

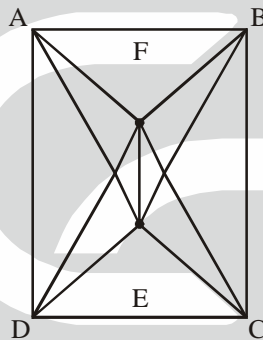
PAPER : DEC. 2014

UGC-NET COMPUTER SCIENCE & APPLICATIONS (87)

PAPER-II

Note: This paper contains **fifty (50)** objective type questions of **two (2)** marks each. All questions are compulsory.

1. Consider a set $A = \{1, 2, 3, \dots, 1000\}$. How many members of A shall be divisible by 3 or by 5 or by both 3 and 5 ?
(a) 533 (b) 599 (c) 467 (d) 66
2. A certain tree has two vertices of degree 4, one vertex of degree 3 and one vertex of degree 2. If the other vertices have degree 1, how many vertices are there in the graph ?
(a) 5 (b) $n - 3$ (c) 20 (d) 11
3. Consider the graph shown below :



This graph is a _____

- (a) Complete Graph (b) Bipartite Graph
(c) Hamiltonian Graph (d) All of the above
4. A computer program selects an integer in the set $\{k : 1 \leq k \leq 10,00,000\}$ at random and prints out the results. This process is repeated 1 million times. What is the probability that the value $k = 1$ appears in the printout atleast once ?
(a) 0.5 (b) 0.704 (c) 0.632121 (d) 0.68
5. If we define the functions f , g and h that map R into R by :
 $f(x) = x^4$, $g(x) = \sqrt{x^2 + 1}$, $h(x) = x^2 + 72$, then the value of the composite functions $h \circ (g \circ f)$ and $(h \circ g) \circ f$ of are given as
(a) $x^8 - 71$ and $x^8 - 71$ (b) $x^8 - 73$ and $x^8 - 73$
(c) $x^8 + 71$ and $x^8 + 71$ (d) $x^8 + 73$ and $x^8 + 73$
6. The BCD adder to add two decimal digits needs minimum of
(a) 6 full adders and 2 half adders (b) 5 full adders and 3 half adders
(c) 4 full adders and 3 half adders (d) 5 full adders and 2 half adders
7. The Excess-3 decimal code is a self-complementing code because
(a) The binary sum of a code and its 9's complement is equal to 9.
(b) It is a weighted code.
(c) Complement can be generated by inverting each bit pattern.
(d) The binary sum of a code and its 10's complement is equal to 9.

