



NIELIT

Scientist 'B'

Technical Assistant 'A'

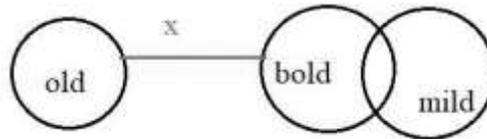
Computer Science Engineering

Mini Mock Challenge

(November 7 - November 8 2020)

Questions & Solutions

Sol. Minimum Possible diagram is-



Conclusions:

- I. No bold are old. (It does not follow as its obvious from the above diagram.)
- II. At least some mild are not old. (It does not follow as its obvious from the above diagram.)
- III. Some old are not bold. (It does not follow as its obvious from the above diagram.)
- IV. All old are not bold. (It does not follow as its obvious from the above diagram.)

So, All conclusions follow.

Hence, option A is the correct answer.

7. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(S) from the statements.

Statements:

- I. No Bike is a Scooter.
- II. No Bike is a car.

Conclusions:

- I. No Car is a Scooter.
 - II. At least some cars are scooters.
- A. only conclusion I follows.
 B. only conclusion II follows.
 C. either conclusion I or II follows.
 D. neither conclusion I nor II follows.

Ans. C

Sol.



The direct relation between Bike and scooter & Bike and car is given but that of car and scooter is not given directly so either no car is a scooter or some cars are scooters.

Hence, option C is the correct answer.

8. Which of the following is a prime number?

- A. 437
- B. 1073
- C. 853
- D. 143

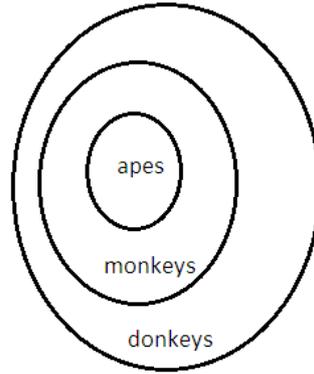
Ans. C

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Sol. The least possible Venn-diagram is:



Conclusions :

I. Some donkeys are monkeys - (It follows as its obvious from the above diagram).

II. Some monkeys are apes - (It follows as its obvious from the above diagram).

III. Some donkeys are apes -(It follows as its obvious from the above diagram).

So, all the conclusions I, II and III follow.

Hence, option D is correct answer.

12. Three numbers which are co-prime to one another are such that the product of the first two numbers is 161 and that of the last two numbers is 299 . Then find the sum of these numbers ?

A. 56

B. 43

C. 61

D. 32

Ans. B

Sol. Since these three numbers are co-prime, so they will contain only 1 as the common factor and no other number. Middle number becomes the common factor.

∴ HCF of 161 and 299= 23 (middle number)

∴ First number= $\frac{161}{23} = 7$

And third number= $\frac{299}{23} = 13$

So, the reqd. sum is= 7+23+13= 43

Hence, option B is the correct answer.

13. A shopkeeper cheats to the extent of 15% while buying and selling fruits, by using tampered weights. His total gain in percentage is:

A. 32.75

B. 32.25

C. 32

D. 32.5

Ans. B

Sol. A shopkeeper cheats to the extent of 15% while buying and selling fruits, by using tampered weights.

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Ans. A

Sol. Here, $60 - 28 = 32$

$$84 - 52 = 32$$

$$96 - 64 = 32$$

As we can observe that in the above-mentioned cases, the remainder is less than the divisor by 32.

$$\text{L.C.M (60, 84, 96)} = 3360$$

$$\therefore \text{Required number} = 3360 - 32 = \mathbf{3328}$$

19. If $a^2 + b^2 + 1 = 2a$, then what is the value of $a^4 + b^6$?

A. 1

B. 0

C. -2

D. 2

Ans. A

Sol. If $a^2 + b^2 + 1 = 2a$

$$\Rightarrow a^2 + b^2 + 1 - 2a = 0$$

$$\Rightarrow (a^2 - 2a + 1) + b^2 = 0$$

$$\Rightarrow (a - 1)^2 + b^2 = 0$$

$a = 1$ and $b = 0$, because for any other value it will not equal to 0.

$$\text{So, } a^4 + b^6 = 1^4 + 0^6 = 1 + 0 = 1$$

Hence, option A is the correct answer.

20. A and B do a work in 16 days, B and C do the same work in 24 days and C and A do the same in 8 days. If A, B and C can together do the work in n number of days (take n as the closest integer), then C does the work done in.

A. 23 days

B. $20\frac{4}{7}$ days

C. 16 days

D. 18 days

Ans. B

Sol. Let a, b and c can be the number of days in which A, B and C can do the work alone,

Then,

$$\frac{1}{a} + \frac{1}{b} = \frac{1}{16}$$

$$\frac{1}{b} + \frac{1}{c} = \frac{1}{24}$$

$$\frac{1}{c} + \frac{1}{a} = \frac{1}{8}$$

Let $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{1}{n}$, where n is an integer.

$$\frac{3+2+6}{48} = \frac{2}{n}$$

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$$\frac{11}{48} = \frac{2}{n}$$

$$n = 48 \times \frac{2}{11} = 96/11$$

$$n = 8.72 = 9 \text{ days (integer value)}$$

$$\text{For } \frac{1}{c} = \frac{1}{9} - \frac{1}{16} = \frac{7}{144}$$

$$C = \frac{144}{7} = 20\frac{4}{7} \text{ days.}$$

21. If $x^6 + y^6 = x^3y^3$, then find the value of $(x^9 + y^9)$?

- A. 2
- B. 0
- C. 3
- D. 1

Ans. B

Sol. $(x^9 + y^9) = \{(x^3)^3 + (y^3)^3\}$
 $= (x^3 + y^3) \{(x^3)^2 + (y^3)^2 - x^3y^3\}$
 $= (x^3 + y^3) (x^6 + y^6 - x^3y^3)$

Put the value of $(x^6 + y^6 = x^3y^3)$ in the above expression,

$$\therefore (x^3 + y^3)(x^3y^3 - x^3y^3)$$

$$= (x^3 + y^3) \times 0 = 0$$

Hence, option B is the correct answer.

22. A big cube is formed by rearranging 275 coloured and 68 non-coloured similar smaller cubes in such a way that the exposure of the coloured cubes to the outside is minimum. The percentage of the exposed cubes that are coloured on the surface is:

- A. 93.54%
- B. 51.02%
- C. 43.73%
- D. 52.43%

Ans. B

Sol. Total small cubes = $275 + 68 = 343$

So, the side of the cube = 7 unit

Now, the number of cubes without exposure = $(7 - 2)^3 = 125$

These 125 cubes will be inside of the big cube and will have no exposure.

Remaining coloured cubes = $275 - 125 = 150$

Now, number of cubes with one face outside = $6 \times (5 \times 5) = 150$

To keep the exposure of coloured cubes minimum, all these will be coloured cubes.

Now, total outer area = $6 \times (7 \times 7) = 294$

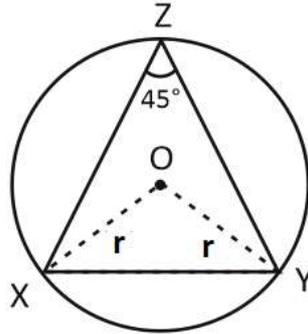
Required percentage = $(150/294) \times 100 = 51.02\%$

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23. XY is a chord of length $5\sqrt{2}$ cm and $\angle XZY = 45^\circ$ as shown in the figure below, where Z is a point on the circle. Find the area of the circle?



