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Preface

When in fifteenth century, some audacious mariners had sailed to discover America; in the eyes of their contemporaries it wasn't justifiable but the fervour to uncover America from rest of the world made them to set the voyage. As it is rightly said "Heritage of man is not the earth but the entire universe"; and now man dares to assault the sky, just because of thinking what was never thought.

B. Singh (Ex. IES)

ISRO is such a organisation which think creatively and think beyond imagination. Ranging from 31 satellites in one flight to FATBOY to now 104 satellites in one rocket, launching and establishing satellites has become ISRO's metier.

To be a part of such great organisation is matter of pride hence, to help all aspirants looking forward to be the part of INDIA's next space exploration, MADE EASY team has solved accurately and in detail all previous years' papers of DRDO and ISRO.

MADE EASY team has made deep study of previous exam papers and observed that a good percentage of questions are repetitive. This book containing fully explained questions from 2007 onwards will serve as an effective tool to succeed in examination.

I would like to acknowledge efforts of entire MADE EASY team who worked hard to solve previous years' papers with accuracy and I hope this book will stand upto the expectations of aspirants and my desire to serve student fraternity by providing best study material and quality guidance will get accomplished.

With Best Wishes

B. Singh

CMD, MADE EASY Group

ISRO : CS

Previous Years Solved Papers

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ISRO

Indian Space Research Organization

(Technical)

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ISRO-2007

(Indian Space Research Organisation)

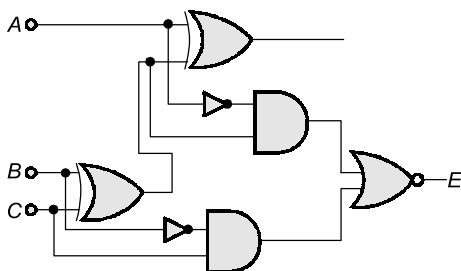**Q.1** The boolean expression $Y = (A + \bar{B} + \bar{A}B)\bar{C}$ is given by

(a) $A\bar{C}$ (b) $B\bar{C}$

(c) $\bar{C}$ (d) AB

Q.2 The circuit shown in the following figure realizes the function.
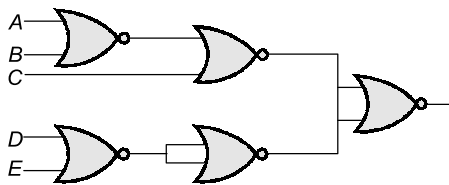
(a) $(\overline{A + B} + C)(\bar{D}\bar{E})$ (b) $(\overline{A + B} + C)(D\bar{E})$

(c) $(A + \overline{B + C})(\bar{D}E)$ (d) $(A + B + \bar{C})(\bar{D}\bar{E})$

Q.3 The circuit shown in the given figure is a

(a) full adder   (b) full subtracter

(c) shift register   (d) decade counter

Q.4 When two numbers are added in excess-3 code and the sum is less than 9, then in order to get the correct answer it is necessary to

(a) subtract 0011 from the sum

(b) add 0011 to the sum

(c) subtract 0110 from the sum

(d) add 0110 to the sum

Q.5 The characteristic equation of an SR flip-flop is given by

(a) $Q_{n+1} = S + RQ_n$ (b) $Q_{n+1} = S\bar{Q}_n + \bar{S}Q_n$

(c) $Q_{n+1} = \bar{S} + RQ_n$ (d) $Q_{n+1} = S + \bar{R}Q_n$

Q.6 A graph with n vertices and $n - 1$ edges that is not a tree, is

(a) Connected   (b) Disconnected

(c) Euler   (d) A circuit

Q.7 If a graph requires k different colours for its proper colouring, then the chromatic number of the graph is

(a) 1   (b) k

(c) $k - 1$ (d) $\dfrac{k}{2}$

Q.8 A read bit can be read

(a) and written by CPU

(b) and written by peripheral

(c) by peripheral and written by CPU

(d) by CPU and written by the peripheral

Q.9 Eigen Vectors of $\begin{bmatrix} 1 & \cos\theta \\ \cos\theta & 1 \end{bmatrix}$

(a) $\begin{bmatrix} a^n & 1 \\ 0 & a^n \end{bmatrix}$ (b) $\begin{bmatrix} a^n & n \\ 0 & a^n \end{bmatrix}$

(c) $\begin{bmatrix} a^n & na^{n-1} \\ 0 & a^n \end{bmatrix}$ (d) $\begin{bmatrix} a^n & na^{n-1} \\ -n & a^n \end{bmatrix}$

Q.10 The term 'aging' refers to

(a) booting up the priority of the process in multi-level of queue without feedback.

