CET(PG)-2015

Sr. No. : **241039**

Question Booklet Series : A

Roll No. *In Figures*

In Words

O.M.R. Answer Sheet Serial No.

Signature of the Candidate : _____

Subject : M.E. (Computer Science and Engineering/Information Technology)

Time : 90 minutes **Number of Questions : 75** **Maximum Marks : 75**

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

SEAL

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen.**
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen.**
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the mark of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation.** Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

1. The 32bit value 30A79847 H is stored to location 1000 H. What is the value of the byte stored in address 1002 H be if the system is little endian ?

   (A) 98

   (B) A7

   (C) 30

   (D) 79

2. The SQL statement given below prints

   SELECT SUBSTR ('12345678', INSTR('abcabcabc', 'b'), 4) FROM DUAL :

   (A) 6789

   (B) 2345

   (C) 1234

   (D) 456789

3. How many 5-digit numbers that are divisible by 4 can be formed using the digits 0 to 6, if no digit is to occur more than once in each number ?

   (A) 612

   (B) 624

   (C) 780

   (D) 684

4. If $X(n,p)$ follows a binomial distribution with n=6 such that $9P[X=4] = P[X=2]$, then p =

   (A) 1/3

   (B) 1/2

   (C) 1

   (D) 1/4

5. The differential equation of all rectangular hyperbolas with asymptotes as coordinate axes is :

   (A) $xy' + xy = 0$

   (B) $1 + y' = 0$

   (C) $y + xy' = 0$

   (D) $x + yy' = 0$

6. The solution of the equation $x\, dy + y\, dx = x\, dx$ is

   (A) $x^2y = x/2 + c$

   (B) $2x = x^2y + c$

   (C) $xy = x^2/2 + c$

   (D) $xy = x^3/3 + c$

7. Both the real and imaginary parts of an analytic function are :

   (A) Harmonic

   (B) Non-harmonic

   (C) Periodic

   (D) Non-periodic

8. If A and B are two sets such that n(A) = 3 and n(B) = 5, then the number of mappings from A to B are :

   (A) 5^3

   (B) 3^5

   (C) 2^5

   (D) 3×5

9. Which of the following is best case for implementing the Booth's algorithm for a multiplier ?

   (A) 01110110

   (B) 01010101

   (C) 01111100

   (D) 00000111

10. Let R = {(a,a)} be a relation on a set A. Then R is :

    (A) Symmetric but not antisymmetric

    (B) Symmetric and antisymmetric

    (C) Anti symmetric but not symmetric

    (D) Neither symmetric nor antisymmetric

11. If $f(x) = 3x^3 + 5 \sin x + \sin 5x$, then $f(x)$ is :
   (A) Even
   (B) Odd
   (C) Neither even nor odd
   (D) Even and odd

12. If the simple graph G has m vertices and n edges. How many edges does have $\overline{G}$?
   (A) m(m+1)/2-n
   (B) m(m-1)/2-n
   (C) m(m-1)/2+n
   (D) n(n-1)/2-m

13. The sum of degree of all vertices of a $K_{3,2}$ graph is :
   (A) 3
   (B) 6
   (C) 12
   (D) 17

14. The floating point representation of –0.125 by using ANSI 32 bit floating point format using 8-bit exponent and 24 bit mantissa is :
   (A) 11111110 10000000 00000000 00000000
   (B) 10000010 10000000 00000000 00000000
   (C) 10000010 11111110 00000000 00000000
   (D) 00000010 10000000 00000000 00000000

15. A 4:1 multiplexer is used to implement the sum S of 1-bit full adder with inputs A,B and carry input C. Which of the following combinations of inputs, realize it for selection inputs A,B ?
   (A) $D_0, D_1, D_2, D_3 = C$
   (B) $D_0, D_1 = C, D_2, D_3 = C'$
   (C) $D_0, D_1 = C', D_2, D_3 = C^+$
   (D) $D_0, D_3 = C \; D_1, D_2 = C'$

16. The bit sequence 0010 is serially entered into a 4-bit parallel out shift register that is initially clear. What are the Q outputs after two clock pulses ?
   (A) 0 0 1 0
   (B) 0 0 0 0
   (C) 1 1 1 1
   (D) 1 0 0 0

17. Consider a logical address space of four pages of 2048 words each mapped into a physical memory of 32 frames. How many bits in the logical address ?
   (A) 12 bits
   (B) 14 bits
   (C) 13 bits
   (D) 11 bits

18. A short term scheduler executes at least once every 20 ms. If it takes 2 ms to decide to execute a process for 2 ms. What is the percentage of CPU time wasted ?
   (A) 8%
   (B) 9%
   (C) 10%
   (D) 11%

19. A system uses FIFO page replacement algorithm. It has 3 page frames with no pages loaded. First 50 pages are accessed in some order and the same pages are accessed in the reverse order. What is the number of page faults ?
   (A) 98
   (B) 96
   (C) 97
   (D) 95

20. Consider a program to be run on a computer in Round-Robin scheduling algorithm. The program size is 200K. Hard disk transfer rate is 2Mbps. Average latency is 5 ms. Assuming no head seek, what would be the acceptable time quantum for effective CPU utilization ?

