newspaper *X*, 50% read newspaper *Y* and 10% read both the papers. What percentage of people read neither newspaper?
(a) 10% (b) 15%
(c) 20% (d) 25%

31. A man has ₹ 480 in the denominations of one-rupee notes, five-rupee notes and ten-rupee notes. The number of notes is equal. What is the total number of notes he has?
(a) 45 (b) 60
(c) 75 (d) 90

32. In a chess tournament each of the six players will play every other player exactly once. How many matches will be played during the tournament?
(a) 12 m (b) 15 m
(c) 30 m (d) 36 m

33. A wheel makes 1000 revolutions in covering the distance of 88 km. The diameter of the wheel is
(a) 26 m (b) 42 m
(c) 28 m (d) 18 m

34. A car completes a certain journey in 8 h. It covers half the distance at 40 km/h and rest at 60 km/h. The length of the journey is
(a) 340 km (b) 412 km
(c) 384 km (d) 364 km

35. A tank is filled by a pipe *A* in 32 min and pipe *B* in 36 min. When full, the tank can be emptied by a pipe *C* in 20 min. If all the three pipes are opened simultaneously, half of the tank will be filled in
(a) 16 min (b) 20 min
(c) 24 min (d) None of these

36. The largest gold producing country in the world is
(a) India (b) USA
(c) Australia (d) South Africa

37. The CEO of BIOCON is
(a) Kiran Majumdar Shah
(b) Kiran Kranik
(c) LN Mittal
(d) NR Narayana Murthy

38. Which of the following is one of the main rivers of the Himalayan Group?
(a) Brahmaputra (b) Kaveri
(c) Krishna (d) Ganga

39. Traders under which of the following are exempted from implementation of VAT?
(a) ₹ 6 lakh to 50 lakh
(b) ₹ 1 crore
(c) ₹ 10 lakh
(d) ₹ 5 lakh

40. FIFA world cup to tournament 2006 is held in
(a) Germany (b) France
(c) Italy (d) Hungary

41. The first President of the Indian Republic who travelled in Sukhoi-30
(a) R Venkataraman (b) Shankar Dayal Sharma
(c) APJ Abdul Kalam (d) Dr Rajendra Prasad

42. Sales tax rates on motor fuels in Karnataka in June 2006 is
(a) 24% (b) 28%
(c) 14% (d) 19%

43. BSE stands for
(a) Bombay Stock Exchange
(b) Bengaluru Stock Exchange
(c) Brazil Stock Exchange
(d) Bharath Stock Exchange

44. The year 2005 is being celebrated all over the world is the year of
(a) Nano technology (b) Water management
(c) Quantum technology (d) Physics

45. The Chief Minister of Bihar is
(a) Rabri Devi (b) Lalu Prasad Yadav
(c) Nitish Kumar (d) Ram Vilas Paswan

46. The antonym of SALVAGE is
(a) remove (b) burn
(c) lose (d) confuse

47. The synonym of GARNER is
(a) prevent (b) assist
(c) collect (d) consult

48. The opposite of HAMPER is
(a) feed (b) animate
(c) facilitate (d) treat lightly

49. In his usual ..... manner, he had insured himself against this type of loss.
(a) pensive (b) providential
(c) caustic (d) circumspect

50. ANGLE : DEGREE
(a) area : square inch
(b) milk : qart
(c) society : classes
(d) time : minutes

51. Choose the appropriate word : Traffic speed limits are set at a level that achieves some balance between the danger of ..... speed and the desire of most people to travel as quickly as possible.
(a) normal (b) prudent
(c) inadvertent (d) excessive

52. Choose the appropriate word : We lost confidence in him because he never ..... the grandiose promises he had made.
(a) forgot about (b) reneged on
(c) tired of (d) delivered on

53. She ..... like football very much.
(a) don't (b) doesn't
(c) hasn't (d) haven't

54. He eventually managed ..... the door by kicking it hard.
(a) open (b) opening
(c) to open (d) opened

55. Choose the correct opposite word : Ravi is fat : His brother is .....
(a) thin (b) small
(c) thick (d) large

56. How many types of articles are there in English language?
(a) Two (b) Three
(c) Five (d) One

57. I ..... the film we saw at the cinema on Wednesday.
(a) doesn't like (b) haven't liked
(c) didn't like (d) don't like