(b) gradually increasing the priority of jobs that wait in the system for a long time to remedy infinite blocking

(c) keeping track of the following a page has been in memory for the purpose of LRU replacement

(d) letting job reside in memory for a certain amount of time so that the number of pages required can be estimated accurately.

Q.11 Consider a set of n tasks with known run times r_1, $r_2, \dots r_n$ to be run on a uniprocessor machine. Which of the following processor scheduling algorithms will result in the maximum throughput?

(a) Round Robin

(b) Shortest job first

(c) Highest response ratio next

(d) First come first served

Q.12 Consider a job scheduling problem with 4 jobs J_1, J_2, J_3 and J_4 with corresponding deadlines: $(d_1, d_2, d_3, d_4) = (4, 2, 4, 2)$. Which of the following is not a feasible schedule without violating any job schedule?

(a) J_2, J_4, J_1, J_3 (b) J_4, J_1, J_2, J_3

(c) J_4, J_2, J_1, J_3 (d) J_4, J_2, J_3, J_1

Q.13 By using an eight bit optical encoder the degree of resolution that can be obtained is (approximately)

(a) 1.8°   (b) 3.4°

(c) 2.8°   (d) 1.4°

Q.14 The principal of the locality of reference justifies the use of

(a) virtual memory   (b) interrupts

(c) main memory   (d) cache memory

Q.15 Consider the following pseudo-code

x ; = 1;

i ; = 1;

while ($x <= 1000$) begin

x : = 2^x;

i; = i + 1; end;

What is the value of i at the end of the pseudo-code?

(a) 4   (b) 5

(c) 6   (d) 7

Q.16 The five items: A, B, C, D, and E are pushed in a stack, one after other starting from A. The stack is popped four items and each element is inserted in a queue. The two elements are deleted from the queue and pushed back on the stack. Now one item is popped from the stack. The popped item is

(a) A (b) B

(c) C (d) D

Q.17 Round Robin schedule is essentially the preemptive version of

(a) FIFO

(b) Shortest job first

(c) Shortest remaining time

(d) Longest remaining time

Q.18 The number of digit 1 present in the binary representation of $3 \times 512 + 7 \times 64 + 5 \times 8 + 3$ is

(a) 8   (b) 9

(c) 10   (d) 12

Q.19 Assume that each character code consists of 8 bits. The number of characters that can be transmitted per second through an synchronous serial line at 2400 baud rate, and with two stop bits is

(a) 109   (b) 216

(c) 218   (d) 219

Q.20 If the bandwidth of a signal is 5 kHz and the lowest frequency is 52 kHz, what is the highest frequency

(a) 5 kHz   (b) 10 kHz

(c) 47 kHz   (d) 57 kHZ

Q.21 An Ethernet hub

(a) functions as a repeater

(b) connects to a digital PBX

(c) connects to a token-ring network

(d) functions as a gateway

Q.22 Phase transition for each bit are used in

(a) Amplitude modulation

(b) Carrier modulation

(c) Manchester encoding

(d) NRZ encoding

Q.23 Study the following program

// precondition : $x >= 0$

public void demo (int x)

{   System. out.print (x % 10)

    if ((x / 10) ! = 10)

    {

      demo (x / 10);

    }

    System. out.print (x % 10)

}

Which of the following is printed as a result of the call demo (1234)?

(a) 1441   (b) 3443

(c) 12344321   (d) 43211234

Q.24 Bit stuffing refers to

(a) inserting a 0 in user stream to differentiate it with a flag

(b) Inserting a 0 in flag stream to avoid ambiguity

(c) appending a nipple to the flag sequence

(d) appending a nipple to the use data stream

Q.25 What is the name of the technique in which the operating system of a computer executes several programs concurrently by switching back and forth between them?
(a) Partitioning   (b) Multi-tasking
(c) Windowing   (d) Paging

Q.26 If there are five routers and six networks in intranet using link state routing, how many routing tables are there?
(a) 1   (b) 5
(c) 6   (d) 11

Q.27 Virtual memory is
(a) Part of Main Memory only used for swapping
(b) A technique to allow a program, of size more than the size of main memory, to run
(c) Part of secondary storage used in program execution
(d) None of these

Q.28 The level of aggregation of information required for operational control is
(a) Detailed   (b) Aggregate
(c) Qualitative   (d) None of these

Q.29 The set of all Equivalence Classes of a set A of Cardinality C
(a) is of cardinality 2^c
(b) have the same cardinality as A
(c) forms a partition of A
(d) is of cardinality c^2

Q.30 0.75 decimal system is equivalent to _____ in octal system
(a) 0.60   (b) 0.52
(c) 0.54   (d) 0.50

Q.31 In an SR latch made by cross-coupling two NAND gates, if both S and R inputs are set to 0, then it will result in
(a) $Q = 0$, $Q' = 1$ (b) $Q = 1$, $Q' = 0$
(c) $Q = 1$, $Q' = 1$ (d) Indeterminate states

Q.32 Identify the correct translation into logical notation of the following assertion. Some boys in the class are taller than all the girls

Note: taller (x, y) is true if x is taller then y.