8. How many PUSH and POP operations will be needed to evaluate the following expression by reverse polish notation in a stack machine $(A * B) + (C * D/E)$?
(a) 4 PUSH and 3 POP instructions (b) 5 PUSH and 4 POP instructions
(c) 6 PUSH and 2 POP instructions (d) 5 PUSH and 3 POP instructions
9. The range of representable normalized numbers in the floating point binary fractional representation in a 32-bit word with 1-bit sign, 8-bit excess 128 biased exponent and 23-bit mantissa is
(a) 2^{-128} to $(1 - 2^{-23}) \times 2^{127}$ (b) $(1 - 2^{-23}) \times 2^{-127}$ to 2^{128}
(c) $(1 - 2^{-23}) \times 2^{-127}$ to 2^{23} (d) 2^{-129} to $(1 - 2^{-23}) \times 2^{127}$
10. The size of the ROM required to build an 8-bit adder/subtractor with mode control, carry input, carry output and two's complement overflow output is given as
(a) $2^{16} \times 8$ (b) $2^{18} \times 10$ (c) $2^{16} \times 10$ (d) $2^{18} \times 8$
11. What will be the output of the following 'C' code ?
main ()
{ int x = 128;
 printf("\n%d", 1 + x ++);
}
- (a) 128 (b) 129 (c) 130 (d) 131
12. What does the following expression mean ?
`char *(*(* a[N]) ()) () ;`
(a) A pointer to a function returning array of N pointers to function returning character pointers.
(b) A function return array of N pointers to functions returning pointers to characters.
(c) An array of N pointers to function returning pointers to characters.
(d) An array of N pointers to function returning pointers to functions returning pointers to characters.
13. Which of the following is not a member of class ?
(a) Static function (b) Friend function (c) Const function (d) Virtual function
14. When an array is passed as parameter to a function, which of the following statements is correct ?
(a) The function can change value in the original array.
(b) In C, parameters are passed by value, the function cannot change the original value in the array.
(c) It results in compilation error when the function tries to access the elements in the array.
(d) Results in a run time error when the function tries to access the elements in the array.
15. Which of the following differentiates between overloaded functions and overridden functions ?
(a) Overloading is a dynamic or runtime binding and overridden is a static or compile time binding.
(b) Overloading is a static or compile time binding and overriding is dynamic or runtime binding.
(c) Redefining a function in a friend class is called overloading, while redefining a function in a derived class is called as overridden function.
(d) Redefining a function in a derived class is called function overloading, while redefining a function in a friend class is called function overriding.
16. Division operation is ideally suited to handle queries of the type :
(a) Customers who have no account in any of the branches in Delhi.
(b) Customers who have an account at all branches in Delhi.
(c) Customers who have an account in atleast one branch in Delhi.
(d) Customers who have only joint account in any one branch in Delhi.
17. Which of the following is true ?
I. Implementation of self-join is possible in SQL with table alias.
II. Outer-join operation is basic operation in relational algebra.
III. Natural join and outer operations are equivalent.
(a) I and II are correct (b) II and III are correct
(c) Only III is correct (d) Only I is correct



18. What kind of mechanism is to be taken into account for converting a weak entity set into strong entity set in entity-relationship diagram ?
 (a) Generalization (b) Aggregation (c) Specialization (d) Adding suitable attributes
19. The best normal form of relation scheme $R(A, B, C, D)$ along with the set of functional dependencies $F = \{AB \rightarrow C, AB \rightarrow D, C \rightarrow A, D \rightarrow B\}$ is
 (a) Boyce-Codd Normal form (b) Third Normal form
 (c) Second Normal form (d) First Normal form
20. Identify the minimal key for relational scheme $R(A, B, C, D, E)$ with functional dependencies $F = \{A \rightarrow B, B \rightarrow C, AC \rightarrow D\}$
 (a) A (b) AE (c) BE (d) CE
21. Convert the following infix expression into its equivalent postfix expression
 $(A + B \wedge D) / (E - F) + G$
 (a) $ABD \wedge + EF - / G +$ (b) $ABD + \wedge EF - / G +$
 (c) $ABD + \wedge EF / - G +$ (d) $ABD \wedge + EF / - G +$
22. You have to sort a list L, consisting of a sorted list followed by a few 'random' elements. Which of the following sorting method would be most suitable for such a task ?
 (a) Bubble sort (b) Selection sort (c) Quick sort (d) Insertion sort
23. The directory can be viewed as _____ that translates filenames into their directory entries.
 (a) Symbol table (b) Partition (c) Swap space (d) Cache
24. Consider an array $A[20, 10]$, assume 4 words per memory cell and the base address of array A is 100. What is the address of $A[11, 5]$? Assume row major storage.
 (a) 560 (b) 565 (c) 570 (d) 575
25. A full binary tree with n leaves contains
 (a) n nodes (b) $\log_2 n$ nodes (c) $2n - 1$ nodes (d) 2^n nodes
26. The period of a signal is 10 ms. What is its frequency in Hertz ?
 (a) 10 (b) 100 (c) 1000 (d) 10000
27. In a classful addressing, first four bits in class A IP address is
 (a) 1010 (b) 1100 (c) 1011 (d) 1110
28. Which of the following algorithms is not a broadcast routing algorithm ?
 (a) Flooding (b) Multidestination routing
 (c) Reverse path forwarding (d) All of the above
29. An analog signal has a bit rate of 6000 bps and a baud rate of 2000 baud. How many data elements are carried by each signal element ?
 (a) 0.336 bits/ baud (b) 3 bits/ baud
 (c) 120,00,000 bits/ baud (d) None of the above
30. How many distinct stages are there in DES algorithm, which is parameterized by a 56-bit key ?
 (a) 16 (b) 17 (c) 18 (d) 19
31. Shift-Reduce parsers perform the following :
 (a) Shift step that advances in the input stream by $K(K > 1)$ symbols and Reduce step that applies a completed grammar rule to some recent parse trees, joining them together as one tree with a new root symbol.
 (b) Shift step that advances in the input stream by one symbol and Reduce step that applies a completed grammar rule to some recent parse trees, joining them together as one tree with a new root symbol.
 (c) Shift step that advances in the input stream by $K(K = 2)$ symbols and Reduce step that applies a completed grammar rule to form a single tree.
 (d) Shift step that does not advance in the input stream and Reduce step that applies a completed grammar rule to form a single tree.

