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Branch: Computer Science and Information Technology MOCK-F- SOLUTIONS

01. Ans: 2

Sol: $r = (a^*b)^*$



Number of states in MFA = 2

- \therefore Number of equivalence classes w.r.t L is 2
- 02. Ans: (d)
- 03. Ans: (c)
- 04. Ans: (a)

Sol: $f(x) = \frac{1}{x}, g(x) = \frac{1}{x^2}$ in [1, 2]

By Cauchy's Mean value Theorem,

 $\frac{f(b)}{g(b)} - \frac{f(a)}{g(a)} = \frac{f^{1}(c)}{g^{1}(c)}$ $\Rightarrow \frac{\frac{1}{2} - 1}{\frac{1}{4} - 1} = \frac{-\frac{1}{c^{2}}}{-\frac{2}{c^{3}}}$ $\Rightarrow \frac{2}{3} = \frac{c}{2}$ $\therefore c = \frac{4}{3}$

05. Ans: (a)

Sol: If a file requires 'n' blocks and the starting location is given as block b, then the blocks assigned to the file will be: b, b + 1, b+2,...,b+n-1

06. Ans: (d)



07. Ans: (d)

Sol: Start with lowermost left element and compare. If the searching element is greater, go searching towards right else up. Continue till element is found.

08. Ans: 9

Sol: size of each data = 4 bit

 $A = 0111_2(7)$

longest latency is required to stabilize the carry bit of MSB Adder and to get carry in MSB Adder, (4th adder) the minimum value to be loaded in 'B' Register is 9

$$0111 = A$$

 $1001 = B$
 $1\ 0000$

For this carry bit, highest delay is needed to stabilize.



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09. Ans: (c)

Sol: operator * has higher precedence than +, so a*b is evaluated first and the same result is used to evaluate + operator.

10. Ans: (c)

Sol: Required probability = $P(\overline{A} \cap \overline{B})$ = $P(\overline{A \cup B})$ = 1 - P (A \cup B) = 1-{P(A) +P(B) -P(A \cap B)} = 1-{0.25+0.5-0.14} = 0.39

11. Ans: (d)

Sol: If A = 0, B = 0, C = 1 then output F = 1

12. Ans: (a)

Sol: In buddy system, entire memory space available is treated as a single block of 2^n . Entire block is allocated, if a request S arrives such that $2^{n-1} < S < 2^n$

13. Ans: (c)

14. Ans: 25

Sol: Tag offset 25 word offset 5

log₂ 32

Block size = 32 words

Hence word offset size = 5 bit

and remaining bits represent tag offset

 \therefore size of the tag comparator is 25 bits.

15. Ans: 76

Sol: Given Prefix Expression: 1, 3, 8, ^, ^, 15, 5, *, + Infix Expression: 1 ^ 3 ^ 8 + 5 × 15 = 1 + 75 = 76

16. Ans: (b)

Sol:
$$a^{28} = (a^{14})^2$$

= $((a^7)^2)^2$
= $((a.a^6)^2)^2$
= $((a.(a^3)^2)^2)^2$
= $((a.(a. (a)^2)^2)^2)^2$
= 6 multiplications

17. Ans: (b)

Sol: In an n-variable K-map

→Group of $8=2^3$ cells consists (n-3) literals →Group of 16= 2^4 cells consists (n - 4) literals

18. Ans: (d)

19. Ans: (c)

Sol: For increment operators, an operand cannot be expression. So it gives Compile Time Error, L-value required.

20. Ans: (a)

Sol:	Κ	32	40	52	10	82	95	46	30
	K % 10	2	0	2	0	2	5	6	0

0	1	2	3	4	5	6	7	8	9
40	10	32	52	82	95	46	30		

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21. Ans: 256 Sol: MAR size = 36 bits MDR size = 32 bits Hence number of addressable words = 2^{36} and word size = 32 bits \therefore Size of the RAM = $2^{36} \times 32$ bits = $2^{36} \times 4$ bytes = $64G \times 4$ Bytes

= 256 G bytes.