(a) $(\exists x)(\text{boy}(x) \rightarrow (\forall y)(\text{girl}(y) \text{ and taller}(x,y)))$

(b) $(\exists x)(\text{boy}(x) \text{ and } (\forall y)(\text{girl}(y) \text{ and taller}(x,y)))$

(c) $(\exists x)(\text{boy}(x) \rightarrow (\forall y)(\text{girl}(y) \rightarrow \text{taller}(x,y)))$

(d) $(\exists x)(\text{boy}(x) \text{ and } (\forall y)(\text{girl}(y) \rightarrow \text{taller}(x,y)))$

Q.33 Company X shipped 5 computer chips, 1 of which was defective, and company Y shipped 4 computer chips, 2 of which were defective. One computer chip is to be chosen uniformly at a random from the 9 chips shipped by the companies. If the chosen chip is found to be defective, what is the probability that the chip came from the company Y?

(a) $\dfrac{2}{9}$ (b) $\dfrac{4}{9}$

(c) $\dfrac{2}{3}$ (d) $\dfrac{1}{2}$

Q.34 Ring counter is analogous to
(a) Toogle Switch
(b) Latch
(c) Stepping Switch
(d) S-R flip-flop

Q.35 The output 0 and 1 level for TTL logic family is approximately
(a) 0.1 and 5 V   (b) 0.6 and 3.5 V
(c) 0.9 and 1.75 V   (d) −1.75 and 0.9 V

Q.36 Consider a computer system that stores a floating-point numbers with 16-bit mantissa and an 8-bit exponent, each in two's complement. The smallest and largest positive values which can be stored are
(a) 1×10^{-128} and $2^{15} \times 10^{128}$
(b) 1×10^{-256} and $2^{15} \times 10^{255}$
(c) 1×10^{-128} and $2^{15} \times 10^{127}$
(d) 1×10^{-128} and $(2^{15} - 1) \times 10^{127}$

Q.37 In comparison with static RAM memory, the dynamic RAM memory has
(a) lower bit density and higher power consumption
(b) higher bit density and higher power consumption
(c) lower bit density and lower power consumption
(d) higher bit density and lower power consumption

Q.38 The Hexadecimal equivalent of 0 1 1 1 1 1 0 0 1 1 0 1 1 1 1 0 0 0 1 1 is
(a) CD73E   (b) ABD3F
(c) 7CDE3   (d) FA4CD

Q.39 Disk requests are received by a disk drive for cylinder 5, 25, 18, 3, 39, 8 and 35 in that order. A seek takes 5 msec per cylinder moved. How much seek time is needed to serve these requests for a Shortest Seek First (SSF) algorithm? Assume that the arm is at cylinder 20 when the last of these requests is made with none of the requests yet served
(a) 125 msec   (b) 295 msec
(c) 575 msec   (d) 750 msec

Q.40 Consider a system having 'm' resources of the same type. The resources are shared by 3 processes A, B, C, which have peak time demands of 3, 4, 6 respectively. The minimum value of 'm' that ensures that deadlock will never occur is
(a) 11   (b) 12
(c) 13   (d) 14

Q.41 A task in a blocked state
(a) is executable
(b) is running
(c) must still be placed in the run queues
(d) is waiting for some temporarily unavailable resources

Q.42 Semaphores
(a) synchronize critical resources to prevent deadlock
(b) synchronize critical resources to prevent contention
(c) are used to do input / output
(d) are used for memory management

Q.43 On a system using non-preemptive scheduling, processes with expected run times of 5, 18, 9 and 12 are in the ready queue. In what order should they be run to minimize wait time ?
(a) 5, 12, 9, 18   (b) 5, 9, 12, 18
(c) 12, 18, 9, 5   (d) 9, 12, 18, 5

Q.44 The number of page frames that must be allocated to a running process in a virtual memory environment is determined by
(a) the instruction set architecture
(b) page size
(c) number of processes in memory
(d) physical memory size