58. Simon forgot ..... the lights before he left.
(a) turn off
(b) turning off
(c) to turn off
(d) to turned off

59. The feminine gender of TIGER is
(a) tigers (b) tigress
(c) tigresses (d) None of these

60. Choose the correct preposition : Pour the tea ..... the cup
(a) between (b) over
(c) behind (d) into

Part-B

61. If the lines $4x + 3y = 1$, $y = x + 5$ and $5y + bx = 3$ are concurrent, then the value of b is
(a) 1 (b) 3
(c) 6 (d) 0

62. The system of equations $x + y = 2$ and $2x + 2y = 3$ has
(a) no solution
(b) a unique solution
(c) finitely many solutions
(d) infinitely many solutions

63. If $AB = A$ and $BA = B$, then B^2 is equal to
(a) A (b) B
(c) I (d) 0

64. If $x^2 + ax + 10 = 0$ and $x^2 + bx - 10 = 0$ have a common root, then $a^2 - b^2$ is equal to
(a) 10 (b) 20
(c) 30 (d) 40

65. If $\tan A + \cot A = 4$, then $\tan^4 A + \cot^4 A$ is equal to
(a) 110 (b) 194
(c) 88 (d) 190

66. If one side of a triangle is double of another side and the angle opposite to these sides differ by 60°, then the triangle is
(a) right angled (b) an obtuse angled
(c) an acute angled (d) None of these

67. The radius of the circle $16x^2 + 16y^2 - 8x + 32y - 257 = 0$ is
(a) 8 (b) 6
(c) 15 (d) None of these

68. Axis of the parabola $x^2 - 3y - 6x + 6 = 0$ is
(a) $x = -3$ (b) $y = -1$
(c) $x = 3$ (d) $y = 1$

69. The locus of a point which moves such that the difference of its distances from two fixed points is always a constant is
(a) a circle (b) a straight line
(c) a hyperbola (d) an ellipse

70. If $\sin A = \sin B$ and $\cos A = \cos B$, then
(a) $A = n\pi + B$ (b) $A = n\pi - B$
(c) $A = 2n\pi + B$ (d) $A = 2n\pi - B$

71. A shelf has 6 Mathematics books and 4 Physics books. The probability that 3 particular Mathematics books will be together is
(a) 1/15 (b) 2/15
(c) 3/15 (d) 4/15

72. A marble is drawn at random from a box containing 10 red, 30 white, 20 blue and 15 orange marbles. What is the probability of the ball is white?
(a) 2/5 (b) 4/5
(c) 1/3 (d) 3/2

73. The number of 1's present is the binary representation of $3 \times 512 + 7 \times 64 + 5 \times 8 + 3$, is
(a) 7 (b) 8
(c) 9 (d) 10

74. The binary representation of the hexadecimal number 3B7F is
(a) 0011 1011 0111 1111
(b) 0011 1010 0111 0111
(c) 0011 0100 0110 0111
(d) 1100 0100 1000 1000

75. A decimal number has 30 digits, approximately, how many bits are required to represent it in binary form?
(a) 60 (b) 30 (c) 120 (d) 90

76. What is the binary equivalent of Gray code 11100?
(a) 01011 (b) 10101 (c) 00111 (d) 10111

77. Which of the following is the result of dividing 00111000_2 by 1000_2?
(a) 1100 (b) 1110 (c) 0011 (d) 0111

78. If $\tan^{-1} x + \tan^{-1} y = \pi/4$, then
(a) $x + y + xy = 1$
(b) $x + y - xy = 1$
(c) $x + y + xy + 1 = 1$
(d) $x + y - xy + 1 = 0$

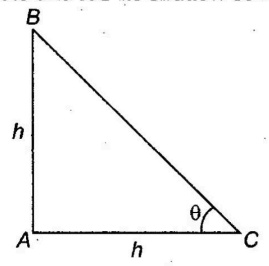
79. The equation $3\cos x + 4 \sin x = 6$ has ..... solutions.
(a) finite (b) infinite
(c) one (d) no

80. The value of $\begin{vmatrix} 1 & 2 & 3 \\ 3 & 5 & 7 \\ 10 & 14 & 20 \end{vmatrix}$ is
(a) 20 (b) –2
(c) 0 (d) 5

Answers *with* Solutions

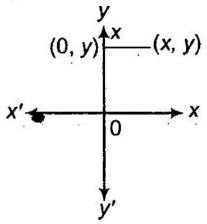
1. (d) $\phi = \{\}$ is the subset of all sets.

2. (b) Let AB be the pole and AC its shadow so if elevation is θ.



$$\tan\theta = \frac{h}{h} = 1 \Rightarrow \theta = 45°$$

3. (c) Distance is $|x|$.