32. Which of the following is true ?
(a) Canonical LR parser is LR (1) parser with single look ahead terminal.
(b) All LR(K) parsers with $K > 1$ can be transformed into LR(1) parsers.
(c) Both (a) and (b)
(d) None of the above
33. In a two-pass assembler, symbol table is
(a) Generated in first pass
(b) Generated in second pass
(c) Not generated at all
(d) Generated and used only in second pass
34. Debugger is a program that
(a) Allows to examine and modify the contents of registers
(b) Does not allow execution of a segment of program
(c) Allows to set breakpoints, execute a segment of program and display contents of registers
(d) All of the above
35. The following Context-Free Grammar (CFG) :
 $S \rightarrow aB \mid bA$
 $A \rightarrow a \mid as \mid bAA$
 $B \rightarrow b \mid bs \mid aBB$
will generate
(a) Odd numbers of a's and odd numbers of b's
(b) Even numbers of a's and even numbers of b's
(c) Equal numbers of a's and b's
(d) Different numbers of a's and b's
36. Consider the following justifications for commonly using the two-level CPU scheduling :
I. It is used when memory is too small to hold all the ready processes.
II. Because its performance is same as that of the FIFO.
III. Because it facilities putting some set of processes into memory and a choice is made from that.
IV. Because it does not allow to adjust the set of in-core processes.
Which of the following is true ?
(a) I, III and IV
(b) I and II
(c) III and IV
(d) I and III
37. A specific editor has 200 K of program text, 15 K of initial stack, 50 K of initialized data, and 70 K of bootstrap code. If five editors are started simultaneously, how much physical memory is needed if shared text is used ?
(a) 1135 K
(b) 335 K
(c) 1065 K
(d) 320 K
38. Which of the following conditions does not hold good for a solution to a critical section problem ?
(a) No assumptions may be made about speeds or the number of CPUs.
(b) No two processes may be simultaneously inside their critical sections.
(c) Processes running outside its critical section may block other processes.
(d) Processes do not wait forever to enter its critical section.
39. For the implementation of a paging scheme, suppose the average process size be x bytes, the page size be y bytes, and each page entry requires z bytes. The optimum page size that minimizes the total overhead due to the page table and the internal fragmentation loss is given is
(a) $\frac{x}{2}$
(b) $\frac{xz}{2}$
(c) $\sqrt{2xz}$
(d) $\frac{\sqrt{xz}}{2}$
40. In a demand paging memory system, page table is held in registers. The time taken to service a page fault is 8 m.sec. if an empty frame is available or if the replaced page is not modified. and it takes 20 m.sec., if the replaced page is modified. What is the average access time to service a page fault assuming that the page to be replaced is modified 70% of the time ?
(a) 11.6 m.sec.
(b) 16.4 m.sec.
(c) 28 m.sec.
(d) 14 m.sec.