22. Ans: (b)

Sol: The first 2 symbols of 'S' production is distinct hence the grammar is LL(2).

23. Ans: (b)

Sol: The characteristic equation is $|A - \lambda I| = 0$ $\Rightarrow (3 - \lambda) (-6 - \lambda) + 8 = 0$ $\Rightarrow \lambda = 2, -5$ Eigen values of A^4 are 2^4 and $(-5)^4$

24. Ans: (c)

Sol:
$$i = 0, j = 0 \Rightarrow j = 2$$

 $i = 1, j = 1 \Rightarrow j = 3$
 $i = 2, j = 2 \Rightarrow j = 4$
 $i = 3, j = 3 \Rightarrow j = 5$
 $i = 4, j = 4 \Rightarrow$ condition fails as $j < 4$
 $i + j \Rightarrow 4 + 4 = 8$

25. Ans: (a)

Sol: In Bubble sort, if we apply first pass we get first largest element, say 'x' and second pass we get second largest element say 'y' and then test the given condition x+y>100. So time complexity

> = (n-1) + (n-2) comparisons = O(n)

Sol: $A \times B = +38$ Booth code for $B = -1 + 1 \ 0 - 1 + 1 - 1$ 'B' value in decimal $= -1 + 1 \ 0 - 1 + 1 - 1$ $32 \ 16 \ 8 \ 4 \ 2 \ 1$ = -32 + 16 + 0 - 4 + 2 - 1 = -19Hence $A \times (-19) = +38$ then A = -2

27. Ans: 0.416 (range 0.41 to 0.42)

Sol: Let X represent the co-ordinate of the chosen point. The probability density function of X is

$$f(x) = \begin{cases} \frac{1}{2}, & 0 < X < 2\\ 0, & \text{otherwise} \end{cases}$$
$$P\left(\frac{2}{3} < X < \frac{3}{2}\right) = \int_{\frac{2}{3}}^{\frac{3}{2}} \frac{1}{2} dx$$
$$= \frac{1}{2} \left(\frac{3}{2} - \frac{2}{3}\right) = \frac{5}{12}$$

28. Ans: (c)

Sol: Let number of columns = x

Number of Rows = 2 x

Memory space =

Number of Rows \times Number of columns

 $2x \times x = 2048$ bits

 $x^2 = 1024, \qquad x = 32$

Hence number of Rows = 64

Size of the Row Address Decoder is 8×64

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29. Ans: (c) Sol:

- Usage information contains Date created, identity of creator. Date last read access, identity of last reader, date of last backup, identity of last modifier, date of last backup and current usage.
- Owner, Access information and permitted actions will be in access control information.

30. Ans: 64

Sol: As we know size of int data type is two byte while char pointer can point one byte at a time.

Memory representation of int i = 320

FIRST BYTE SECOND BYTE

0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
ntr								↓							
pu		SIGN BIT													

So char pointer ptr is pointing to only first byte as shown in above figure.

*ptr i.e. content of first byte is 01000000 and its decimal value is 64.

31. Ans: (a)

Sol: As A is Key constraint to B and C the max. number of tuples will be equal to number of tuples in the relation A

32. Ans: (b)

Sol: $D = \overline{A} BC + A \overline{B} C = C(A \oplus B)$,

 $F = (\overline{A} + \overline{B})C + AB \overline{C}$

 $F = \overline{A}C + \overline{B}C + AB\overline{C} = \overline{AB}C + AB\overline{C} = AB \oplus CF$ For H. A circuit if inputs are x, y then outputs are



33. Ans: (a)

34. Ans: (d)

Sol: Keyword break is not part of if-else statement. Hence it will show compile error: Misplaced break.

35. Ans: (b)

Sol: Perform AND operation for given IP address and net mask and compare results with network number if it matches with network number, then forward packet through that interface. If not matched with any entry then use default route.