4. (b) $1 + 3 + 5 + \ldots + (2n-1) = \frac{n}{2}[1 + 2n - 1] = n^2$
It is sum of first n terms of AP with
$a = 1, d = 2$

5. (a) $(1 - p)$ is a root of $x^2 + px + (1 - p) = 0$
$\Rightarrow \quad (1-p)^2 + p(1-p) + (1-p) = 0$
$\Rightarrow \quad (1-p)(1-p+p+1) = 0$
$\Rightarrow \quad 2(1-p) = 0 \Rightarrow p = 1$
So, quadratic equation is
$x^2 + x = 0 \Rightarrow x(x+1) = 0 \Rightarrow x = 0, -1$

6. (b)
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
.....
etc.

7. (d) $(A + A)' = A' + (A)' = A' + A = A + A'$
$\Rightarrow$ It is symmetric.

8. (d) As prodouct of integers as well as sum and difference of integers are integers, hence it can be any arbitrary integer.

9. (b) 'DISTANCE' has 3 vowels and 5 consonants. So, number of ways in which three vowels remain together
$= (5 + 1)\,!3! = 6!3! = 720 \times 6 = 4320$

10. (a) Probability that atleast one will be alive
$= 1 -$ probability that no one will be alive
$= 1 - (0.2)(0.1)$
$= 1 - 0.02 = 0.98$

11. (a) 4 bits = 1 nibble

12. (d) All are internal memories.

13. (d) The excess – 3 code is also known as self complementry code because it can easily be complemented [9's complement] to perform addition in the case of subtraction.

14. (b) $(11111111111)_2$
(∵ Max Number $= 2^n - 1$)
$= 2^{11} - 1 = 2048 - 1 = 2047$

15. (c) Floating point numbers means real numbers which represent too large or too small quantity of numbers.

16. (c) John Van Newman

17. (b) Thick and thin lines

18. (d) Ada is a programming language.

19. (d) $S = 2 + 3 + 5 + 7 = 17$

20. (b) Distance $= 4 \times \left(2\frac{3}{4}\right) = 11$
Speed = 16.5 km / h
$\Rightarrow$ Time $= \frac{11}{16.5}\text{ h} = \frac{11 \times 60}{16.5}$ min
$= 40$ min

21. (c) Given, $\frac{x}{y} = \frac{3}{4}; 3y = 4x$
and $x + y = 420$
$\Rightarrow \quad 3x + 3y = 420 \times 3$
$\Rightarrow \quad 3x + 4x = 420 \times 3$
$x = 180, y = 240$

22. (d) 16-bit code

23. (a) $\log_{0.1} 100 = \log_{0.1} (0.1)^{-2} = -2$

24. (c) a and b are orthogonals, if $\mathbf{a} \cdot \mathbf{b} = 0$
$\mathbf{a} = (1, -2, 3); \mathbf{b} = (-2, \lambda, 4)$
$\Rightarrow \quad \mathbf{a} \cdot \mathbf{b} = -2 - 2\lambda + 12 = 0$
$\Rightarrow \quad \lambda = 5$

25. (a) Interest of one year = 925 − 850 = ₹ 75

$\therefore$ Sum = 850 − 3 × 75

= ₹ 625

26. (c) 18 A 12 C 6 D 2 B 5 = 18 + 12 ÷ 6 × 2 − 5

= 18 + 2 × 2 − 5 = 18 + 4 − 5 = 17

27. (b) Let x be the number of questions answered correctly, so marks obtained

$= x \times 4 + (75 - x) \times (-1) = 125$

$\Rightarrow \quad 5x = 200 \quad \therefore \quad x = 40$

28. (b) Let x be the number of required boys, then daily wage from both sides are

$$\frac{240}{12 \times 5} = \frac{420}{21 \times x} \Rightarrow x = 5$$

29. (d) In 12 h span minute hand and hour hand coincide 11 times. So, in a day it will coincide 22 times.

30. (c) $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$= 40 + 50 - 10 = 80$

$n(A' \cap B') = n(A \cup B)' = 100 - 80 = 20\%$

31. (d) Let x be number of notes of each denomination.