- A. 20π cm²
- B. 25π cm²
- C. 30π cm²
- D. 40π cm²

Ans. B

Sol. Since $\angle XZY = 45^\circ$,

$$\therefore \angle XOY = 2 \times 45^\circ = 90^\circ$$

In ΔXOY , $XY^2 = XO^2 + OY^2$

$$\Rightarrow (5\sqrt{2})^2 = r^2 + r^2$$

$$\Rightarrow 2r^2 = 50$$

$$\Rightarrow r^2 = 25 \Rightarrow r = 5 \text{ cm}$$

Now, area of the circle will be = πr^2

$$= \pi(5)^2 = 25\pi \text{ cm}^2$$

Hence, option B is the correct answer.

24. A sum of 5120 rupees, invested at 25% p.a., amounts to 7290 in a certain time, if the interest is compound half - yearly. What will be the compound interest on the half of this sum for the same time at $\frac{2}{5}$ th of the previous interest rate, when interest is compounded annually?

- A. 306.6
- B. 356.4
- C. 396.8
- D. 496.8

Ans. C

Sol. Given $r = 25\%$ (yearly)

$$r = 12\frac{1}{2}\% = (\text{half yearly})$$

$$5120 \left(1 + \frac{25}{200}\right)^n = 7290$$

$$\left(\frac{225}{200}\right)^n = \frac{7290}{5120}$$

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$$\left(\frac{9}{8}\right)^n = \left(\frac{9}{8}\right)^3$$

$$n = 3 \text{ (half year) or } 1\frac{1}{2} \text{ year}$$

$$\text{Now } r = 25 \times \frac{2}{5} = 10\%; P = 5120/2 = 2560$$

$$\text{Total rate} = 10 + 5 + \frac{10 \times 5}{100} = 15.5\%$$

$$\begin{aligned} \text{New CI} &= 15.5\% \text{ of } 2560 \\ &= \text{Rs. } 396.8 \end{aligned}$$

25. The ratio of income of A and B is 8 : 7 and ratio of their expenditure is 4 : 3 . A saves rupees 3000 and B saves rupees 3000. Income of C is 20% more than the income of A and income of D is 30% more than the income of B . find the respective ratio of the income of C and D .

A. 96 : 91

B. 96 : 92

C. 91 : 96

D. 91 : 92

Ans. A

Sol. Let income of A and B Rs. 8k and Rs.7k respectively

$$\frac{(8k - 3000)}{(7k - 3000)} = \frac{4}{3}$$

$$3 \times (8k - 3000) = 4 \times (7k - 3000)$$

$$24k - 9000 = 28k - 12000$$

$$4k = 3000$$

$$k = 750$$

$$\text{Income of A} = 8k = 8 \times 750 = \text{Rs. } 6000$$

$$\text{Income of B} = 7k = 7 \times 750 = \text{Rs. } 5250$$

$$\text{So, income of C} = A \times \frac{120}{100}$$

$$= 6000 \times 1.2 = \text{Rs. } 7200$$

$$\text{Income of D} = B \times \frac{130}{100}$$

$$= 5250 \times 1.3 = \text{Rs. } 6825$$

$$\text{Required ratio C : D} = 7200 : 6825$$

$$= 96 : 91.$$

Sol. Percentage of coconut water in first jar = $100 - 42\frac{1}{3} = 57\frac{2}{3}\%$

Percentage of coconut water in second jar = $100 - 45.5 = 54\frac{1}{2}\%$

Since, the capacities of both the jars are equal, percentage of coconut water in

$$\text{mixture} = \frac{57\frac{2}{3} + 54\frac{1}{2}}{2} = \frac{112\frac{1}{6}}{2} = 56\frac{1}{12}\%$$

37. Find the area and circumference of a circle if the radius is 14 cm? (Take $\pi = \frac{22}{7}$)

A. Area = 44 cm^2 ; Circumference = 308 cm

B. Area = 88 cm^2 ; Circumference = 616 cm

C. Area = 308 cm^2 ; Circumference = 44 cm

D. Area = 616 cm^2 ; Circumference = 88 cm

Ans. D

Sol. $r = 14 \text{ cm}$

$$\text{Area} = \pi r^2 = \left(\frac{22}{7}\right) \times 14 \times 14 = 616 \text{ cm}^2$$

$$\text{Circumference} = 2\pi r = 2 \times \left(\frac{22}{7}\right) \times 14 = 88 \text{ cm.}$$

38. Find the greatest number among the given numbers $\sqrt{2}, \sqrt[6]{3}, \sqrt[3]{4}, \sqrt[4]{5}$

A. $\sqrt{2}$

B. $\sqrt[6]{3}$

C. $\sqrt[3]{4}$

D. $\sqrt[4]{5}$

Ans. C

Sol. LCM of denominators of powers 2, 6, 3, 4, is 12

$$\Rightarrow \sqrt{2} = 2^{\frac{1}{2}} = 2^{\frac{1 \times 12}{2}} = 2^{\frac{6}{12}}$$

$$\Rightarrow \sqrt[6]{3} = 3^{\frac{1}{6}} = 3^{\frac{1 \times 12}{6}} = 3^{\frac{2}{12}}$$

$$\Rightarrow \sqrt[3]{4} = 4^{\frac{1}{3}} = 4^{\frac{1 \times 12}{3}} = 4^{\frac{4}{12}}$$

$$\Rightarrow \sqrt[4]{5} = 5^{\frac{1}{4}} = 5^{\frac{1 \times 12}{4}} = 5^{\frac{3}{12}}$$

$$64^{\frac{1}{12}}, 9^{\frac{1}{12}}, 256^{\frac{1}{12}}, 125^{\frac{1}{12}}$$

Therefore, $\sqrt[3]{4}$ is greatest.

39. Ram makes a profit of 30% by selling an article. What would be the profit percent if it were calculated on the selling price instead of the cost price? (Correct to one decimal place)

A. 24.2%

B. 22.4%

C. 20.1%

D. 23.1%

Ans. D

Sol. Let Cost price of the article = Rs. 100

Profit = 30% of C.P.

Profit = Rs. 30

Selling price of the article = Rs. 100 + Rs. 30 = Rs. 130

We are interested in finding the profit percent if it were calculated on the selling price instead of the cost price.

$$\text{Required Profit Percentage} = \frac{\text{Profit}}{\text{S.P.}} \times 100 = \frac{30}{130} \times 100 = 23.1\%$$

40. If $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$ then find the value of $\frac{x^2+xy+y^2}{x^2-xy+y^2}$

A. $\frac{15}{13}$

B. $\frac{15}{19}$

C. $\frac{15}{17}$

D. $\frac{13}{17}$

Ans. B

Sol. Given, $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$

Here, $xy = 1$

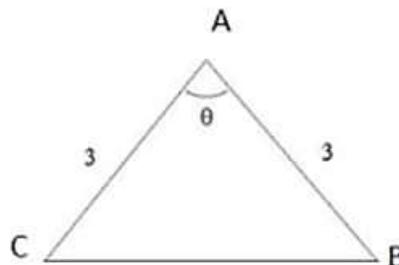
$$\text{Also, } x + y = \frac{\sqrt{3}+1}{\sqrt{3}-1} + \frac{\sqrt{3}-1}{\sqrt{3}+1} = \frac{(\sqrt{3}+1)^2 + (\sqrt{3}-1)^2}{(\sqrt{3}-1)(\sqrt{3}+1)}$$

$$= \frac{3+1+2\sqrt{3}+3+1-2\sqrt{3}}{3-1} = \frac{8}{2} = 4$$

Now,

$$\frac{x^2+xy+y^2}{x^2-xy+y^2} = \frac{(x+y)^2-xy}{(x+y)^2-3xy} = \frac{16-1}{16+3} = \frac{15}{19}$$