41. _____ are applied throughout the software process.
 (a) Framework activities (b) Umbrella activities
 (c) Planning activities (d) Construction activities
42. Requirement Development, Organizational Process Focus, Organizational Training, Risk Management and Integrated Supplier Management are process areas required to achieve maturity level
 (a) Performed (b) Managed (c) Defined (d) Optimized
43. The software _____ of a program or a computing system is the structure or structures of the system, which comprise software components, the externally visible properties of those components, and the relationships among them.
 (a) Design (b) Architecture (c) Process (d) Requirement
44. Which one of the following set of attributes should not be encompassed by effective software metrics ?
 (a) Simple and computable
 (b) Consistent and objective
 (c) Consistent in the use of units and dimensions
 (d) Programming language dependent
45. Which one of the following is used to compute cyclomatic complexity ?
 (a) The number of regions – 1
 (b) $E - N + 1$, where E is the number of flow graph edges and N is the number of flow graph nodes.
 (c) $P - 1$, where P is the number of predicate nodes in the flow graph G.
 (d) $P + 1$, where P is the number of predicate nodes in the flow graph G.
46. Consider the following statements S1 and S2 :
 S1 : A hard handover is one in which the channel in the source cell is retained and used for a while in parallel with the channel in the target cell.
 S2 : A soft handover is one in which the channel in the source cell is released and only then the channel in the target cell is engaged.
 (a) S1 is true and S2 is not true (b) S1 is not true and S2 is true
 (c) Both S1 and S2 are true (d) Both S1 and S2 are not true
47. Fact-less fact table in a data warehouse contains
 (a) Only measures (b) Only dimensions
 (c) Keys and measures (d) Only surrogate keys
48. Which e-business model allows consumers to name their own price for products and services ?
 (a) B2 B (b) B2 G (c) C2 C (d) C2 B
49. _____ model is designed to bring prices down by increasing the number of customers who buy a particular product at once.
 (a) Economic Order Quantity (b) Inventory
 (c) Data Mining (d) Demand-Sensitive Pricing
50. Match the following :
- | List – I | List – II |
|--------------------------|---|
| A. Call control protocol | i. Interface between Base Transceiver Station (BTS) and Base Station Controller (BSC) |
| B. A-bits | ii. Spread spectrum |
| C. BSMAP | iii. Connection management |
| D. CDMA | iv. Works between Mobile Switching Centre (MSC) and Base Station Subsystem (BSS) |

Codes :

	A	B	C	D
(a)	iii	iv	i	ii
(b)	iii	i	iv	ii
(c)	i	ii	iii	iv
(d)	iv	iii	ii	i

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UGC-NET COMPUTER SCIENCE & APPLICATIONS (87)

PAPER-III

Note: This paper contains **seventy five (75)** objective type questions of **two (2)** marks each. All questions are compulsory.

1. A hierarchical memory system that uses cache memory has cache access time of 50 nano seconds, main memory access time of 300 nano seconds, 75% of memory requests are for read, hit ratio of 0.8 for read access and the write through scheme is used. What will be the average access time of the system both for read and write requests ?
(a) 157.5 n.sec. (b) 110 n.sec. (c) 75 n.sec. (d) 82.5 n.sec.
2. For switching from a CPU user mode to the supervisor mode following type of interrupt is most appropriate
(a) Internal interrupts (b) External Interrupts
(c) Software interrupts (d) None of the above
3. In a dot matrix printer the time to print a character is 6 m.sec., time to space in between characters is 2 m.sec., and the number of characters in a line are 200. The printing speed of the dot matrix printer in characters per second and the time to print a character line are given by which of the following options ?
(a) 125 chars/second and 0.8 seconds (b) 250 chars/second and 0.6 seconds
(c) 166 chars/second and 0.8 seconds (d) 250 chars/second and 0.4 seconds
4. Match the following 8085 instructions with the flags :

List – I	List – II
A. XCHG	i. only carry flag is affected.
B. SUB	ii. no flags are affected.
C. STC	iii. all flags other than carry flag are affected.
D. DCR	iv. all flags are affected.

