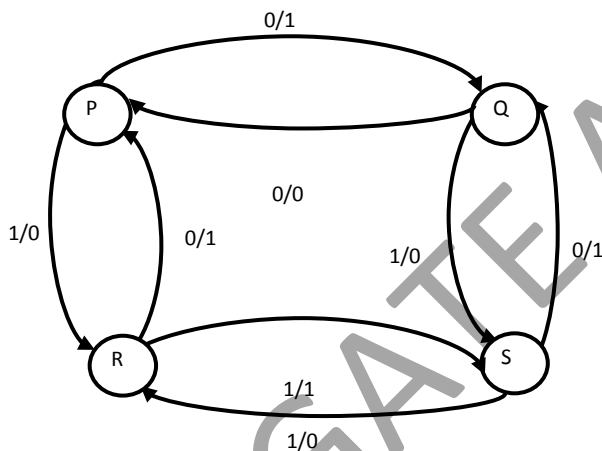


**Answer keys: CS-TS-1**

1	C	2	A	3	C	4	D	5	B	6	B	7	D	8	A	9	C	10	A
11	C	12	B	13	D	14	C	15	A	16	D	17	C	18	A	19	C	20	C
21	B	22	B	23	B	24	B	25	C	26	A	27	A	28	A	29	A	30	A
31	D	32	D	33	A	34	D	35	B	36	C	37	B	38	D	39	B	40	D
41	C	42	D	43	B	44	B	45	A	46	A	47	B	48	A	49	B	50	B
51	C	52	A	53	C	54	A	55	B	56	D	57	C	58	C	59	A	60	D
61	D	62	C	63	C	64	D	65	C										

**Solutions:**

1. [Ans. C]



2. [Ans. A]

3. [Ans. C]

Let  $2^p$  be the page size (frame size) the maximum number of page table entries that can fit in a single frame is  $2^{p-2}$ , since page table entries are 4 bytes.

For two level paging each virtual address is composed of two page number each  $p-2$  bits long and  $p$ -bit offset

For a  $2^{38}$  byte address space we need

$$(p-2) + (p-2) + p = 38$$

$$3p - 4 = 38$$

$$3p = 42$$

$$P = 14$$

4. [Ans. D]

Minimum 11 resources ensure that at least 1 process will have no pending request. This process after using will release the resources and 80 deadlock can never occur.

5. [Ans .B]

6. [Ans. B]

7. [Ans. D]

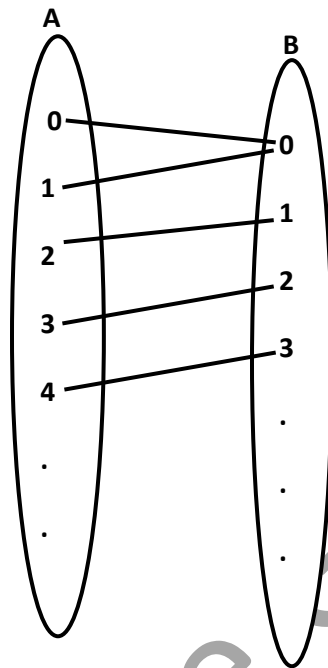
8. [Ans .A]

9. [Ans. C]

10. [Ans .A]

The Relation R will look like this  $\{(S1,S1), (S2,S2), ..\}$ . Notice that both elements of each pair are same. The relation is Reflexive, Symmetric and Transitive. Therefore R is a Equivalence relation.

11. [Ans. C]



$f$  is not one to one

12. [Ans .B]

$$(a \uparrow b) \uparrow c \equiv \neg(\neg(a \wedge b) \wedge c) \equiv (a \wedge b) \vee \neg c$$

$$a \uparrow (b \uparrow c) \equiv \neg(a \wedge \neg(b \wedge c)) \equiv \neg a \vee (b \wedge c)$$

Both the expressions calculate to different truth values when  $a = \text{FALSE}$ ,  $b = \text{FALSE}$ , and  $c = \text{TRUE}$ .

Therefore,  $(a \uparrow b) \uparrow c \neq a \uparrow (b \uparrow c)$

13. [Ans .D]

14. [Ans. C]

Subnet mask = 255.255.252.0 By representing in binary it is 11111111 11111111

11111100, 00000000 in a class B address, the number of bits used to identify the network id=16 so the host part in the above subnet mask = 11111100 00000000

The subnet id in the above contains 6 is so we can form up to  $(2^6-2) = 6^2$  subnets with the above subnets mask.