    (A) 0.204 ms

    (B) 0.218 ms

    (C) 0.348 ms

    (D) 2.86 ms

21. M : 1 multi-threading model is used in which of the following operating systems :

    (A) Windows NT

    (B) Windows 95

    (C) UNIX

    (D) Ra

22. A m × n matrix is stored in column major form. The expression which accesses the (i j)th entry of the same matrix is :

    (A) $n \times (j-1)+i$

    (B) $m \times (j-1)+i$

    (C) $n \times (m-1)+ij$

    (D) $m \times (n-1)+j$

23. The time taken to search an element in a linked list of length n is :

    (A) $O(\log_2 n)$

    (B) $O(n^2)$

    (C) $O(1)$

    (D) $O(n)$

24. A binary search tree contains the values 3, 6, 10, 22, 25, 30, 60, 75. The tree is traversed in pre order and the values are printed out. Which of the following is a valid output ?

    (A) 25 6 3 10 22 60 30 75

    (B) 25 6 10 3 22 75 30 60

    (C) 25 6 75 60 30 3 10 22

    (D) 75 30 60 22 10 3 6 25

25. An undirected graph G with n vertices and e edges is represented by adjacency list. What is the time required to generate all the connected components ?

    (A) $O(n)$

    (B) $O(e)$

    (C) $O(e+n)$

    (D) $O(e^2)$

26. What are the states of the Auxiliary Carry (AC) and Carry flag (CY) after executing the following 8085 program ?

MVI H, 5DH.

MVI L, 6BH.

MOV A, H.

ADD L.

    (A) AC = 0 and CY = 0

    (B) AC = 1 and CY = 1

    (C) AC = 1 and CY = 0

    (D) AC = 0 and CY = 1

27. A computer uses a memory with 256 K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has 4 parts: an indirect bit, an operation code, a register code part to specify 64 registers and address part. How many bits are there in Opcode, register code and address part ?

    (A) 5, 8, 8

    (B) 7, 6, 16

    (C) 7, 6, 18

    (D) 8, 7, 16

28. If the starting address of 4K memory is 3000H, what would be the last address ?

(A) 4FFFH
(B) 4000H
(C) 33FFH
(D) 3FFFH

29. The maximum bit rate for a FSK signal is _____ . If the bandwidth of the medium is 12000 Hz and difference between two carriers must be at least 2000 Hz and transmission in full duplex.

(A) 6000 bps
(B) 4000 bps
(C) 10000 bps
(D) 8000 bps

30. Imagine a signal travels through a transmission medium and its power is reduced to half. The attenuation is :

(A) −10 db
(B) −5 db
(C) −3 db
(D) −2 db

31. The message 11001001 is to be transmitted using CRC polynomial x^3+1 to protect it from errors. The message that would be transmitted is :

(A) 11001010
(B) 11001001000
(C) 11001001011
(D) 110010010011

32. Suppose an array A having n-elements is to be sorted using selection sort algorithm. What is number of swaps required in worst case scenario ?

(A) $\Theta(n^2.\log n)$
(B) $\Theta(n.\log n)$
(C) $\Theta(n^2)$
(D) $\Theta(n)$

33. A program P reads and processes 500 consecutive records from a sequential file F stored on device D without using any file system facility. Given the following :

(i) Size of each record = 4800 bytes
(ii) Access time of D = 15 msec
(iii) Data transfer rate of D = $800*10^3$ bytes/sec
(iv) CPU time to process each record = 2 msec

What is the elapsed time of P if F contains unblocked records and P does not use buffering ?