Codes :

	A	B	C	D
(a)	iv	i	iii	ii
(b)	iii	ii	i	iv
(c)	ii	iii	i	iv
(d)	ii	iv	i	iii
5. How many times will the following loop be executed ?
LXI B, 0007 H
LOP : DCX B
MOV A, B
ORA C
JNZ LOP
(a) 05 (b) 07 (c) 09 (d) 00
6. Specify the contents of the accumulator and the status of the S, Z and CY flags when 8085 microprocessor performs addition of 87 H and 79 H.
(a) 11, 1, 1, 1 (b) 10, 0, 1, 0 (c) 01, 1, 0, 0 (d) 00, 0, 1, 1



7. Location transparency allows :
- I. Users to treat the data as if it is done at one location.
 - II. Programmers to treat the data as if it is at one location.
 - III. Managers to treat the data as if it is at one location.
- Which one of the following is correct ?
- (a) I, II and III (b) I and II only (c) II and III only (d) II only
8. Which of the following is correct ?
- I. Two phase locking is an optimistic protocol.
 - II. Two phase locking is pessimistic protocol.
 - III. Time stamping is an optimistic protocol.
 - IV. Time stamping is pessimistic protocol.
- (a) I and III (b) II and IV (c) I and IV (d) II and III
9. _____ rules used to limit the volume of log information that has to be handled and processed in the event of system failure involving the loss of volatile information.
- (a) Write-ahead log (b) Check-pointing (c) Log buffer (d) Thomas
10. Let $R = ABCDE$ is a relational scheme with functional dependency set $F = \{A \rightarrow B, B \rightarrow C, AC \rightarrow D\}$. The attribute closures of A and E are
- (a) ABCD, ϕ (b) ABCD, E (c) Φ, ϕ (d) ABC, E
11. Consider the following statements :
- I. Re-construction operation used in mixed fragmentation satisfies commutative rule.
 - II. Re-construction operation used in vertical fragmentation satisfies commutative rule.
- Which of the following is correct ?
- (a) I (b) II
(c) Both are correct (d) None of the statements are correct
12. Which of the following is false ?
- (a) Every binary relation is never be in BCNF.
(b) Every BCNF relation is in 3NF.
(c) 1 NF, 2 NF, 3 NF and BCNF are based on functional dependencies.
(d) Multivalued Dependency (MVD) is a special case of Join Dependency (JD).
13. Which of the following categories of languages do not refer to animation languages ?
- (a) Graphical languages (b) General-purpose languages
(c) Linear-list notations (d) None of the above
14. Match the following :
- | | |
|----------------------------|----------------------------|
| List – I | List – II |
| A. Tablet, Joystick | i. Continuous devices |
| B. Light Pen, Touch Screen | ii. Direct devices |
| C. Locator, Keyboard | iii. Logical devices |
| D. Data Globe, Sonic Pen | iv. 3D interaction devices |
- Codes :**
- | | A | B | C | D |
|-----|----------|----------|----------|----------|
| (a) | ii | i | iv | iii |
| (b) | i | iv | iii | ii |
| (c) | i | ii | iii | iv |
| (d) | iv | iii | ii | i |

15. A technique used to approximate halftones without reducing spatial resolution is known as _____.
 (a) Halftoning (b) Dithering (c) Error diffusion (d) None of the above

16. Consider a triangle represented by A(0, 0), B(1, 1), C(5, 2). The triangle is rotated by 45 degrees about a point P(-1, -1). The co-ordinates of the new triangle obtained after rotation shall be _____

(a) $A'(-1, \sqrt{2} - 1), B'(-1, 2\sqrt{2} - 1), C'\left(\frac{3}{2}\sqrt{2} - 1, \frac{9}{2}\sqrt{2} - 1\right)$

(b) $A'(\sqrt{2} - 1, -1), B'(2\sqrt{2} - 1, -1), C'\left(\frac{3}{2}\sqrt{2} - 1, \frac{9}{2}\sqrt{2} - 1\right)$