$\Rightarrow \quad x(1 + 5 + 10) = 480 \Rightarrow 16x = 480$

$\Rightarrow \quad x = 30$

$\therefore$ Total number of notes = 30 + 30 + 30 = 90

32. (b) Required number of matches = ${}^6C_2$

$$= \frac{6 \times 5}{2} = 15$$

33. (c) If d is the diameter, then perimeter = πd

$\Rightarrow \quad \pi d \times 1000 = 88$ km

$\Rightarrow \quad \frac{22}{7} \times 1000 \times d = 88000$ m

$d = 28$ m

34. (c) Suppose, the length of the journey = d

Then, $\frac{d/2}{40} + \frac{d/2}{60} = 8$ (total time taken)

$\Rightarrow \quad \frac{d}{80} + \frac{d}{120} = \frac{5d}{240} = 8$

$\Rightarrow \quad d = \frac{240 \times 8}{5} = 384$ km

35. (d) One min work of a pipe

$$\frac{1}{32} + \frac{1}{36} - \frac{1}{20} = \frac{45 + 40 - 72}{1440} = \frac{13}{1440}$$

Half-part will be full in

$$\frac{1440}{13} \times \frac{1}{2} = \frac{720}{13} \text{ min}$$

36. (d) South Africa

37. (a) Kiran Majumdar Shah

38. (d) Ganga

39. (c) ₹ 10 lakh

40. (c) **41.** (c) **42.** (a) **43.** (a) **44.** (b) **45.** (c)

46. (c) **Salvage** To save property or possessions from a building that has been damaged or destroyed in a fire, flood etc.
Its Antonym Lose

47. (c) **Garner** To collect or obtain a large amount of something useful or important.
Its synonymn Collect.

48. (c) **Hamper** To prevent something from happening.
Its Antonym Facilitate

49. (a) **Pensive** Seeming to be thinking carefully about something.
Providential Happening by chance at a time that suits you.
Caustic Expressing severe criticism of someone.
Circumspect Thinking carefully about something before you say or do it.

50. (a) The relation of angle with degree is complementary as an angle is measured in degree.
Similarly, area is measured in square inch or square km's etc.

51. (d) **52.** (d) **53.** (b) **54.** (c) **55.** (a)

56. (b) There are 3 types of articles : A, An, The.

57. (c) didn't like

58. (c) to turn off

59. (b) Tigress

60. (d) into

61. (c) Given three lines are concurrent, if

$$\begin{vmatrix} 4 & 3 & -1 \\ 1 & -1 & 5 \\ b & 5 & -3 \end{vmatrix} = 0$$

$\Rightarrow \quad -88 + 4 + 14b = 0$

$\Rightarrow \quad 14b = 84$

$\Rightarrow \quad b = 6$

62. (a) $x + y = 2$ ...(i)

$2x + 2y = 3$ ...(ii)

Eq. (i) × 2 $\Rightarrow$ $2x + 2y = 4$ ...(iii)

Since, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

So, it has no solution.

63. (b) $AB = A; BA = B$

$B^2 = BB = BABA = BAA = BA = B$

64. (d) Let α be a common root of

$x^2 + ax + 10 = 0$

and $x^2 + bx - 10 = 0$

$\Rightarrow \quad \alpha^2 + a\alpha + 10 = 0$

$\alpha^2 + b\alpha - 10 = 0$

By cross multiplication method

$\Rightarrow \quad \frac{\alpha^2}{-10(a+b)} = \frac{\alpha}{20} = \frac{1}{b-a}$

$\Rightarrow \quad -10(a+b)(b-a) = (20)^2$

$\Rightarrow \quad 10(a^2 - b^2) = 400$

$\Rightarrow \quad a^2 - b^2 = 40$

65. (b) $\tan^4 A + \cot^4 A$

$= (\tan^2 A + \cot^2 A)^2 - 2\tan^2 A \cot^2 A$

$[(\tan A + \cot A)^2 - 2\tan A \cot A]^2 - 2$

$= [(4)^2 - 2]^2 - 2 = 196 - 2 = 194$

66. (a) By sine rule of triangle

$$\left(\frac{a}{\sin\theta}\right) = \frac{2a}{\sin(60° + \theta)}$$

$\Rightarrow \quad \sin(60° + \theta) = 2\sin\theta$

$\Rightarrow \quad \frac{\sqrt{3}}{2} \cdot \cos\theta + \frac{1}{2} \cdot \sin\theta = 2\sin\theta$

$\Rightarrow \quad \sqrt{3}\cos\theta - 3\sin\theta = 0$

$\Rightarrow \quad \tan\theta = \frac{1}{\sqrt{3}} = \tan 30°$

$\Rightarrow \quad \theta = 30°; 60° + \theta = 90°$

So, it is right angled triangle.