41. In the given figure ΔABC , if $\theta = 80^\circ$, the measure of each of the other two angles will be:



A. 60°

B. 80°

C. 40°

D. 50°

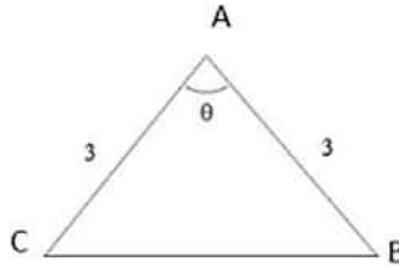
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Ans. D

Sol. Given, $\theta = 80^\circ$



As, $AC = AB = 3 \text{ cm}$

We know that angles opposite to equal sides of a triangle are equal.

$$\angle ACB = \angle ABC = x \text{ (say)}$$

We know that sum of all angles of a triangle are 180°

$$\angle ACB + \angle ABC + \angle CAB = 180^\circ$$

$$\Rightarrow 2x + 80^\circ = 180^\circ$$

$$\Rightarrow 2x = 100^\circ$$

$$\Rightarrow x = 50^\circ$$

Hence, the measure of each of the other two angles will be 50°

42. What is the smallest integer that is a multiple of 5, 8 and 15?

- A. 60
- B. 40
- C. 600
- D. 120

Ans. D

Sol. We are interested in finding the smallest integer that is a multiple of 5, 8 and 15.

\Rightarrow smallest integer that is a multiple of 5, 8 and 15 = $\text{LCM}(5,8,15)$

$$5 = 1 \times 5$$

$$8 = 2 \times 2 \times 2$$

$$15 = 3 \times 5$$

$$\text{LCM}(5,8,15) = 2 \times 2 \times 2 \times 3 \times 5 = 120$$

43. Consider a computer system with 40-bit virtual addressing and page size of sixteen kilobytes. If the computer system has a one-level page table per process and each page table entry requires 48 bits, then the size of the per-process page table is _____ megabytes.

- A. 384
- B. 48
- C. 192
- D. 96

Ans. A

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Sol. Size of memory = 2^{40}
Page size = 16KB = 2^{14}
No of pages = size of Memory / page size = $2^{40} / 2^{14} = 2^{26}$
Size of page table = $2^{26} * 48/8$ bytes = $2^6 * 6$ MB = 384 MB
Thus, A is the correct choice

44. The mapping of logical address to corresponding physical address is carried out by a hardware unit known as
- A. Memory management unit
 - B. Relocation Register
 - C. Dynamic Loading Register
 - D. Instruction Register

Ans. A

Sol. MMU converts the logical address generated by a user application to corresponding physical address for accessing memory.

45. A cycle in resource allocation graph is
- A. A necessary and sufficient condition, with system having multi-instance resource
 - B. Not necessary and neither sufficient condition for any system
 - C. Necessary but not sufficient condition for system with multi instance resource
 - D. Necessary but not sufficient for system with single instance resource

Ans. C

Sol. By Definition, since every cycle is not a Deadlock.

46. How many address lines are needed to address each memory location in a 2048×4 memory chip?
- A. 10
 - B. 11
 - C. 8
 - D. 12

Ans. B

Sol. The give memory chip is 2048 *4 means 2048 words ,each word consists of 4 bits .
So we have to address 2048 locations i.e $2 * 1024 = 2 * 2^{10} = 2^{11}$ locations which corresponds to 11 address lines.
Hence the option B. is correct.

47. Consider a 32- bit processor which supports 70 instructions. Each instruction is 32 bit long and has 4 fields namely opcode, two register identifiers and an immediate operand of unsigned integer type. Maximum value of the immediate operand that can be supported by the processor is 8191 . How many registers the processor has?
- A. 32
 - B. 64
 - C. 128
 - D. 16

Ans. B

Opcode	Reg1	Reg2	Immediate Operand
--------	------	------	-------------------

Sol.

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Number of instructions which are supported =70

13–bits support the maximum value of immediate operand =8191 (as 8191 is nearly equal to 2¹³)

Now,

Number of bits needed for opcode =7bits (as for 70 instructions, 2⁷, i.e., 7 bits are sufficient)

Number of bits left to represent register bits =32-(13+7) = 12

Since we have two Register fields, which means 6–bits per register.

Hence, at max. 64 registers.

∴ (B) is the correct option.

48. Cache memory

- A. has greater capacity than RAM
- B. is faster to access than CPU Registers
- C. is permanent storage
- D. faster to access than RAM

Ans. D

Sol. **Cache memory** is an extremely fast **memory** type that acts as a buffer between **RAM** and the **CPU**. **Cache memory** is used to reduce the average time to access data from the Main **memory**. The **cache** is a smaller and faster **memory** which stores copies of the data from frequently used main **memory** locations. Cache memory faster to access than RAM.

49. How many 2K × 1 RAM chips are needed to provide a capacity of 16KB memory?

- A. 32
- B. 64
- C. 16
- D. 8

Ans. B

Sol. Number of chips = $\frac{\text{Total capacity}}{\text{1 Chip capacity}}$

$$= \frac{16\text{KB}}{2\text{K} \times 1 \text{ bits}} \left[\begin{array}{l} \text{default storage} \\ \text{unit is bits} \end{array} \right]$$

$$= \frac{16\text{K} \times 8\text{bits}}{2\text{K} \times 1 \text{ bits}} = 64$$

50. Consider a network with a packet size of 100 Bytes and Bandwidth of 800Kbps (Kilo bits Per Second). Then Transmission delay is _____ ms. (NOTE: 1Kbps=10³ bits/sec)

- A. 1ms
- B. 2ms
- C. 3ms
- D. 0.5ms

Ans. A

Sol. Transmission delay = packet size/bandwidth

$$= 100 \text{ Bytes} / 800 \text{ Kbps}$$

$$= 100 \times 8\text{bits} / 800 \times 10^3 \text{ bits/sec}$$

$$= 800 / 800 \text{ ms}$$

$$= 1\text{ms}$$

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Sol. Symbol table is used for checking type compatibility, suppressing duplicate error messages and storage allocation.

55. DNS translates

- A. domain name into IP
- B. IP into domain name
- C. both A and B
- D. domain name into physical address

Ans. A

Sol. Domain Name System (or Service or Server), an Internet service that translates domain names into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses.

56. Which of the following methodology is used for Error detection at data link layer

- A. Bit stuffing
- B. Hamming codes
- C. Cyclic redundancy codes
- D. Equalization

Ans. C

Sol. *Bit stuffing is the insertion of one or more bits into a transmission unit as a way to provide signalling information to a receiver. The receiver knows how to detect and remove or disregard the stuffed bits.

*Hamming codes can detect up to two-bit errors or correct one-bit errors without detection of uncorrected errors.

*CRC is a code added to data which is used to detect errors occurring during transmission, storage, or retrieval.

*Equalization (British: equalisation) is the process of adjusting the balance between frequency components within a electronic signal.

57. What is the responsibility of the ARP protocol?

- A. IP addressing and routing
- B. Converting IP address to MAC address
- C. Reporting datagram problems to the sender within the IP network
- D. Multicasting data to multiple recipients simultaneously

Ans. B

Sol. The Address Resolution Protocol (ARP) feature performs a required function in IP routing. ARP finds the hardware address, also known as Media Access Control (MAC) address, of a host from its known IP address. ARP maintains a cache (table) in which MAC addresses are mapped to IP addresses.

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

- A. Registers
- B. Terms
- C. K-maps
- D. Latches

Ans. C

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



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59. _____ attributes can take values from parent and/or siblings.