15. [Ans .A]

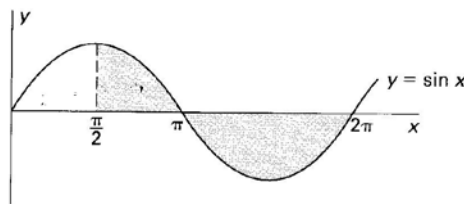
16. [Ans .D],  $X = \text{Log } N$

$$e^x = N \quad e^x - N = 0$$

$$x_{n+1} = \frac{f(x_n)+f(x_{n-1})}{2} = \frac{e^{x_n}+e^{x_{n-1}}}{2} - N,$$

17. [Ans .C], Integrate  $\sin x$  with respect to  $x$  to obtain the area between the curve and the  $x$ -axis.

The calculation must be done in pieces, because over the region where the value of  $\sin x$  is negative, the integral is negative. Take the absolute value of the negative area and add it to the result from the positive section to get the total area.



$$\begin{aligned} A &= \int y dx \\ &= \int_{\pi/2}^{\pi} \sin x dx + \left| \int_{\pi}^{2\pi} \sin x dx \right| \\ &= (-\cos x) \Big|_{\pi/2}^{\pi} + \left| (-\cos x) \Big|_{\pi}^{2\pi} \right| \\ &= 1 + 2 = 3, \end{aligned}$$

18. [Ans .A], Integrate the  $f(X)$  between  $10^{-4}$  and  $10^{-2}$ ,  $P(X) = 0.09$ ,

19. [Ans .C],

$$Y =$$

A \ BC	00	01	11	10
0	1	1	0	1
1	0	0	0	1

$$\begin{aligned} y &= \bar{A}\bar{B} + B\bar{C} \\ z &= y + \bar{C} \\ &= \bar{A}\bar{B} + C\bar{C} + \bar{C} \\ &= \bar{A}\bar{B} + \bar{C} \end{aligned}$$

20. [Ans .C]

21. [Ans .B]

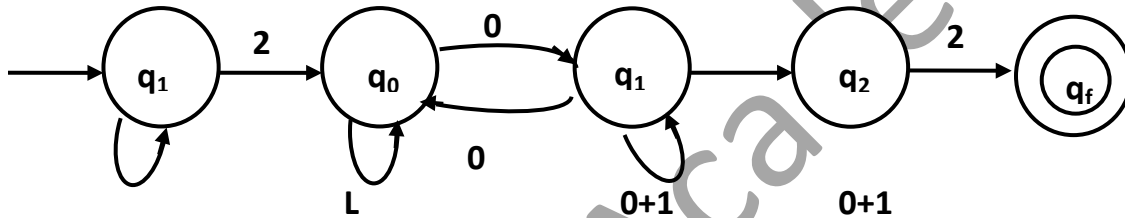
- 22. [Ans .B]
- 23. [Ans .B]
- 24. [Ans .B]
- 25. [Ans .C]
- 26. [Ans .A]

We have  $S \rightarrow aB \rightarrow aaBB \rightarrow aabB \rightarrow aabb$ . So (B) is wrong. We have  $S \rightarrow aB \rightarrow ab$ . So (C) is wrong

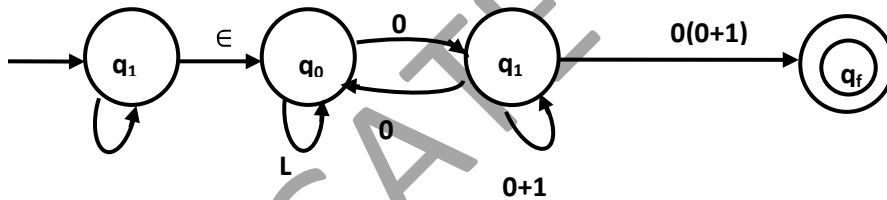
A careful observation of the production will reveal a similarity. Change A to B, B to A, a to b and b to a. So (D) is false and (a) is the correct answer.

- 27. [Ans .A]

To find equivalent regular expression first we introduce a unique non reachable initial state and unique non leavable final state and label the edges with regular expression form as follows



Again, we can by pass state  $q_2$  as follows



Proceeding in similar fashion, we get Answer.