(A) 11.5 sec
(B) 23 sec
(C) 21 sec
(D) 10.5 sec

34. Which of the following sorting methods would be most suitable for sorting a list which is almost sorted :

(A) Bubble Sort
(B) Insertion Sort
(C) Selection Sort
(D) Quick Sort

35. The XS-3 code is a :

(A) Cyclic code
(B) Weighted Code
(C) Self Complementing Code
(D) Error-Correcting Code

36. The number of 16 : 1 multiplexers required for designing a 4-output 4-variable combinational circuit is :

    (A) 16   (B) 8

    (C) 4   (D) 1

37. A symmetrical square wave of time period 100 μs can be obtained from a square wave of time period 10 μs by using a :

    (A) Divide-by-5 circuit

    (B) BCD counter

    (C) Divide-by-5 circuit followed by a divide-by-2 circuit

    (D) 4-bit binary counter

38. What is regular expression corresponding to the language of strings of even lengths over the alphabet of {a, b} ?

    (A) (aa+bb+ba+ab)*   (B) (aa+bb)*

    (C) (ab+bb+ba)*   (D) a*b*a*b

39. Context free languages are closed under :

    (A) Union   (B) Intersection

    (C) Complementation   (D) Set Difference

40. A language L is accepted by a finite automation if and only if it is :

    (A) Context Free   (B) Context Sensitive

    (C) Recursive   (D) Expressible by a right linear grammar

41. Suppose L_1 = {10,1} and L_2 = {011,11}. How many distinct elements are there in L= $L_1 L_2$?

    (A) 4   (B) 3

    (C) 2   (D) 1

42. Which of the following is undecidable ?

    (A) Equivalence of regular languages   (B) Equivalence of context free languages

    (C) Finiteness check on context free language   (D) Emptiness of regular languages

43. The number of directed arcs terminating on any state of a state diagram is :

    (A) 2^n where n is the number of inputs   (B) Independent of the number of inputs

    (C) An arbitrary number   (D) 2^n, n is number of flip flops

44. An ASM chart of the Mealy model :

    (A) Contains conditional output box

    (B) Does not contain conditional output box

    (C) Is represented by writing output state variable inside the state box

    (D) Contains only state and decision boxes

45. A certain 4 bit DAC uses binary weighted resistors. If the MSB resistor is 100 KΩ, the LSB resistor will be :

    (A) 400 KΩ   (B) 25 KΩ

    (C) 800 KΩ   (D) 12.5 KΩ

46. How many switch points are there in a crossbar switch network that connects 'p' processors to 'm' memory modules ?

(A) $\dfrac{p}{m}$

(B) p^m

(C) pm

(D) p log$_2$ m

47. A hash table can store a maximum of 10 records. At present there are records in locations 1, 3, 4, 7, 8, 9, 10. The probability of a new record going into location 2 with hash function resolving collisions by liner probing is :

(A) 0.1

(B) 0.2

(C) 0.5

(D) 0.6

48. Suppose a system contains n processes and system uses the round robin algorithm for CPU scheduling then which data structure is best suited ready queue of the processes ?

(A) Stack

(B) Queue

(C) Circular Queue

(D) Tree

49. Suppose we have a system in which processes is in hold and wait condition then which of the following approach prevent the deadlock ?

(A) Request all resources initially

(B) Spool everything

(C) Take resources away

(D) Order resources numerically

50. In pages memory, the page hit ratio is unity. The time required to access a page in primary memory is 20 ns, then the average time required to access page is :

(A) 14 ns

(B) 20 ns

(C) 6 ns

(D) 10 ns

51. Dijkstra's banking algorithm in an operating system solves the problem of :

(A) Deadlock Avoidance

(B) Deadlock Recovery

(C) Mutual Exclusion

(D) Context Switching

52. A 2 level memory has average access time 30 ns with cache and memory access time as 20 ns and 150 ns respectively. What is the hit ratio ?

(A) 80%

(B) 93%

(C) 70%

(D) 99%

53. A declaration for a pointer to an array of 8 floats is :

(A) float a[8];

(B) float *a [8];

(C) float (*a) [8];

(D) float *(*a) [8];

54. Average successful search time for sequential search of 'm' items is :

(A) $\dfrac{m}{2}$

(B) $\dfrac{m-1}{2}$

(C) $\dfrac{m+1}{2}$

(D) $\dfrac{m(m-1)}{2}$

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55. If it takes 5 ns to read an instruction from memory, 2 ns to decode the instruction, 3 ns to read register file, 4 ns to perform the computation required by instruction, and 2 ns to write the results into register file, what is the max clock rate of the processor ?

    (A) 16 MHz

    (B) 16 GHz

    (C) 62.5 MHz

    (D) 62.5 GHz

56. Suppose it takes 2.5 ns to access the long array of a set associative cache, 4 ns to access the data array, 1 ns to perform the hit/miss comparison and 1 ns to return the selected data to processor in case of hit. What is the cache hit latency of system? Is the data array access the critical path in a cache hit ?