- A. Inherited
- B. Synthesised
- C. Both A and B
- D. None

Ans. A

Sol. Inherited attributes can take values from parent and/or siblings.

Eg: $S \rightarrow ABC$

A can get values from S, B and C. B can take values from S, A, and C. Likewise, C can take values from S, A, and B.

60. Consider the following grammar

$S \rightarrow ABC$

$A \rightarrow Aa | aB$

$B \rightarrow Bb | \epsilon$

$C \rightarrow Cc | \epsilon$

The Follow(S) and Follow(C) is

- A. { \$ } and { \$, b }
- B. { \$ } and { \$, a }
- C. { \$ } and { \$, c }
- D. None

Ans. C

Sol. Follow(S) = { \$ } because no one is following S so by default for start symbol follow is \$.

Follow(C) = { c } \cup Follow(S) = { \$, c }

61. Which of the following is not a relational algebra function?

- A. Select
- B. Project
- C. Manipulate
- D. Union

Ans. C

Sol. There does not exist any operation named as manipulate operation in relational algebra.

The union, project and select are operators in relational algebra.

62. Which of the following is true:

S1: In sequential file, it is possible to add a record in the middle of the file.

S2: In Direct access file or hashing the data can be accessed randomly.

- A. Only S1
- B. Only S2
- C. Both S1 and S2
- D. None of the above

Ans. B

Sol. • In sequential file, it is not possible to add a record in the middle of the file without rewriting the file.

• Direct access file is also known as random access or relative file organization.

63. We apply the aggregate function to a group of sets of tuples using the _____ clause.

- A. group by
- B. group
- C. group set
- D. group attribute

Ans. A

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Sol. We apply the aggregate function to a group of sets of tuples using the group by clause. The group by clause must always be used whenever we are willing to apply the aggregate function to a group of sets of tuples.

64. What does the following relational algebra expression do?

$$\sigma_{\text{amount} > 1200}(\text{loan})$$

- A. Finds all the tuples in loan
- B. Finds the tuples in loan where the amount is greater than 12000
- C. Finds all the tuples in loan where the amount is less than 1200
- D. finds all the tuples in loan wherever the amount is greater than 1200

Ans. D

Sol. The above expression finds all the tuples in loan wherever the amount is greater than 1200. Because the condition specifies that the amount should be greater than 1200.

65. Which of the following operator is useful in selecting subset of Attributes:

- A. Selection
- B. Projection
- C. Rename
- D. None

Ans. B

Sol. Projection is used in selecting subset of Attributes.

66. $A \rightarrow B$ is called a transitive dependency if and only if:

- A. A is not a super key.
- B. B is a non-prime attribute.
- C. Both a and b
- D. None

Ans. C

Sol. $A \rightarrow B$ is called a transitive dependency if and only if:

- a. A is not a super key.
- b. B is a non-prime attribute.

67. Let $R = \{(1,3), (3,4), (1,4), (4,2), (3,3), (3,2), (4,4), (1,1), (2,2)\}$ be a relation on set $A = \{1,2,3,4\}$, The relation is

- A. Reflexive and transitive only
- B. Reflexive only
- C. an equivalence relation
- D. reflexive and symmetric only

Ans. A

Sol. As the relation follows the technique of $A \in A$, so it satisfies the definition of reflexivity hence reflexive.

As the relation does not follow the technique of $A \in B$ and $B \in A$, so it does not satisfies the definition of symmetricity hence non-symmetric.

As the relation follows the technique of $A \in B$ and $B \in C$ so $A \in C$, so it satisfies the definition of transitivity hence transitive.



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eg. $(1,4) \in R, (4,4) \in R$ so $(1,4) \in R$.

As the relation is reflexive, non-symmetric and transitive so it can be declared as not an equivalence relation.

68. A function is called bijective if the function is _____
- A. One-one function
 - B. Onto function
 - C. One-one and onto function
 - D. Many-one and onto function

Ans. C

Sol. A function $f: A \rightarrow B$ is a bijection if it is

- (i) One-one function
- (ii) Onto function

Hence, C is the correct answer.

69. The function $f(x) = x^2 + 2$ is
- A. one-one function
 - B. onto function
 - C. Many-one function
 - D. Surjective function

Ans. C

Sol. It is many-one function. Because, For negative and positive integers with same magnitude gives out same value.

70. How is the right outer join symbol represented in relational algebra?
- A. \bowtie
 - B. $\bowtie\!-\!$
 - C. $\bowtie\!-\!$
 - D. \bowtie

Ans. B

Sol. The symbol of the right outer join is similar to the symbol of the natural join but it has two dashes on the top and bottom right side as $\bowtie\!-\!$

71. Which command is used to create a new relation in SQL
- A. create table(, ...)
 - B. create relation(, ...)
 - C. new table(, ...)
 - D. new relation(, ...)

Ans. A

Sol. We use the create table command to create a new relation in the database. The syntax is create table(, ...);

72. What is the output of following C code-

```
#include <stdio.h>
int main()
{
    int x = 2;
```

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```
switch (x)
{
    case 1: printf("Choice is 1");
            break;
    case 2: printf("Choice is 2");
            break;
    case 3: printf("Choice is 3");
            break;
    default: printf("Choice other than 1, 2 and 3");
            break;
}
return 0;
}
```

- A. Choice is 1 Choice is 2
- B. Choice is 2
- C. Choice is 2 Choice is 3
- D. Choice is 3 Choice other than 1, 2 and 3

Ans. B

Sol. Here, there is break statement after every case, therefore $x=2$, only case 2 will be executed.

73. What is the output of following code-

```
int main()
{
    int a=5;
    printf("The value of a<<2 is : %d ", a<<2);
    return 0;
}
```

- A. 5
- B. 20
- C. 16
- D. 30

Ans. B

Sol. **int** a = 5;

The binary representation of 'a' is given below:

a = 0101

If we want to left-shift the above representation by 2, then the statement would be:

a << 2;

$0101 << 2 = 00010100 \rightarrow$ in decimal $\rightarrow 20$

Output= 20

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74. The Output of following Code is-