Q.45 A program consists of two modules executed sequentially. Let $f_1(t)$ and $f_2(t)$ respectively denote the probability density functions of time taken to execute the two modules. The probability density function of the overall time taken to execute the program is given by
(a) $f_1(t) + f_2(t)$ (b) $\int_0^t f_1(x)f_2(x)dx$

(c) $\int_0^t f_1(x)f_2(t-x)dx$ (d) $\max(f_1(t), f_2(t))$

Q.46 Consider a small 2-way set-associative memory, consisting of four blocks. For choosing the block to be replaced, use the least recently (LRU) scheme. The number of cache misses for the following sequence of block addresses is 8, 12, 0, 12, 8
(a) 2   (b) 3
(c) 4   (d) 5

Q.47 Which commands are used to control access over objects in relational database?
(a) CASCADE and MVD
(b) GRANT and REVOKE
(c) QUE and QUIST
(d) None of these

Q.48 Which of the following is aggregate function in SQL?
(a) Avg   (b) Select
(c) Ordered by   (d) distinct

Q.49 One approach to handling fuzzy logic data might be to design a computer using ternary (base -3) logic so that data could be stored as "true", "false", and "unknown." If each ternary logic element is called a flit, how many flits are required to represent at least 256 different values?
(a) 4   (b) 5
(c) 6   (d) 7

Q.50 A view of database that appears to an application program is known as
(a) Schema   (b) Subschema
(c) Virtual table   (d) None of these

Q.51 Armstrong's inference rule does not determine
(a) Reflexivity   (b) Augmentation
(c) Transitivity   (d) Mutual dependency

Q.52 Which operation is used to extract specified columns from a table?
- (a) Project
- (b) Join
- (c) Extract
- (d) Substitute

Q.53 In the Big-Endian system, the computer stores
- (a) MSB of data in the lowest memory address of data unit
- (b) LSB of data in the lowest memory address of data unit
- (c) MSB of data in the highest memory address of data unit
- (d) LSB of data in the highest memory address of data unit

Q.54 BCNF is not used for cases where a relation has
- (a) Two (or more) candidate keys
- (b) Two candidate keys and composite
- (c) The candidate key overlap
- (d) Two mutually exclusive foreign keys

Q.55 Selection sort algorithm design technique is an example of
- (a) Greedy method
- (b) Divide-and-conquer
- (c) Dynamic Programming
- (d) Backtracking

Q.56 Which of the following RAID level provides the highest Data Transfer Rate (Read / Write)
- (a) RAID 1
- (b) RAID 3
- (c) RAID 4
- (d) RAID 5

Q.57 Which of the following programming languages (s) provides garbage collection automatically
- (a) Lisp
- (b) C++
- (c) Fortran
- (d) C

Q.58 The average case and worst case complexities for Merge sort algorithm are
- (a) $O(n^2)$, $O(n^2)$
- (b) $O(n^2)$, $O(n \log_2 n)$
- (c) $O(n \log_2 n)$, $O(n^2)$
- (d) $O(n \log_2 n)$, $O(n \log_2 n)$

Q.59 The time taken by binary search algorithm to search a key in a sorted array of n elements is
- (a) $O(\log_2 n)$
- (b) $O(n)$
- (c) $O(n \log_2 n)$
- (d) $O(n^2)$

Q.60 Which of the following is correct with respect to Two phase commit protocol?

Q.60 (cont.)
- (a) Ensures serializability
- (b) Prevents Deadlock
- (c) Detects Deadlock
- (d) Recover from Deadlock

Q.61 The Fibonacci sequence is the sequence of integers
- (a) 1, 3, 5, 7, 9, 11, 13
- (b) 0, 1, 1, 2, 3, 5, 8, 13, 21, 54
- (c) 0, 1, 3, 4, 7, 11, 18, 29, 47
- (d) 0, 1, 3, 7, 15

Q.62 Let X be the adjacency matrix of a graph G with no self loops. The entries along the principal diagonal of X are
- (a) all zeros
- (b) all ones
- (c) both zeros and ones
- (d) different

Q.63 Which of these is not a feature of WAP 2.0
- (a) Push and Pull Model
- (b) Interface to a storage device
- (c) Multimedia messaging
- (d) Hashing

Q.64 Feedback queues
- (a) are very simple to implement
- (b) dispatch tasks according to execution characteristics
- (c) are used to favour real time tasks
- (d) require manual intervention to implement properly

Q.65 Which of the following is not a UML DIAGRAM?
- (a) Use case
- (b) Class diagram
- (c) Analysis diagram
- (d) Swimlane diagram

Q.66 Silly Window Syndrome is related to
- (a) Error during transmission
- (b) File transfer protocol
- (c) Degrade in TCP performance
- (d) Interface problem