Ex: 135. 46. 56. 0 AND 255. 255. 252. 0 = 135. 46. 56. 0

Hence packet must be transferred through I_0 . Sometimes result matches with multiple network number, so use interface that has longest length subnet mask.

36. Ans: (a)

Sol: In kruskal's algorithm, edges can be included in the increasing order of their weights without forming any cycle.

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37. Ans: (d)

Sol: Set S is any finite set.

 \Rightarrow S is a countable set

Let 2^{S} = set of all subsets of S.

 $\Rightarrow 2^{S}$ is power set of S

 $\Rightarrow 2^{\text{s}}$ is uncountable set

Since power set of countable set is uncountable.

38. Ans: (d)

Sol: All are independent transactions operating on different data items then it is equivalent to all possible serial schedules with T_1 , T_2 , T_3

39. Ans: (a)

Sol: Relational operators will have left to right associative

x = 3 > 2 > 1= 1 > 1 = 0

40. Ans: 63

Sol: Effective memory access time

 $= H *(t_{TLB} + t_{mm}) + (1 - H) (t_{TLB} + 3t_{mm})$ = 0.9(53 m) + 0.1(153) = 47.7 + 15.3 = 63 nsec

41. Ans: 46656

Sol:
$$|\mathbf{A}| = \begin{vmatrix} 1 & 1 & 0 & 5 \\ 0 & 1 & 0 & 0 \\ 5 & 2 & 3 & -5 \\ -1 & -2 & 0 & 7 \end{vmatrix}$$

Expanding by second row

 $|\mathbf{A}| = \begin{vmatrix} 1 & 0 & 5 \\ 5 & 3 & -5 \\ -1 & 0 & 7 \end{vmatrix}$

Expanding by second column, $|A| = 3 \begin{vmatrix} 1 & 5 \\ -1 & 7 \end{vmatrix} = 36$ $|adj A| = |A|^{3} = (36)^{3} = 46656$ Note: If A is n×n matrix, then |adj A|=|A|ⁿ⁻¹



By using above diagram we have y = 6, x = 6So, return value is x + y = 12

43. Ans: (c)

Sol: In straussens algorithm, we multiply two matrices of order $\frac{n}{2} \times \frac{n}{2}$ 7 times and we have 18 operations for addition, subtraction of matrices of order $\frac{n}{2} \times \frac{n}{2}$. So, T(n) = 7T $\left(\frac{n}{2}\right)$ + O(n²)

44. Ans: (b)

Sol: Indexed file may contain an exhaustive index that contains one entry for every record in the main or partial index & it uses multiple indexes for different key fields. Indexed sequential file, multiple indexes for the same key field can be set up to increase efficiency & overflow is merged with the main file during a batch update.

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 $= O(n^2)$

 \therefore Total number of comparisons = O(nlogn).

48. Ans: (b)

Sol: The LALR (1) parsers for a grammar G can have SR conflict if and only if the LR (1) Parser for G has SR conflicts

language

 $\overline{L} = \phi$ (empty language)

one state is enough to accept empty

 $\Sigma = \{1\}, \Sigma^* = 1^*$

L(N) = 1*

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52. Ans: (a) Sol:

R ₁ (ABC)	R ₂ (ACDE)	R ₃ (ADG)
$AB \rightarrow C$	$AD \rightarrow E$	$AD \rightarrow G$
$AC \rightarrow B$	$AC \rightarrow DE$	
$BC \rightarrow A$		
CK: AC, BC, AB	CK: AC	CK: AD

- Decomposition is lossless $(R_1 \bowtie R_2) \bowtie R_3 = R$
- Not D.P as it looses $B \to D$ and $E \to G$.