    (A) 5 ns, Yes

    (B) 6.5 ns, Yes

    (C) 15 ns, Yes

    (D) 12 ns, No

57. A DMA controller transfers 16-bit words to memory using cycle stealing. The words are assembled from a device that transmits characters at a rate of 2400 characters per second. The CPU is fetching and executing instructions at an average rate of 1 million instructions per second. By how much will the CPU be slowed down because of DMA transfer?

    (A) 18%

    (B) 12.5%

    (C) 0.12%

    (D) 3.4%

58. Consider a join of a relation A with relation B. If A has i tuples and B has j tuples then minimum and maximum sizes of join respectively are :

    (A) 0 and i+j

    (B) |(i-j| and i+j

    (C) 0 and i.j

    (D) I+j and i.j

59. Consider three processes (process id: 1, 2, 3) with CPU burst times of 2, 4 and 8 secs. All processes arrive at time 0. Consider the longest remaining time scheduling algorithm. In this algorithm ties are broken by giving priority to the process with lowest process id. The average turn-around time is :

    (A) 10 sec

    (B) 12 sec

    (C) 14 sec

    (D) 15 sec

60. If A and B are sets then the operation A ∩ B is equivalent to :

    (A) A–(A–B)

    (B) A+(A+B)

    (C) A+(A–B)

    (D) A–(A+B)

61. Pipelining improves CPU performance due to :

    (A) Reduced memory access time

    (B) Increased clock speed

    (C) The introduction of parallelism

    (D) Additional functional units

62. Which of the following connectivity devices typically work at the physical layer of the OSI model ?

(A) Routers   (B) Bridges

(C) Repeaters   (D) Gateways

63. A constructor is called whenever :

(A) An object is declared   (B) An object is used

(C) A class is declared   (D) A class is used

64. Symmetric encryption algorithm is same as :

(A) Secret key encryption algorithm   (B) Public key encryption algorithm

(C) RSA algorithm   (D) SHA algorithm

65. A typical error occurrence percentage in design phase is :

(A) 30%   (B) 50%

(C) 70%   (D) 20%

66. A byte addressable computer has a memory capacity of 2^m kbytes and can perform 2^n operations. An instruction involving 3 operands and one operator needs a maximum of :

(A) 3 m bits   (B) 3m+n bits

(C) m+n bits   (D) 3m+n+30 bits

67. What is the maximum size of the data the application layer can pass on to the TCP layers below ?

(A) 1500 bytes   (B) 2^{16} bytes-size of TCP header

(C) 2^{16} bytes   (D) Any size

68. The Hamming distance between 001111 and 010011 is :

(A) 1   (B) 2

(C) 3   (D) 4

69. Consider a function given below :

Test(int x, int y)

{return((x < y)? 0: (x–y));}

Let a, b be two non-negative integers. The call Test(a, Test(a,b)) can be used to find the :

(A) Maximum of a, b   (B) Positive difference of a, b

(C) Sum of a, b   (D) Minimum of a, b

70. Packets of the same session may be routed through different paths in :

(A) TCP, but not UDP   (B) TCP and UDP

(C) UDP, but not TCP   (D) Neither TCP nor UDP

71. Which of the following relational algebraic operation is not part of the five basic set operations in relational algebra ?

(A) Union   (B) Division

(C) Cartesian product   (D) Set Difference

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72. There are 4 different algorithms Al, A2, A3, A4 to solve a given problem with the order log(n), log(log(n)), n log(n), n/log(n) respectively. Which is the best algorithm ?

(A) A1

(B) A2

(C) A3

(D) A4

73. Which of the following is not possible algorithmically ?

(A) Regular grammar to context free grammar

(B) Non-deterministic FSA to deterministic FSA

(C) Non-deterministic PDA to deterministic PDA

(D) Non-deterministic turing machine to deterministic turing machine

74. Consider the relation R (A,B,C,D,E,F,G) satisfies the following functional dependencies :

$A \rightarrow B$, $BC \rightarrow DE$, $AEF \rightarrow G$

Which of the following statement is true ?

(A) $BC \rightarrow DG$

(B) $ACF \rightarrow DG$

(C) $A \rightarrow DG$

(D) $B \rightarrow DG$

75. A given relation is known to be in third normal form. Select the statement which can be inferred from this :

(A) All attributes contribute to the primary key

(B) Each non-key attribute determines the primary key

(C) Each non-key attribute is determined by the primary key

(D) Every determinant is a candidate key