Q.67 To execute all loops at their boundaries and within their operational bounds is an example of
- (a) Black Box Testing
- (b) Alpha Testing
- (c) Recovery Testing
- (d) White Box Testing

Answers ISRO-2007

1.	(c)	**2.**	(a)	**3.**	(b)	**4.**	(a)	**5.**	(d)	**6.**	(b)	**7.**	(b)	**8.**	(d)
9.	(*)	**10.**	(b)	**11.**	(b)	**12.**	(b)	**13.**	(d)	**14.**	(d)	**15.**	(b)	**16.**	(d)
17.	(a)	**18.**	(b)	**19.**	(c)	**20.**	(d)	**21.**	(a)	**22.**	(c)	**23.**	(d)	**24.**	(a)
25.	(b)	**26.**	(b)	**27.**	(b)	**28.**	(a)	**29.**	(c)	**30.**	(a)	**31.**	(d)	**32.**	(d)
33.	(c)	**34.**	(c)	**35.**	(b)	**36.**	(d)	**37.**	(b)	**38.**	(c)	**39.**	(b)	**40.**	(a)
41.	(d)	**42.**	(b)	**43.**	(b)	**44.**	(a)	**45.**	(c)	**46.**	(c)	**47.**	(b)	**48.**	(a)
49.	(c)	**50.**	(b)	**51.**	(d)	**52.**	(a)	**53.**	(a)	**54.**	(b)	**55.**	(a)	**56.**	(a)
57.	(a)	**58.**	(d)	**59.**	(a)	**60.**	(a)	**61.**	(*)	**62.**	(a)	**63.**	(d)	**64.**	(b)
65.	(c)	**66.**	(c)	**67.**	(d)	**68.**	(d)	**69.**	(c)	**70.**	(d)	**71.**	(b)	**72.**	(b)
73.	(c)	**74.**	(d)	**75.**	(b)	**76.**	(d)	**77.**	(b)	**78.**	(c)	**79.**	(d)	**80.**	(c)

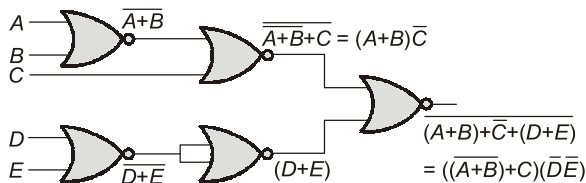*Note: * None of the given option is correct. Question may contain insufficient data.*

Explanations ISRO-2007

1. (c)

$$Y = (A + \bar{B} + \bar{A}B)\bar{C}$$
$$= A\bar{C} + \bar{B}\bar{C} + \bar{A}B\bar{C}$$
$$= \bar{C}(A + \bar{A}B) + \bar{B}\bar{C}\{X + YZ\}$$
$$= (X + Y)(X + Z)\}$$
$$= \bar{C}((A + \bar{A})(A + B)) + \bar{B}\bar{C}$$
$$= \bar{C}(A + B) + \bar{B}\bar{C}$$
$$\{x + \bar{x} = 1, x \cdot 1 = x\}$$
$$= A\bar{C} + B\bar{C} + \bar{B}\bar{C}$$
$$= A\bar{C} + \bar{C}(B + \bar{B})$$
$$= \bar{C}(1 + A) = \bar{C}$$

2. (a)

3. (b)

The circuit shown in the question is of a full subtractor which is constructed by the help of two half subtractors.

4. (a)

When two numbers are added in excess-3 code and the sum is less than 9, then in order to get the correct answer, we need to subtract 0011 i.e., $(3)_{10}$ from the sum.

5. (d)

Characteristic equation of SR flip-flop is,

$$Q_{n+1} = S + \bar{R}Q_n$$

The characteristic table for SR flip-flop is:

Q_n	S	R	Q_{n+1}
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	x
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	x

Drawing the R map:

The characteristic equation will be

$$Q_{n+1} = S + \bar{R}Q_n$$

6. (b)

If the number of vertices are 'n' and there are '$n − 1$' edges and is not a tree. Considering the graph to be a simple graph, it can be said that the graph is disconnected.

7. (b)

Since to properly colour a graph, 'k' different colours are needed. Hence, the chromatic number of the graph is 'k'.

8. (d)

A read bit can be read by CPU and written by the peripheral.

10. (b)

Priority scheduling algorithm suffers from the problem of starvation. There might be the case that some low priority process does not get CPU, because of high priority processes. A solution to this problem is **Aging:** Aging refers to gradually increasing the priority of jobs that wait in the system for a long time to remedy infinite blocking.