```
#include <stdio.h>
int main()
{
    int x = 2;
    switch (x)
    {
        case 1: printf("Choice is 1");
        case 2: printf("Choice is 2");
        case 3: printf("Choice is 3");
                break;
        default: printf("Choice other than 1, 2 and 3");
                break;
    }
    return 0;
}
```

- A. Choice is 1 Choice is 2 Choice is 3
- B. Choice is 1 Choice is 2
- C. Choice is 2 Choice is 3
- D. Choice is 2 Choice is 3 Choice other than 1, 2 and 3

Ans. C

Sol. Here, no break statement after case 2, so it will execute all cases till the break is encountered. So $x=2$, will execute case 2 and case 3, after case 3 break is encountered, hence output will be, Choice is 2 Choice is 3.

75. A _____ is an indirect functional dependency, one in which $X \rightarrow Z$ if $X \rightarrow Y$ and $Y \rightarrow Z$.

- A. Multivalued Dependency
- B. Join Dependency
- C. Trivial Dependency
- D. Transitive Dependencies

Ans. D

Sol. Third Normal Form deals with 'transitive' dependencies. Indirect functional dependency or transitive dependency are the same i.e. if $X \rightarrow Y$ & $Y \rightarrow Z$ then $X \rightarrow Z$

76. The measure of central item is called:

- A. Mean
- B. Median
- C. Mode
- D. Average

Ans. B

Sol. The measure of central item is called median. The measure of average value is called mean. The measure of recurrence is called mode.

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77. The standard deviation of sample given below is

Sample 1,3,2,1,5,6,3,3

- A. 1.66
- B. 1.73
- C. 2.75
- D. 3

Ans. A

Sol. $Mean = \frac{1+3+2+1+5+6+3+3}{8} = 3$

standard deviation

$$= \sqrt{\frac{(1-3)^2 + (3-3)^2 + (2-3)^2 + \dots + (3-3)^2}{8}} = 1.66$$

78. The mean and variance of binomial distribution $b(x: n, p)$ are 4 and $4/3$ respectively. What is the probability of getting 2 successes?

- A. 20
- B. $\frac{20}{243}$
- C. $\frac{1}{243}$
- D. $\frac{40}{243}$

Ans. B

Sol. Mean $np = 4 \therefore q = \frac{npq}{np} = \frac{4/3}{4} = \frac{1}{3}$

Variance $npq = \frac{4}{3}P = 1 - q = \frac{2}{3}, n = \frac{4}{p} = 6$

$$\therefore P(x = 2) = 6_c \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^4 = \frac{20}{243}$$

79. If the elements 1, 2, 3, 4, 5, 6 are inserted into the queue in that order and if an element can be deleted at any time from the queue, which of the following permutation can be obtained as output of queue?

- A. 1 2 4 3 6 5
- B. 1 2 3 4 5 6
- C. 1 5 2 4 3 6
- D. 1 5 2 6 3 4

Ans. B

Sol. Since first element deleted will be 1 and second will be 2 and so on.

80. What is the time complexity to count the number of elements in the linked list?

- A. $O(1)$
- B. $O(n)$
- C. $O(\log n)$
- D. None

Ans. B

Sol. To count the number of elements, you have to traverse through the entire list, hence complexity is $O(n)$.

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81. Enqueue is defined as:
- A. Insert element in array
 - B. Insert element in Queue
 - C. Insert or delete operation in array or queue
 - D. Both A and B

Ans. B

Sol. Enqueue and Dequeue are two major operation in Queue in data structure where enqueue means to insert element in queue and dequeue means to delete element from queue.

82. A typical communication system consist of
- A. Transmitter
 - B. Receiver
 - C. Channel
 - D. All of the above

Ans. D

Sol. For a communication process, the requirement is Source or sender, Contents or message, Media and channel of communication, receiver, Feedback.

83. Which one of the following mode is called a two-way simultaneous, communication between two stations?
- A. Simplex (SX)
 - B. Half duplex (HDX)
 - C. Full duplex (FDX)
 - D. None of these

Ans. C

Sol. Two-way communication by full duplex.

84. A speech signal of 3kHz is used to modulate a carrier signal of frequency 1MHz Using amplitude modulation. The frequencies of the side band will be:
- A. 1.003 MHz and 0.997 MHz
 - B. 3001 kHz and 2997 kHz
 - C. 1003 kHz and 1000 kHz
 - D. 1 MHz and 0.997 MHz

Ans. A

Sol. Side band frequencies are:

Lower side band

$$\begin{aligned} \text{LSB} &= \omega_c - \omega_m \\ &= 1 \times 10^6 \text{ Hz} - 3 \times 10^3 \text{ Hz} \\ &= (1000 - 3) \times 10^3 \text{ Hz} \\ &= 997 \text{ kHz} \\ &= 0.997 \text{ MHz} \end{aligned}$$

Upper side band

$$\begin{aligned} \text{USB} &= \omega_c + \omega_m \\ &= 1 \times 10^6 \text{ Hz} + 3 \times 10^3 \text{ Hz} \\ &= 1003 \text{ kHz} \\ &= 1.003 \text{ MHz} \end{aligned}$$

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85. In communication systems, modulation is the process of
- A. Improving frequency stability of transmitter
 - B. Combining message signal and radio frequency waves
 - C. Generating constant frequency radio waves
 - D. Reducing distortion in RF waves

Ans. B

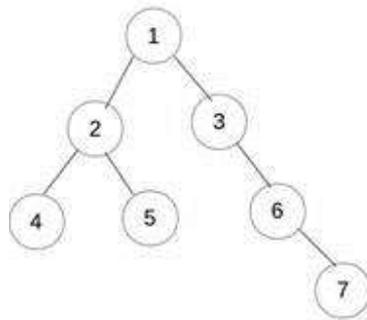
Sol. Modulation is the process of superimposing a low frequency Signal(message signal) on a high Frequency Signal(carrier signal or radio signal).

86. Which modulation technique is used for broadcasting purpose?
- A. Amplitude modulation
 - B. frequency modulation
 - C. Phase modulation
 - D. Delta Modulation

Ans. A

Sol. Amplitude modulation is used for broadcasting as its use avoids receiver complexity as in broadcasting there are large number of receivers hence simple receivers results in low cost.

87. Where will be the postorder of the tree:



- A. 4, 5, 2, 7, 6, 3, 1
- B. 1, 2, 4, 3, 5, 6, 7
- C. 4, 2, 5, 7, 6, 3, 1
- D. None

Ans. A

Sol. Postorder (Left, Right, Root) : 4, 5, 2, 7, 6, 3, 1

88. If $f(n)=n^{k \log n}$, $g(n)=n^{1000}$ and $h(n)=k^{n \log k}$, where k is very large value then find the correct option.
- A. $f(n)=O(g(n))$ and $f(n)=O(h(n))$
 - B. $g(n)=O(f(n))$ and $g(n)=O(h(n))$
 - C. $g(n)=O(f(n))$ and $h(n)=O(f(n))$
 - D. $f(n)=O(h(n))$ and $h(n)=O(f(n))$

Ans. C

Sol. The answer is C. in $f(n)$ n for very large values will grow the fastest, $g(n)$ having constant in power will grow the slowest and $h(n)$ having a constant term k (doesn't makes any difference if it is very large after all it is constant) will also be slow.

89. Consider the following two statements S1 and S2 :
- S1 : Atleast one Asymptotic notation is always exist between two positive functions.
- S2 : Big-Oh and Omega are mutually exclusive asymptotic notations.
- Choose the correct option.
- A. Both are correct
 - B. Both are incorrect
 - C. Only S1 is correct
 - D. Only S2 is correct

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Ans. B

Sol. S1 : This is not necessary always. If while comparing two functions , one function is sometimes bigger and sometimes smaller than the other function , then those two functions will be uncomparable.

Example :

$$F = n$$

$$G = \begin{cases} 1 & \text{if } n \text{ is odd} \\ n^2 & \text{if } n \text{ is even} \end{cases}$$

These two functions are uncomparable.

S2 : This is also false.

For example : $F = \Theta(n^3)$

Then $F = O(n^3)$ and also $F = \Omega(n^3)$

Hence Big-Oh and Omega need not to be mutually exclusive

Hence both statements are incorrect

90. Consider the following pseudo code.