67. (d) $16x^2 + 16y^2 - 8x + 32y - 257 = 0$

$\Rightarrow \quad x^2 + y^2 - \frac{1}{2}x + 2y - \frac{257}{16} = 0$

$\Rightarrow \quad \left(x - \frac{1}{4}\right)^2 + (y + 1)^2$

$$= \frac{257}{16} + \frac{1}{16} + 1 = \frac{274}{16} = \frac{137}{8}$$

$\therefore$ Radius $= \sqrt{\frac{137}{8}} = \frac{1}{2}\sqrt{\frac{137}{2}}$

68. (c) $x^2 - 3y - 6x + 6 = 0$

$\Rightarrow \quad x^2 - 6x + 9 = 3y + 3$

$\Rightarrow \quad (x-3)^2 = 3(y+1)$

So, axis is $x - 3 = 0$

i.e., $x = 3$

69. (c) In hyperbola difference of focal distance are constant and equal to $2a$. (by definition)

So, the required locus is an hyperbola.

70. (c) $\sin A = \sin B$

$\Rightarrow \quad A = n\pi + (-1)^n B$ ...(i)

$\cos A = \cos B$

$\Rightarrow \quad A = 2n\pi \pm B$ ...(ii)

The common term from Eqs. (i) and (ii) is $2n\pi + B$.

71. (a) The three particular books are treated as a unit which are arranged among themselves after total $4 + 3 + 1 = 8$ units have been arranged.

$\therefore$ Required probability $= \frac{8!3!}{10!} = \frac{6}{10 \times 9} = \frac{1}{15}$

72. (a) Probability of white marble

$$= \frac{\text{Total number of white marbles}}{\text{Total number of marbles}}$$

$$= \frac{30}{10 + 30 + 20 + 15} = \frac{30}{75} = \frac{2}{5}$$

73. (c) $3 \times 512 + 7 \times 64 + 5 \times 8 + 3 \times 1$

$= 1536 + 448 + 40 + 3$

$= (2027)_{10} = (11111101011)_2$

2	2027	
2	1013	1
2	506	1
2	253	0
2	126	1
2	63	0
2	31	1
2	15	1
2	7	1
2	3	1
	1	1

There are nine 1's.

74. (a) Each digit of a hexadecimal number has bit representation in binary.

$\Rightarrow$ 3 B 7 F

011 1011 0111 1111 ($\because B = 11, F = 15$)

75. (d) Let x be the number of bits required for 30 digit number of decimal.

$\Rightarrow \quad 10^{30} = 2^x$

Taking logarithm of both sides, we get

$30 \log_2 10 = x$

$\Rightarrow \quad x = \frac{30}{0.3010} = \frac{30000}{301} \approx 100$

So, it is closer to 90.

Hence, approximate value is 90.

76. (d) Gray code retain first bit but takes XOR of consecutive bits of the given binary value

Gray code 1 1 1 0 0

Binary value 1 0 1 1 1

For XOR gate

$1 + 1 \rightarrow 1$

$1 + 0 \rightarrow 0$

$0 + 1 \rightarrow 0$

$0 + 0 \rightarrow 1$

77. (d) $(00111000)_2 = 1 \times 2^3 + 1 \times 2^4 + 1 \times 2^5$

$= (56)_{10}$

$(1000)_2 = (8)_{10}$

$56 \div 8 = 7$

$(7)_{10} = (0111)_2$

2	7	
2	3	1
	1	1

78. (a) $\tan^{-1} x + \tan^{-1} y = \pi/4$

$\Rightarrow \quad \tan^{-1} \frac{x+y}{1-xy} = \frac{\pi}{4}$

$\Rightarrow \quad \frac{x+y}{1-xy} = \tan\frac{\pi}{4} = 1$

$\Rightarrow \quad x + y = 1 - xy$

$\Rightarrow \quad x + y + xy = 1$

79. (d) $3\cos x + 4\sin x = 6$

$\frac{3}{5}\cos x + \frac{4}{5}\sin x = \frac{6}{5}$

Let $\sin\theta = \frac{3}{5}$

$\Rightarrow \quad \cos\theta = \frac{6}{5}$

$\sin\theta\cos x + \cos\theta\sin x = \frac{6}{5}$

$\Rightarrow \quad \sin(\theta + x) = \frac{6}{5}$

It is impossible as $\sin(\theta + x) \leq 1$.

So, no solution is there.

80. (b) $\begin{vmatrix} 1 & 2 & 3 \\ 3 & 5 & 7 \\ 10 & 14 & 20 \end{vmatrix}$

$= 1(100 - 98) - 2(60 - 70) + 3(42 - 50)$

$= 2 + 20 - 24 = -2$