11. (b)

Throughput refers to total number of tasks executed per unit time. Shortest job first scheduling algorithm will result in the maximum throughput because all the shortest jobs will be executed first hence many task will be completed.

12. (b)

Since the deadline of Jobs 'J_2' and 'J_4' is less as compared to the other two jobs, hence these two jobs must be executed first. So, completing J_1 after J_4 is will not be a feasible schedule of the four jobs.

13. (d)

By using an 8-bit optical encoder, the degree of resolution that can be obtained is

$$\frac{360}{2^8} = 1.4 \text{ degree}$$

14. (d)

Locality of reference is a term which is used where the related storage locations are frequently accessed. A cache is used in which the content of the memory locations that are related to the memory location currently accessed in moved to the cache will the possibility that it will be accessed.

15. (b)

On execution of the program, initially 'i' = 1, 'x' = 1; while condition is true, so now $x = 2$, $i = 2$, again condition satisfies, so now, $x = 4$, $i = 3$, again condition is satisfied, $x = 16$, $i = 4$; condition is satisfied so $x = 2^{16}$, $i = 5$. This time the condition will be false. So, the value of i will be 5 at the end.

16. (d)

Four items are pushed into stack A, B, C, D, E where Top is pointing E. Now 4 elements are deleted and enqueue into queue. So queue contain E, D, C, B where Rear is pointing B and Front pointing E.

Now two elements are deleted from the queue i.e. E and D respectively and pushed back on the stack i.e., e, d where stack Top pointing D now delete one element from stack gives D.

17. (a)

In round robin scheduling algorithm, the processes run for a fixed time quantum in the same schedule in which they have arrived and are then preempted after the time quantum expires. Later, they are inserted in the job queue and again get CPU for the fixed time quantum is required.

So, it can be said that it's the preemptive version of FIFO.

18. (b)

$3 \times 512 + 7 \times 64 + 5 \times 8 + 3$

$\Rightarrow (2 + 1)2^9 + (2^2 + 2 + 1)2^6 + (2^2 + 1) \, 2^3 + (2 + 1)$

$\Rightarrow 2^{10} + 2^9 + 2^8 + 2^7 + 2^6 + 2^5 + 2^3 + 2^1 + 2^0$

$\Rightarrow 11111101011$

Therefore, total number of 1's are 9.

19. (c)

Baud rate = 2400

Total number of bits = 8 + 1 start bit + 2 stop bits

         = 11 bits

Number of characters transmitted / sec

$$= \frac{2400}{11} = 218.18 \approx 218$$

Hence, 218 characters can be transmitted per second.

20. (d)

Bandwidth = 5 kHz
Lowest frequency = 52 kHz
Bandwidth = Highest frequency – Lowest frequency
$\Rightarrow \qquad 5 = x - 52$
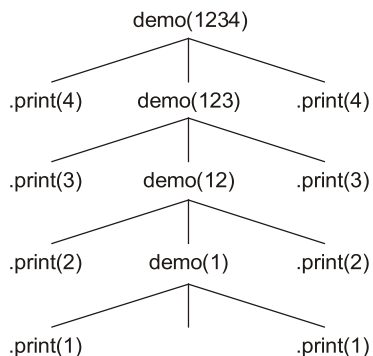$\Rightarrow \qquad x = 57$ kHz
The highest frequency will be 57 kHz.

21. (a)

An ethernet hub functions as a repeater. In telecommunications, a repeater is an electronic device that receives a signal and retransmits it at a higher level or a higher power.

22. (c)

Manchester encoding (also known as phase encoding) is a line code in which the encoding of each data bit is either low then high, or high then low. A logic '0' is indicated by a '0' to '1' transition at the center of the bit and the logic '1' is indicated by a '1' to '0' transmission at the center of the bit.

23. (d)

demo(1234)

.print(4) demo(123) .print(4)

.print(3) demo(12) .print(3)

.print(2) demo(1) .print(2)

.print(1) .print(1)

The result will be 43211234.

24. (a)

Bit stuffing refers to inserting 0 in user stream to differentiate it with a flag.
i.e., flag = 1111111
user stream = 1111111011110
So bit stuffing is 1111110011110

25. (b)

In computers, multitasking is a concept of performing multiple tasks over a certain period of time by executing them concurrently. Now tasks start and interrupt already started ones before they have reached completion, instead of executing the task sequentially, so each started task needs to reach its end before a new one is started.

26. (b)

Since there are 5 routers, hence there will be 5 routing tables. Since every router has its own routing table.

27. (b)

Virtual memory is a memory management technique that is implemented using both hardware and software. It maps memory addresses used by a program, called virtual addresses, into physical addresses in computer memory. Main storage as seen by a process or task appears as a contiguous address space or collection of contiguous segments.