(c) $A'(-1, \sqrt{2} - 1), B'(2\sqrt{2} - 1, -1), C'\left(\frac{3}{2}\sqrt{2} - 1, \frac{9}{2}\sqrt{2} - 1\right)$

(d) $A'(-1, \sqrt{2} - 1), B'(2\sqrt{2} - 1, -1), C'\left(\frac{9}{2}\sqrt{2} - 1, \frac{3}{2}\sqrt{2} - 1\right)$

17. In Cyrus-Beck algorithm for line clipping the value of t parameter is computed by the relation :
 (Here P_1 and P_2 are the two end points of the line, f_i is a point on the boundary, n_i is inner normal)

(a) $\frac{(P_1 - f_i) \cdot n_i}{(P_2 - P_1) \cdot n_i}$ (b) $\frac{(f_i - P_1) \cdot n_i}{(P_2 - P_1) \cdot n_i}$ (c) $\frac{(P_2 - f_i) \cdot n_i}{(P_1 - P_2) \cdot n_i}$ (d) $\frac{(f_i - P_2) \cdot n_i}{(P_1 - P_2) \cdot n_i}$

18. Match the following :

List - I

- A. Cavalier Projection
- B. Cabinet Projection
- C. Isometric Projection
- D. Orthographic Projection

List - II

- i. The direction of projection is chosen so that there is no foreshortening of lines perpendicular to the xy plane.
- ii. The direction of projection is chosen so that lines perpendicular to the xy planes are foreshortened by half their lengths.
- iii. The direction of projection makes equal angles with all of the principal axis.
- iv. Projections are characterized by the fact that the direction of projection is perpendicular to the view plane.

Codes :

	A	B	C	D
(a)	i	iii	iv	ii
(b)	ii	iii	i	iv
(c)	iv	ii	iii	i
(d)	i	ii	iii	iv

19. Consider the following statements S1, S2 and S3 :

S1 : In call-by-value, anything that is passed into a function call is unchanged in the caller's scope when the function returns.

S2 : In call-by-reference, a function receives implicit reference to a variable used as argument.

S3 : In call-by-reference, caller is unable to see the modified variable used to argument.

- (a) S3 and S2 are true
- (b) S3 and S1 are true
- (c) S2 and S1 are true
- (d) S1, S2, S3 are true



20. How many tokens will be generated by the scanner for the following statement ?
 $x = x * (a + b) - 5;$
 (a) 12 (b) 11 (c) 10 (d) 07
21. Which of the following statements is not true ?
 (a) MPI_Isend and MPI_Irecv are non-blocking message passing routines of MPI.
 (b) MPI_Issend and MPI_Ibsend are non-blocking message passing routines of MPI.
 (c) MPI_Send and MPI_Recv are non-blocking message passing routines of MPI.
 (d) MPI_Ssend and MPI_Bsend are blocking message passing routines of MPI.
22. The pushdown automation $M = (\{q_0, q_1, q_2\}, \{a, b\}, \{0, 1\}, \delta, q_0, 0, \{q_0\})$ with
 $\delta(q_0, a, 0) = \{(q_1, 10)\}$
 $\delta(q_1, a, 1) = \{(q_1, 11)\}$
 $\delta(q_1, b, 1) = \{(q_2, \lambda)\}$
 $\delta(q_2, b, 1) = \{(q_2, \lambda)\}$
 $\delta(q_2, \lambda, 0) = \{(q_0, \lambda)\}$
 Accepts the language
 (a) $L = \{a^n b^m \mid n, m \geq 0\}$ (b) $L = \{a^n b^n \mid n \geq 0\}$
 (c) $L = \{a^n b^m \mid n, m > 0\}$ (d) $L = \{a^n b^n \mid n > 0\}$
23. Given two languages :
 $L_1 = \{(ab)^n a^k \mid n > k, k \geq 0\}$
 $L_2 = \{a^n b^m \mid n \neq m\}$
 Using pumping lemma for regular language, it can be shown that
 (a) L_1 is regular and L_2 is not regular. (b) L_1 is not regular and L_2 is regular.
 (c) L_1 is regular and L_2 is regular. (d) L_1 is not regular and L_2 is not regular.
24. Regular expression for the complement of language $L = \{a^n b^m \mid n \geq 4, m \leq 3\}$ is
 (a) $(a + b)^* ba(a + b)^*$
 (b) $a^* b^3 b^*$
 (c) $(\lambda + a + aa + aaa)b^* + (a + b)^* ba(a + b)^*$
 (d) None of the above
25. For n devices in a network, _____ number of duplex-mode links are required for a mesh topology.
 (a) $n(n + 1)$ (b) $n(n - 1)$ (c) $n(n + 1)/2$ (d) $n(n - 1)/2$
26. How many characters per second (7 bits + 1 parity) can be transmitted over a 3200 bps line if the transfer is asynchronous ? (Assuming 1 start bit and 1 stop bit)
 (a) 300 (b) 320 (c) 360 (d) 400
27. Which of the following is not a field in TCP header ?
 (a) Sequence number (b) Fragment offset (c) Checksum (d) Window size
28. What is the propagation time if the distance between the two points is 48,000 ? Assume the propagation speed to be 2.4×10^8 metre/second in cable.
 (a) 0.5 ms (b) 20 ms (c) 50 ms (d) 200 ms
29. _____ is a bit-oriented protocol for communication over point-to-point and multipoint links.
 (a) Stop-and-wait (b) HDLC (c) Sliding window (d) Go-back-N