```
sum = 0;
for (i = 0; i < n; i++) {
    for (j = 0; j < i; j++) {
        for (k = 0; k < j; k++) {
            sum = sum + 1;
        }
    }
}
```

What will be the time complexity of the above code?

- A. $O(n^2)$
- B. $O(n^3)$
- C. $O(n^2 \log n)$
- D. $O(n^3 \log n)$

Ans. B

Sol. The inner most loop will be running j times. And j is varying from j = 1 to i.

$$\sum_{j=1}^i j = O(i^2)$$

Now i is itself varying from i = 1 to n.

$$\sum_{i=1}^n i^2 = O(n^3)$$

91. A discrete memory less source with alphabet (S_0, S_1, S_2) has statistics $\{0.7, 0.15, 0.15\}$ for its output. Applying the Huffman algorithm to this source the average code word length is

- A. 0.9
- B. 1.1
- C. 1.3
- D. 1.7

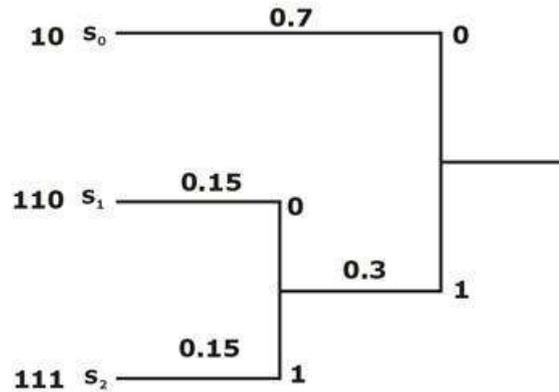
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Ans. C

Sol. Figure given below shows the Huffman coding.



The average code- word length is

$$L = 0.7 (1) + 0.15 (2) + 0.15(2)$$

$$= 1.3$$

92. A communication channel with AWGN operating at a signal to noise ratio $SNR \gg 1$ and bandwidth B has capacity C_1 . If the SNR is doubled keeping B constant, the resulting capacity C_2 is given by
- A. $C_2 \approx 2C_1$
 - B. $C_2 = C_1 + B$
 - C. $C_2 = C_1 + 2B$
 - D. $C_2 \approx C_1 + 0.3B$

Ans. B

Sol. According to Shannon-Hartely law,

$$\text{Channel capacity, } C_1 = B \log_2 \left(1 + \frac{S}{N} \right) \approx B \log_2 \left(\frac{S}{N} \right)$$

$$C_2 = B \log_2 \left(\frac{2S}{N} \right)$$

$$= B \log_2(2) + B \log_2 \left(\frac{S}{N} \right)$$

$$C_2 = B + C_1$$

93. The average information in the binary symmetric source is maximized, when both outcomes with probability p and $1-p$ are
- A. 1 and 0 respectively
 - B. Zero
 - C. Equally likely to occur
 - D. Maximum

Ans. C

Sol. The average information in the binary symmetric source is maximized, when both outcomes with probability p and $1-p$ are equally likely to occur.

94. Which of the following can be identified as cloud?
- A. Web Applications
 - B. Intranet
 - C. Hadoop
 - D. All of the mentioned

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Ans. D

Sol. All the above are cloud Applications.

95. IPSec is designed to provide security at the _____

- A. transport layer
- B. network layer
- C. application layer
- D. session layer

Ans. B

Sol. IPSec is a set of protocols used to provide authentication, data integrity and confidentiality between two machines in an IP network. In the TCP/IP model, it provides security at the IP layer i.e. the network layer.

96. Which of the following is an example of data-link layer vulnerability?

- A. Physical Theft of Data
- B. VLAN circumvention
- C. Route spoofing
- D. Weak or non-existent authentication

Ans. B

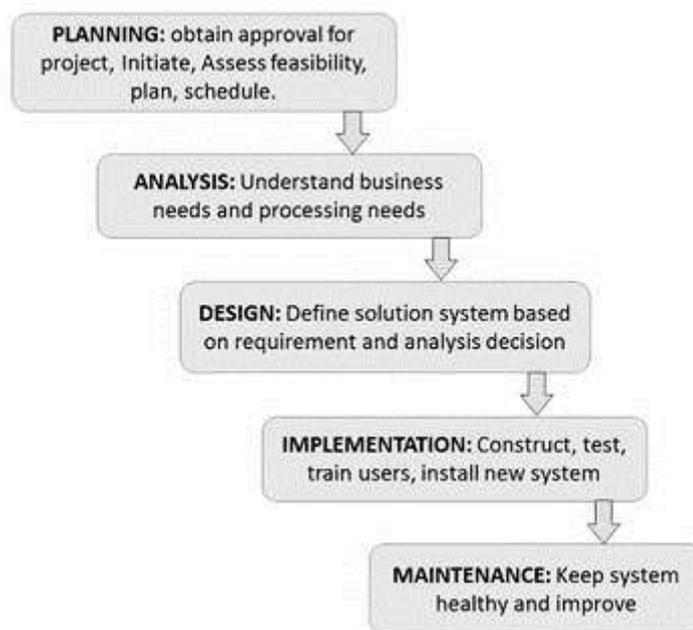
Sol. VLAN circumvention is an example of data-link layer vulnerability. MAC Address Spoofing, as well as switches, may be forced for flooding traffic to all VLAN ports are some other examples of data-link layer vulnerability.

97. Which of the following is correct orders of phases of SDLC

- A. Planning, Analysis, Implementation, Design, Maintenance.
- B. Analysis, Planning, Implementation, Design, Maintenance.
- C. Planning, Analysis, Design, Implementation, Maintenance.
- D. Analysis, Planning, Design, Implementation, Maintenance.

Ans. C

Sol.



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98. _____ is said to occur when several modules have access to the same global data.
- A. Content coupling
 - B. Stamp coupling
 - C. Control coupling
 - D. Common coupling

Ans. D

Sol. Common coupling is said to occur when several modules have access to the same global data.

99. Black Box software testing method focuses on the
- A. Boundary condition of the software
 - B. Control Structure of the Software
 - C. Functional Requirement of the Software
 - D. Independent paths of the software

Ans. C

Sol. Functional requirement of the software: In Software engineering and systems engineering, a functional requirement defines a function of a system or its component. A function is described as a set of inputs, the behavior, and outputs. Therefore, black box software testing method focuses on functional requirement of the software.

100. A software availability close to ____, if MTBF = 60 Hours, MTTR =90 Hours
- A. 40%
 - B. 60%
 - C. 70%
 - D. 80%

Ans. A

Sol. $Availability = [MTBF / (MTBF + MTTR)] * 100\%$
 $= (60 / 60 + 90) * 100$
 $= 40 \%$

101. What should be the first tag in any HTML document?
- A. <html>
 - B. <1>
 - C. <start>
 - D. <begin>

Ans. A

Sol. The first tag in any HTML document is <html> . HTML is the standard markup language for creating Web pages. HTML stands for Hyper Text Markup Language. HTML describes the structure of Web pages using markup.

102. To declare the version of XML, the correct syntax is -
- A. <? XML version = "1.0?" >
 - B. <? XML version = "1.0" >
 - C. < / XML version = 1.0. >
 - D. <? XML version = "1.0">

Ans. A

Sol. correct syntax of declaring the version of XML is -
< ? XML version = "1.0?" >



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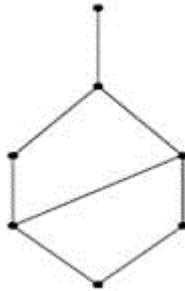