28. (a)

The level of aggregation of information required for operational control is detailed.

29. (c)

The set of all equivalence class of a set A of cardinality C forms a partition of A.

30. (a)

$0.75 \times 8 = 0 \qquad$ [carry 6]
$(0.75)_{10} = (0.60)_8$

31. (d)

In a SR latch, made by cross coupling two NAND gates, if both S and R inputs are set to 0, logic state is said to be in an indeterminate state or racing state. Race condition occurs and output becomes unstable.

32. (d)

Considering each option:
• There exist some x, such that if x is a boy then for every 'x' y is a girl and taller than y.
• There exist an 'x' such that 'x' is a boy and every 'y' is a girl and x is taller than 'y'.
• There exist an 'x' such that if 'x' is a boy then for every x, if 'y' is a girl then x is taller than y.
• Some boys in the class are taller than all the girls.

33. (c)

Probability of chip shipped by $X = \dfrac{5}{9}$.

Probability of chip shipped by $Y = \dfrac{4}{9}$.

Probability of defect chip from $X = \dfrac{1}{5}$.

Probability of defect chip from $Y = \dfrac{2}{4}$.

Probability of defected chip from

$$Y = \dfrac{\dfrac{4}{9} \times \dfrac{2}{4}}{\left(\dfrac{4}{9} \times \dfrac{2}{4}\right) + \left(\dfrac{5}{9} \times \dfrac{1}{5}\right)} = \dfrac{2}{3}$$

34. (c)

Ring counter is analogous to stepping switch. A stepping switch is an electromechanical device which allows an input connection to be connected to one of a number of possible output connections, under the control of a series of electrical pulses.

35. (b)

The acceptable input signal voltage ranges from 0 volts to 0.8 volts for a low logic state, and 2 volts to 5 volts for a high logic state.

36. (d)

The smallest and largest possible values that can be stored are 1×10^{-128} and $(2^{15} - 1) \times 10^{127}$.

37. (b)

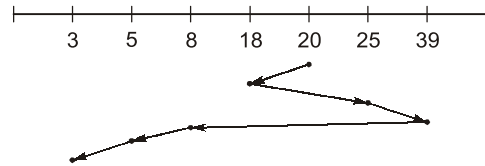Static RAM has lower density because there are 6 transistors while DRAM has one transistor and capacitor. Therefore density (SRAM) < Density of (DRAM). A DRAM has capacitor, therefore power consumption (DRAM) > (SRAM).

So, dynamic RAM memory has higher bit density and higher power consumption.

38. (c)

$$\underset{7}{0111}\,\underset{C}{1100}\,\underset{D}{1101}\,\underset{E}{1110}\,\underset{3}{0011}$$

$$= (7CDE3)_{16}$$

39. (b)

Total number of seeks = (20 − 18) + (25 − 18) + (39 − 25) + (39 − 8) + (8 − 5) + (5 − 3) = 59
Each take 5 ms per cylinder.
Total time = 59 × 5 = 295 ms

40. (a)

Minimum value of 'm' can be obtained by taking (peak demands) −1 from each process and adding 1 to it.

$$= (3 - 1) + (4 - 1) + (6 - 1) + 1$$
$$= 11$$

41. (d)

A task in a blocked state is waiting for some temporarily unavailable resources. A process that is blocked is one that is waiting for some event, such as a resource becoming available or the completion of an input / output operation.

42. (b)

Semaphores are used for synchronization. Semaphores ensure that only one process is in its critical section at a time. They synchronize critical resources to prevent contention.

43. (b)

In order to reduce wait time, shorted job first is the scheduling policy that can be used. So, the execution manner of the processes should be 5, 9, 12 and 18.

44. (a)

The number of page frames that must be allocated to a running process in a virtual memory environment is determined by instruction set architectures. The frames will be allocated as per the instruction sets that are allowed.

45. (c)

Since the two modules execute sequentially. The total runtime of the program is the sum of runtime of the two module.

Probability density function of overall time taken

$$= \int_{0}^{t} f_1(x) f_2(t-x) dx$$

46. (c)

Sequence of block addresses:

8, 12, 0, 12, 8

8̶ 0	Set 0
1̶2̶ 8	
	Set 1

Total number of cache misses are 4.

47. (b)

GRANT, REVOKE and DENY are the three commands that are used to control access over objects in relational database. Data control language is a part of SQL that allows database administrators to configure security access to relational database.

48. (a)

'Avg' is an aggregate function is SQL. It take the average of the input set provided to the query.