30. Which one of the following is true for asymmetric-key cryptography ?
 (a) Private key is kept by the receiver and public key is announced to the public.
 (b) Public key is kept by the receiver and private key is announced to the public.
 (c) Both private key and public key are kept by the receiver.
 (d) Both private key and public key are announced to the public.

31. Any decision tree that sorts n elements has height
 (a) $\Omega(n)$ (b) $\Omega(\lg n)$ (c) $\Omega(n/\lg n)$ (d) $\Omega(n^2)$

32. Match the following :

List – I

- A. Bucket sort
 B. Matrix chain multiplication
 C. Huffman codes
 D. All pairs shortest paths

List – II

- i. $O(n^3 \lg n)$
 ii. $O(n^3)$
 iii. $O(n/\lg n)$
 iv. $O(n)$

Codes :

	A	B	C	D
(a)	iv	ii	i	iii
(b)	ii	iv	i	iii
(c)	iv	ii	iii	i
(d)	iii	ii	iv	i

33. We can show that the clique problems is NP-hard by proving that
 (a) $\text{CLIQUE} \leq_p \text{3-CNF_SAT}$ (b) $\text{CLIQUE} \leq_p \text{VERTEX_COVER}$
 (c) $\text{CLIQUE} \leq_p \text{SUBSET_SUM}$ (d) None of the above

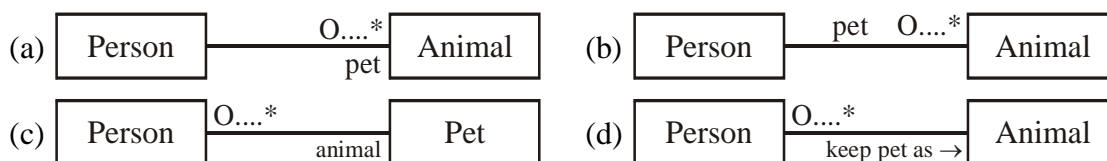
34. Dijkstra algorithm, which solves the single-source shortest--paths problem, is a _____, and the Floyd-Warshall algorithm, which finds shortest paths between all pairs of vertices, is a _____
 (a) Greedy algorithm, Divide-conquer algorithm
 (b) Divide-conquer algorithm, Greedy algorithm
 (c) Greedy algorithm, Dynamic programming algorithm
 (d) Dynamic programming algorithm, Greedy algorithm