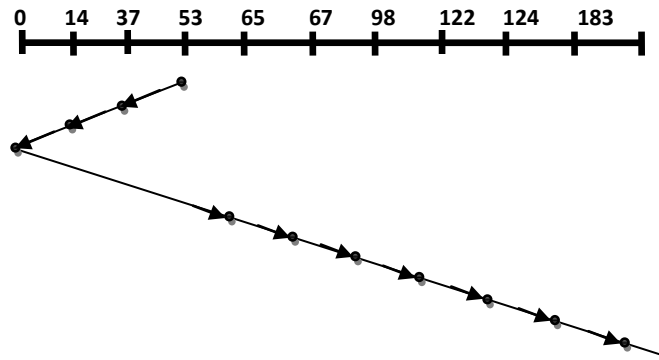
- 28. [Ans .A]
- 29. [Ans .A]

First we will check space is available in queue or not at producing time same at consuming time first check item is available or not.

- 30. [Ans. A ]

Total resources  $\langle 6, 6, 6 \rangle$  so available  $\langle 1, 1, 2 \rangle$  first  $P_2$  can complete then available  $\langle 3, 1, 3 \rangle$  now  $P_1$  can complete and at last  $P_3$

31. [Ans. D]



Current 53

53 → 37 → 14 → 0 → 65 → 67 → 98 → 122 → 124 → 183 →  
 16 + 23 + 14 + 65 + 2 + 31 + 24 + 2 + 59

Total head moment is 236

Or

From 53 to 0 = 53

And from 0 to 183 = 183

236

32. [Ans. D]

$$1 - (1 - 0.5)(1 - 0.4) = 0.7$$

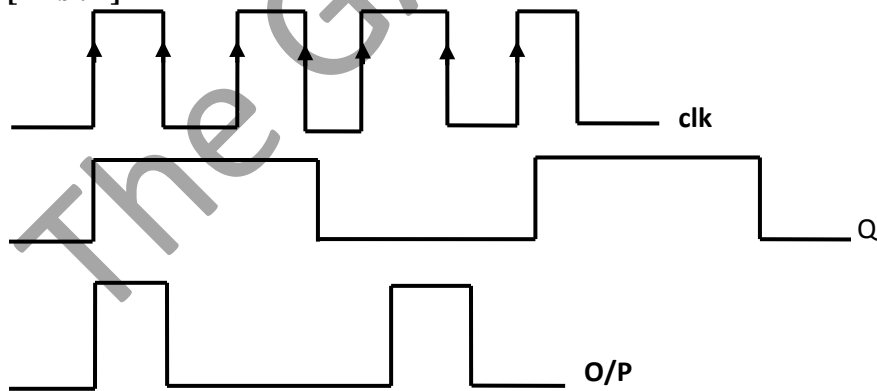
33. [Ans. A],

$$A = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \quad \begin{bmatrix} -1 & -2 \\ -1 & 3 \end{bmatrix}$$

$$A^{99} = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} 1^{99} & 0 \\ 0 & (-1)^{99} \end{bmatrix} \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$$

∴ A = A<sup>99</sup>,

34. [Ans. D]



35. [Ans. B]

36. [Ans. C]

Time required for serial /unpipelined execution = 10 + 8 + 10 + 10 + 7 = 45ns

Time required for pipelined execution = the time for largest clock cycle + pipeline over head

$$= 10 + 1 = 11\text{ns}$$

Thus the speed up is  $= \frac{45}{11} = 4.1\text{ns}$ .

37. [Ans .B]

38. [Ans .D]

39. [Ans .B]

40. [Ans .D]

41. [Ans .C]

42. [Ans .D], at least one condition should be true for 3NF

43. [Ans .B]

For the salary field of each tuple in the outer Queries of Query1 and Query2, The Subquery in Query1 and Query2 outputs the number of salaries that are less than or equal to the salary field of the tuple of the outer query

By which query1 gives us the correct output.

44. [Ans .B]

$$\begin{array}{r} 1100\sqrt{11100110} \\ \underline{11001} \\ 0010111 \\ \underline{11001} \\ 011100 \\ \underline{11001} \\ 0010100 \\ \underline{11001} \\ 011010 \\ \underline{11001} \\ 000110 \end{array}$$

So CRC is 111001100110

45. [Ans. A]

Usable bandwidth of pure aloha is 18.4% of the allocated bandwidth

$$\Rightarrow \frac{18.4 \times 28\text{kbps}}{100} = 5.15 \text{ kbps}$$

bit rate from each station  $= \frac{1000}{100} = 10$  bits per second.