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103. Which of the following poset is a lattice?

- A.
- B.
- C.
- D. None of these

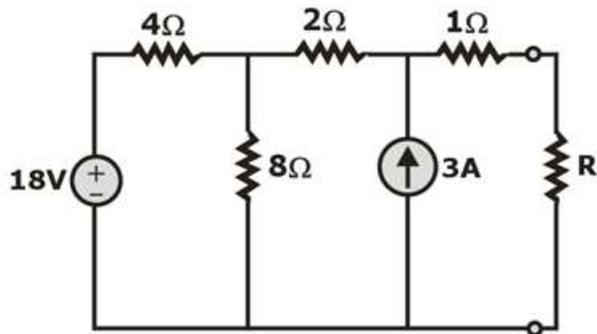
Ans. C

Sol.



For every two elements of poset have meet and join.

104. Maximum power transferred to load resistance in the given circuit will be.



- A. 2.98 W
- B. 29.82 W
- C. 29.82 kW
- D. 2.98 kW

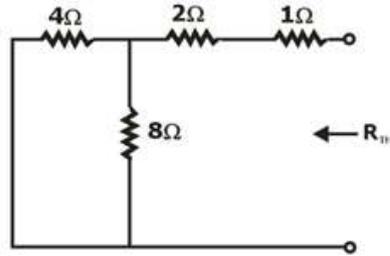
Ans. B

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Sol. We know that, for maximum power transfer $R_L = R_{th}$.

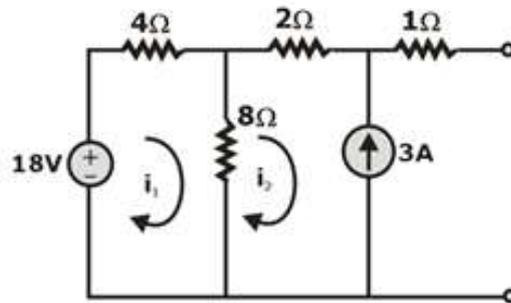
Therefore, R_{th} can be calculated from the circuit as shown below,



$$R_{th} = (4 \parallel 8) + 3$$

$$R_{th} = 5.67$$

Applying KVL in the circuit shown below,



$$-18 + 12i_1 - 8i_2 = 0$$

$$\text{And } i_2 = -3 \text{ A}$$

Solving above equation we get, $i_1 = -0.5 \text{ A}$.

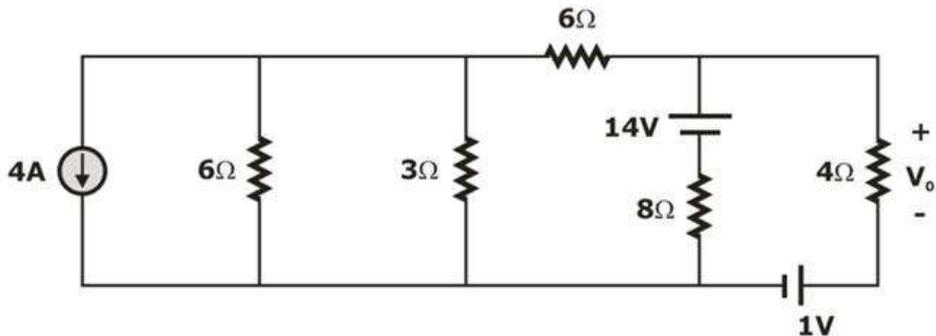
V_{th} can be calculated as

$$-18 + 4(-0.5) + 2(-3) + V_{th} = 0$$

$$V_{th} = 26 \text{ V}$$

$$\text{Therefore, } P_{max} = \frac{(V_{th})^2}{4R_{th}} = 29.82 \text{ W}$$

105. Find V_o of the circuit shown



A. 1 V

B. 2 V

C. 3 V

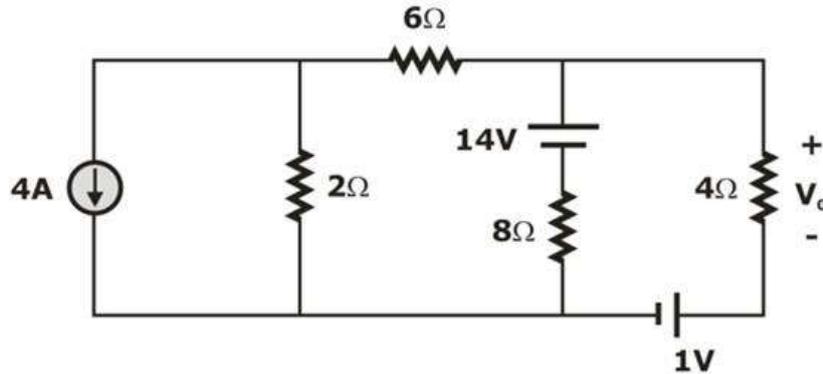
D. 4 V

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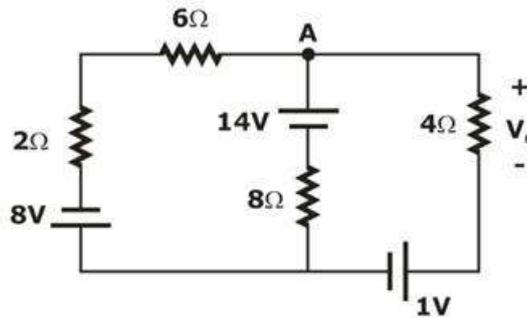
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Ans. A

Sol. In the circuit shown, 6Ω and 3Ω are in parallel.



By source transformation:



Applying KCL at node A;

$$\Rightarrow \frac{V_A + 8}{8} + \frac{V_A - 14}{8} + \frac{V_A - 1}{4} = 0$$

$$\Rightarrow V_A = 2V$$

$$V_A = 1 + V_0$$

$$V_0 = 2 - 1$$

$$V_0 = 1V$$

106. Which of the following is an interrupt according to temporal relationship with system clock?

- A. Maskable interrupt
- B. Periodic interrupt
- C. Division by zero
- D. Synchronous interrupt

Ans. D

Sol. According to temporal relationship with system clock we classify interrupt in two ways:

1. Synchronous: The source of interrupt is in phase to the system clock is called synchronous interrupt. In other words interrupts which are dependent on the system clock. Example: timer service that uses the system clock.
2. Asynchronous: If the interrupts are independent or not in phase to the system clock is called asynchronous interrupt.

So, option D. is correct.

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107. In a series RL circuit, the two resistors of $R = 5\Omega$ and 10Ω , are connected in series with inductor, of L.H. The supply voltage is 50V. If the power consumed by the 5Ω resistor is 10W, then power factor of the circuit is:

- A. 0.828
- B. 0.424
- C. 0.567
- D. 0

Ans. B

Sol. power consumed by 5Ω resistor is 10 W.

$$i^2 R = 10$$

$$i^2 = \frac{10}{5} = 2$$

$$i = \sqrt{2} \text{ A}$$

$$\text{Voltage drop across } 5\Omega \text{ resistor} = 5\sqrt{2}$$

$$\text{Voltage drop across } 10\Omega \text{ resistor} = 10\sqrt{2}$$

$$\therefore \text{voltage across inductor} = v_L = \sqrt{V_S^2 - V_R^2}$$

$$v_L = \sqrt{(50)^2 - (15\sqrt{2})^2} = 45.27 \text{ V}$$

$$i \times X_L = 45.27$$

$$X_L = \frac{45.27}{\sqrt{2}} = 32.02 \Omega$$

$$Z = \sqrt{R^2 + X_L^2}$$

$$Z = \sqrt{15^2 + (32.02)^2} = 35.35 \Omega$$

$$\text{Power factor} = \cos \phi = \frac{R}{Z} = \frac{15}{35.35} = 0.424$$

108. Turn on time of an SCR can be reduced by using a:

- A. Rectangular pulse of high amplitude and narrow width
- B. Rectangular pulse of low amplitude and wide width
- C. Triangular pulse
- D. Trapezoidal pulse

Ans. A

Sol. A SCR turns on when the threshold gate voltage is applied and the time taken for this is called as turn on time.

The turn on time will get reduced if Large amplitude (greater than threshold voltage)

Is applied with narrow width. Narrow width ensure high frequency and hence less turn on time.

109. Full rectified version of bipolar signaling is?

- A. Polar NRZ signaling
- B. ON-OFF signaling
- C. Manchester signaling
- D. Polar RZ signaling

Ans. B

Sol. Full rectified version of bipolar signaling is ON-OFF signaling.

110. The number of corona positive people in a city in a month follows poisson distribution with mean of 7.8. find the probability that number of corona positive is less than 3 during a randomly selected month is

- A. 0.16
- B. 0.016
- C. 0.024
- D. 0.032

Ans. B

Sol. $P(x) = \frac{e^{-\lambda} \lambda^x}{x!}$

$\lambda = 7.8$

$P(x < 3) = P(0) + P(1) + P(2)$

$= e^{-7.8} \left[\frac{7.8^0}{0!} + \frac{7.8^1}{1!} + \frac{7.8^2}{2!} \right]$

$P(x < 3) = 0.016$

111. A Bag has 4 white balls & 5 red balls. Now, two balls are drawn in succession from the bag without replacement, & it was noted that the 2nd one is white. Calculate the probability that the first ball which was drawn is also white.

- A. $\frac{3}{8}$
- B. $\frac{4}{9}$
- C. $\frac{5}{8}$
- D. $\frac{5}{9}$

Ans. B

Sol. Let,

$A \in (\text{white on first draw}), \therefore P(A) = \frac{4}{9}$

$B \in (\text{white on second draw}), \therefore P(B) = \frac{3}{8}$

Then, we are looking for $P(A/B)$:

$$p(A / B) = \frac{p(A \cap B)}{p(B)} = \frac{\frac{4}{9} \times \frac{3}{8}}{\frac{3}{8}} = \frac{4}{9}$$