53. Ans: (a)

Sol: Let T(n) = Time required for f(n, r)

 $T(n) = C + T\left(\frac{n}{r}\right)$

By using master theorem,

 $T(n) = O(n^{\log 1} \cdot \log_r n)$ $= O(\log_r n)$

54. Ans: (a)

Sol: Subnet-0

200.1.2.<u>0</u> 0 0 0 0 0 0 0 to 200.1.2.<u>0</u> 0 1 1 1 1 1 1

Subnet-1

200.1.2. $\underline{0} \underline{1} 0 0 0 0 0 0 0 to 200.1.2. \underline{0} \underline{1} 1 1 1 1 1 1$

Subnet-2

 $200.1.2.\underline{10}000000$ to $200.1.2.\underline{10}111111$

Subnet-3

 $200.1.2.\underline{1}\ \underline{1}0\ 0\ 0\ 0\ 0\ 0\ to\ 2000.1.2.\underline{1}\ \underline{1}1\ 1\ 1\ 1\ 1$

Broadcast address used in subset is the last IP address in that subnet.

... For subnet-2, broadcast address is

200.1.2.10111111

55. Ans: (b)

Sol: For a full adder

A	B	С	Sum (F ₁)	Carry (F ₂)
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

 $F_1 = \Sigma m(1,2,4,7)$ $F_2 = \Sigma m(3,5,6,7)$

56. Ans: (d)

Sol: 'Cut out for' means designed to be so. 'Cut up' means 'to be emotionally upset'. 'Cut down' means 'to kill somebody' or 'to make something fall down by cutting it at the base'. 'Cut off' means 'separated from the rest of the world'.

57. Ans: (c)

58. Ans: (a)



59. Ans: (d)

Sol: Let principle be 1. then amount after 10 years = $3 \times 1 = 3$

 \therefore Simple interest = 3 - 1 = 2

$$\therefore \text{ Rate of interest } = \frac{2 \times 100}{1 \times 10} = 20\%$$

60. Ans: (c)

Sol: Note that 20 - 14 = 6; 25 - 19 = 6; 35 - 29 = 6; 40 - 34 = 6.

Required number = L.C.M. of (20, 25, 35 and 40) is -6.

$$20 = 2*2*5
25 = 5*5
35 = 1*5*7
40 = 2*2*2*5$$

$$= (2 \times 2 \times 2 \times 5 \times 5 \times 7) - 6$$

= 1400 - 6 = 1394

61. Ans: (c)

Sol: The angle subtended by an arc at the centre of the circle is twice the angle subtended by the arc at any point on the remaining part of the circle.

 $\therefore \angle BOC = 2 \angle BAC = 2 \times 50^{\circ} = 100^{\circ}$ Now in $\triangle BOC$ OB = OC [radii of circumcentre] $\therefore \angle OBC = \angle OCB = x \text{ (let)}$ $\therefore x + x + 100^{\circ} = 180^{\circ}$ $\Rightarrow 2x = 80^{\circ}$ $\Rightarrow x = 40^{\circ}$

62. Ans: (a)

Sol: At 4:10 the hour hand is a head of minute hand

Given that n = 4 and x = 10

Then according to the formula required angle

$$= \left\{ 30\left(n - \frac{x}{5}\right) + \frac{x}{2} \right\}^{0}$$
$$= \left\{ 30\left(4 - \frac{10}{5}\right) + \frac{10}{2} \right\}^{0}$$
$$= \left\{ (30 \times 2) + 5 \right\}^{0} = (60 + 5)^{0} = 65^{0}$$

63. Ans: (b)

Sol: Total cost (in Rs) of journey to Town A
= 4300 + 3100 + 4000 + 6000 = 17400
Average cost =
$$\frac{17400}{4}$$
 = Rs. 4350

64. Ans: (a)

Sol: Maximum cost (in Rs) of journey from Delhi to town A = By Train 4 = Rs. 6000 Similarly, for town B = Rs. 6300 Town C = Rs. 5600 and Town D = Rs. 5700 \Rightarrow Maximum cost = 6000 + 6300 + 5600 = Rs. 23600

65. Ans: (d)

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