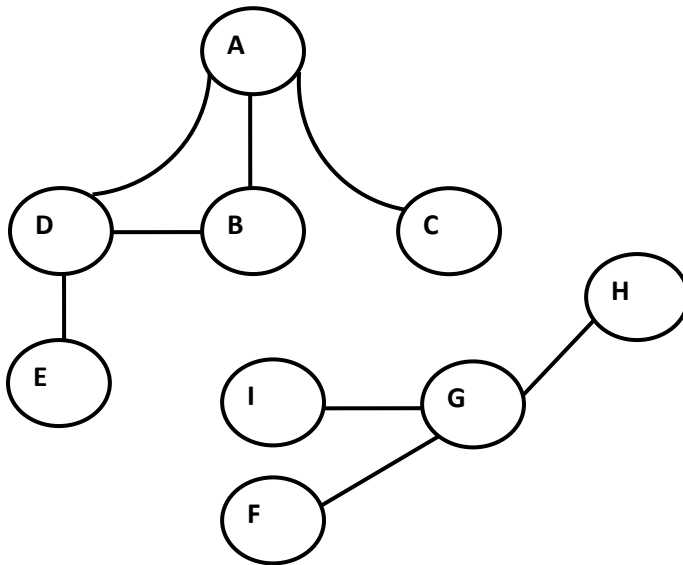
$$\text{There fore } N = \frac{5.15 \times 1000 \text{ bps}}{10 \text{ ps}}$$

$$\Rightarrow 515 \text{ station}$$

46. [Ans .A]

47. [Ans .B]

After treating undirected the graph would be



BDA have clique – 3

48. [Ans .A]

49. [Ans .B]

50. [Ans .B]

The processor can only devote 5% of its time to I/O. Thus the maximum I/O instruction execution rate is  $10^6 \times 0.05 = 50,000$  instructions per second.

The I/O transfer rate is therefore 25,000 words/second

51. [Ans .C]

The number of machine cycle available for DMA control is

$$10^6 (0.05 \times 5 + 0.95 \times 2) = 2.15 \times 10^6$$

52. [Ans .A]

53. [Ans .C]

54. [Ans .A]

55. [Ans .B]

56. [Ans .D]

A can give B start of 50 meters or 10 sec in a 1000 m race. That is, B takes 10 sec to run 50 mts.

$\Rightarrow$  B will take  $10/50 \times 1000 = 200$  sec. to run 1000 mts.

A who can give B a start of 10 sec. will take 10 sec. lesser to run the 1000m.

$\therefore$  A takes 190 sec.

57. [Ans .C]

The highest power of 2 in 50!

$$= \left\lfloor \frac{50}{2} \right\rfloor + \left\lfloor \frac{50}{2^2} \right\rfloor + \left\lfloor \frac{50}{2^3} \right\rfloor + \left\lfloor \frac{50}{2^4} \right\rfloor + \left\lfloor \frac{50}{2^5} \right\rfloor$$

$$= 25 + 12 + 6 + 3 + 1 = 47$$

58. [Ans .C]

59. [Ans .A]

60. [Ans .D]

61. [Ans .D]

62. [Ans .C]

63. [Ans .C]

Initial sum of the terms of the sequence  $1, 2, 3, \dots, 40 = \frac{40 \times 41}{2} = 820$ . After erasing two numbers

a, b and replacing with a+b-1, the sum of the terms of the sequence = 820 -1

Similarly, after every operation, the sum of the terms of the sequence = 820 - 1

Similarly after every operation, the sum of the terms of the sequence reduces by 1.

∴ The last number left (i.e. final sum) = 820 - 39 = 781.

64. [Ans .D]

Sum of the digits of multiples of 9 is always 9.

∴ f(n) = 9 if and only if it is a multiple of 9.

There are 55 multiples of 9 which are less than 500 (as  $500/9 = 55.55$ )

∴ f(n) = 9 ⇒ 55 +ve integers .

65. [Ans .C]

for a triangle

$$a + b > c \text{ ----- ( 1)}$$

for a obtuse triangle

$$a^2 + b^2 < c^2 \text{ (c is the largest) ----- ( 2)}$$

x be the largest side

$$\sqrt{8^2 + 15^2} = 17.$$

∴ x can be 18, 19, 20, 21, 22.

after 23 it violates condition( 1 ).

if 15 is the largest side.

$$\sqrt{15^2 - 8^2} = 12.69$$

∴ possible values are 12, 11, 10, 9, 8.

below 7 it violates condition (1).

∴ 10 possible values.