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112. The chance of student failing an exam is 40%. The chance of student failing the exam and getting below 40% exams in it is 10%. Given that student fails the examination, the probability that the student gets below 40% marks is

- A. 1/2
- B. 1/4
- C. 1/8
- D. 2/3

Ans. B

Sol. Given $P(\text{failing the exam}) = 0.40$

$$P(\text{failing the exam} \cap < 40\%) = 0.10$$

Using conditional Probability,

$$P\left(\frac{A}{B}\right) = \frac{P(A \cap B)}{P(B)}$$

$$P\left(\frac{< 40\%}{\text{failing the exam}}\right) = \frac{P(\text{failing the exam} \cap < 40\%)}{P(\text{failing the exam})}$$

$$= \frac{0.10}{0.40} = \frac{1}{4}$$

113. Probability of passing in Physics is 35%. The chance of passing in Physics and getting above 85 marks in it is 7%. Given that student passes in Physics. Find the probability that student gets above 85 marks.

- A. 2/5
- B. 1/5
- C. 3/5
- D. 4/5

Ans. B

Sol. Given,

$$\text{Probability (Passing in physics)} = 0.35$$

$$\text{Probability (Passing the exam} \cap > 85 \text{ marks)} = 0.07$$

So desired probability = $P(> 85 \text{ marks} / \text{passing in physics})$

$$= \frac{P(\text{Passing in physics} \cap > 85 \text{ marks})}{P(\text{Passing in physics})}$$

$$= \frac{0.07}{0.35}$$

$$= \frac{1}{5}$$

114. Let $R = \{(1,1), (3,3), (5,5), (7,7), (3,7), (1,3), (1,5), (1,7)\}$ be a relation on the set $A = \{1,3,5,7\}$. The relation is

- A. Reflexive only
- B. Reflexive and symmetric
- C. An equivalence relation
- D. Reflexive and transitive

Ans. D

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Sol. The relation is not symmetric because,

$$(1, 3) \in R \Rightarrow (3, 1) \notin R$$

Whereas clearly R is reflexive and transitive

115. If we define a relation R on the set $N \times N$ as $(a, b)R(c, d) \Leftrightarrow a + d = b + c$ for all $(a, b), (c, d) \in N \times N$, then the relation is

- A. symmetric only
- B. symmetric and transitive only
- C. equivalence relation
- D. reflexive only

Ans. C

Sol. Reflexive: Reflexive relation on set is a binary element in which every element is related to itself.

a relation R on the set $N \times N$ is defined as $(a, b)R(c, d) \Leftrightarrow a + d = b + c$ for all $(a, b), (c, d) \in N \times N$

$$\text{As } a + b = a + b \Leftrightarrow (a, b)R(a, b)$$

So, R is reflexive

Symmetric: A relation R on set A is said to be symmetric relation if $(a, b) \in R$ implies that $(b, a) \in R$

$$\text{Let } (a, b)R(c, d) \Leftrightarrow a + d = b + c$$

$$\text{So, } c + b = a + d$$

$$\text{So } (c, d) R(a, b)$$

Hence R is symmetric

A relation R on A is said to be transitive relation iff $(a, b) \in R$ and $(b, c) \in R$ implies that $(a, c) \in R$ for all a, b, c belongs to A .

$$\text{Let } (a, b)R(c, d) \Leftrightarrow a + d = b + c \dots\dots\dots(1)$$

$$\text{Also } (c, d)R(x, y) \Leftrightarrow c + y = d + x \dots\dots\dots(2)$$

$$\text{From (1), } c - d = a - b$$

$$\text{From (2), } c - d = x - y$$

$$\Rightarrow a - b = x - y$$

$$\Rightarrow a + y = x + b$$

Which means $(a, b)R(x, y)$

Hence R is transitive also

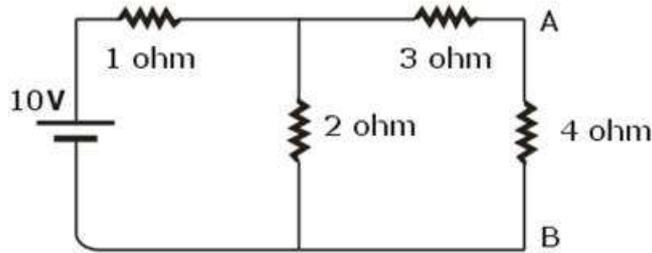
\Rightarrow If R is reflexive, symmetric and transitive then R is equivalence relation.

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116. Calculate V_{th} for the given circuit.



- A. 5 .54V
- B. 3 .33V
- C. 6 .67V
- D. 3 .67V

Ans. C

Sol. 4 ohm is removed and then v across 2 ohm is calculated by voltage divider $2*10/(2+1) = 6.67V$. Voltage between A and B i.e. V_{th} is equal to voltage across 4 ohm resistance since no current flow through 3 ohm resistance. So, $V_{th} = 6.67V$.

117. The method which offers higher speeds of I/O transfers is _____

- A. Interrupts
- B. Memory mapping
- C. Program-controlled I/O
- D. DMA

Ans. D

Sol. In DMA the I/O devices are directly allowed to interact with the memory without the intervention of the processor and the transfers take place in the form of blocks increasing the speed of operation.

118. Which protocol layer uses the protocols are WWW, HTTP, FTP, SMTP, e-mail etc

- A. Application Layer Protocol
- B. Transport Layer Protocol
- C. Network Layer Protocol
- D. Data Link Layer

Ans. A

Sol. Application Layer Protocol provide following services- WWW,HTTP,FTP,SMTP, email,etc.

119. Which of the following is correct with regard to insertion sort?

- A. insertion sort is stable and it sorts In-place
- B. insertion sort is unstable and it sorts In-place
- C. insertion sort is stable and it does not sort In-place
- D. insertion sort is unstable and it does not sort In-place

Ans. A

Sol. During insertion sort, the relative order of elements is not changed. Therefore, it is a stable sorting algorithm. And insertion sort requires only $O(1)$ of additional memory space. Therefore, it sorts In-place.

120. Which of the following has best lower bound time complexity?

- A. Merge sort
- B. Quick sort
- C. Selection sort
- D. Insertion sort

Ans. D

Sol. In best case merge sort time complexity = $O(n \log n)$

For Quick sort in best case = $O(n \log n)$

For Selection sort = $O(n^2)$

For insertion sort = $O(n)$

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