49. (c)

Logic used : Ternary

Number of values to be represented = 256

If take flit = 5, 3^5 = 243, which is insufficient to hold 256. So, answer will be, since 3^6 = 729, which is sufficient to hold 256 values.

50. (b)

The external level is the user's view of the database end is closest to the users. A subschema expresses the external view.

51. (d)

Armstrong's inference rule satisfies:
(*i*) Reflexivity, $Y \subseteq X$ then $X \rightarrow Y$
(*ii*) Augmentation if $X \rightarrow Y$ then $XT \rightarrow YT$
(*iii*) Transitivity, if $X \rightarrow Y$, $Y \rightarrow Z$ then $X \rightarrow Z$

52. (a)

To extract a specified column from a table projection operation is used. To extract a specified row in a table, selection operation is used.

53. (a)

Two system are used for mapping (*i*) Big endian system (*ii*) Little endian system. In big endian system, MSB of the data is in lowest memory address of data unit and LSB of the data is in higher memory address of data unit.

54. (b)

BCNF is not used for cases where a relation has two candidate keys and composite.

55. (a)

Selective sort algorithm design technique is an example of greedy method.

56. (a)

RAID level 1 provides the highest data transfer rate (read/write). RAID levels 2, 3 and 4 are theoretically defined but not used in practice.

57. (a)

LISP provide garbage collection automatically, whereas Fortan, C++ and C don't provide automatic garbage collection.

58. (d)

Merge sort algorithm has complexity of $O(n \log_2 n)$ in both average case as well as worst case.

59. (a)

Binary search reduce its search space to half in each of its iteration. So, the time taken by binary search algorithm to search a key in a sorted array of *n*-elements is $O(\log_2 n)$.

60. (a)

Two phase commit protocol ensures serializability. It does not prevent deadlock. Neither it detects deadlock nor it recover from deadlock.

61. (*)

None of the options is correct. In Fibonacci series previous two addition give the next term value. Hence none of the options satisfy the property.

62. (a)

Since the graph *G* has no self loops, hence there is no edge from a vertex to itself. Hence, the corresponding entry will be 0.

So, the entries along the principal diagonal of X are all zeros.

63. **(d)**

WAP 2.0 is a push and pull model. It provides interface to a storage device. Also, it provides multimedia messaging.

Hashing is not a feature of WAP 2.0.

64. **(b)**

Feedback queries dispatch task according to execution characteristics. These queries separate processes into categories based on their need for the processor. It allows a process to move between queries.

65. **(c)**

An analysis diagram is a simplified activity diagram, which is used to capture high level business processes and early models of system behaviour and elements. It is not a UML diagram.

66. **(c)**

Silly Window Syndrome is a problem in computer networking caused by poorly implemented TCP flow control. The problem that can arise in the silly window operation when the sending application program creates data slowly, the receiving application program consumes data slowly, or both. If a server with this problem is unable to process all incoming data, it requests that its clients reduce the amount of data they send at a time as a result the window becomes smaller.

67. **(d)**

Black box testing checks incorrect functions, interface errors, performance errors etc. Alpha testing is a kind of system testing that is performed at developer's end. Recovery testing forces the system to fail and then verifies that the recovery is properly performed.

68. **(d)**

Secure socket layer is the standard security technology for establishing an encrypted link between a web server and a browser. This link ensures that all data is passed between the web server and browsers remain private and integral.

It is not responsible for error detection and correction.

69. **(c)**

A rule in a limited entry decision table is a column of the table consisting of the condition entries and the corresponding action entries. A decision table is a tool to use in both testing and requirements management. Essentially, it is a structured exercise to formulate requirements when dealing with complex business rules.

70. **(d)**

In cryptography, X.509 is an important standard for a public key infrastructure (PKI) to manage digital certificates and public-key encryption and a key part of the important layer security protocol used to secure web and E-mail communication.

71. **(b)**

A hashed message is signed by a sender using his private key and is verified by the verifier using the sender's public key.

72. **(b)**

It defines the parallel subtype of the multipart context type. It is syntactically identical to multipart / mixed type but not semantically. In a parallel entity, all of the parts are intended to be presented in parallel i.e., simultaneously on hardware and software that are capable of doing it.

73. **(c)**

Range of IP address from 224.0.0.0 to 239.255.255.255 are used for multicast packets.

74. **(d)**

IEEE-802.11 is a standard for wireless LANs.

75. **(b)**

IP addresses are used for the routing purposes. With the help of IP address, routers decide to which interface the packet should be forwarded.

76. **(d)**

SPICE, standard CMI assessment method for process improvement and ISO 90001:2000 are approaches to software process assessment but not IEEE 2000 : 2001.