35. Consider the problem of a chain $\langle A_1, A_2, A_3 \rangle$ of three matrices. Suppose that the dimensions of the matrices are 10×100 , 100×5 and 5×50 respectively. There are two different ways of parenthesization : (i) $((A_1 A_2)A_3)$ and (ii) $(A_1(A_2 A_3))$. Computing the product according to the first parenthesization is _____ times faster in comparison to the second parenthesization.
 (a) 5 (b) 10 (c) 20 (d) 100

36. Suppose that we have numbers between 1 and 1000 in a binary search tree and we want to search for the number 365. Which of the following sequences could not be the sequence of nodes examined ?
 (a) 4, 254, 403, 400, 332, 346, 399, 365 (b) 926, 222, 913, 246, 900, 260, 364, 365
 (c) 927, 204, 913, 242, 914, 247, 365 (d) 4, 401, 389, 221, 268, 384, 384, 383, 280, 365

37. Which methods are utilized to control the access to an object in multi-threaded programming ?
 (a) Asynchronized methods (b) Synchronized methods
 (c) Serialized methods (d) None of the above

38. How to express that some person keeps animals as pets ?



39. Converting a primitive type data into its corresponding wrapper class object instance is called
 (a) Boxing (b) Wrapping (c) Instantiation (d) Autoboxing



40. The behaviour of the document elements in XML can be defined by
 (a) Using document object (b) Registering appropriate event handlers
 (c) Using elements object (d) All of the above
41. What is true about UML stereotypes ?
 (a) Stereotype is used for extending the UML language
 (b) Stereotyped class must be abstract
 (c) The stereotype indicates that the UML element cannot be changed
 (d) UML profiles can be stereotyped for backward compatibility
42. Which method is called first by an applet program ?
 (a) start() (b) run() (c) init() (d) begin()
43. Which one of the following is not a source code metric ?
 (a) Halstead metric (b) Function point metric
 (c) Complexity metric (d) Length metric
44. To compute function points (FP), the following relationship is used
 $FP = Count - total \times (0.65 + 0.01 \times \sum(F_i))$ where F_i ($i = 1$ to n) are value adjustment factors (VAF) based on n questions. The value of n is
 (a) 12 (b) 14 (c) 16 (d) 18
45. Assume that the software team defines a project risk with 80% probability of occurrence of risk in the following manner :
 Only 70 percent of the software components scheduled for reuse will be integrated into the application and the remaining functionality will have to be custom developed. If 60 reusable components were planned with average component size as 100 LOC and software engineering cost for each LOC as \$ 14, then the risk exposure would be
 (a) \$ 25,200 (b) \$ 20,160 (c) \$ 17,640 (d) \$ 15,120
46. Maximum possible value of reliability is
 (a) 100 (b) 10 (c) 1 (d) 0
47. 'FAN IN' of a component A is defined as
 (a) Count of the number of components that can call, or pass control, to a component A
 (b) Number of components related to component A
 (c) Number of components dependent on component A
 (d) None of the above
48. Temporal cohesion means
 (a) Coincidental cohesion (b) Cohesion between temporary variables
 (c) Cohesion between local variables (d) Cohesion with respect to time
49. Various storage devices used by an operating system can be arranged as follows in increasing order of accessing speed :
 (a) Magnetic tapes → magnetic disks → optical disks → electronic disks → main memory → cache → registers
 (b) Magnetic tapes → magnetic disks → electronic disks → optical disks → main memory → cache → registers
 (c) Magnetic tapes → electronic disks → magnetic disks → optical disks → main memory → cache → registers
 (d) Magnetic tapes → optical disks → magnetic disks → electronic disks → main memory → cache → registers
50. How many disk blocks are required to keep list of free disk blocks in a 16 GB hard disk with 1 kB block size using linked list of free disk blocks ? Assume that the disk block number is stored in 32 bits.
 (a) 1024 blocks (b) 16794 blocks (c) 20000 blocks (d) 1048576 blocks

51. Consider an imaginary disk with 40 cylinders. A request come to read a block on cylinder 11. While the seek to cylinder 11 is in progress, new requests come in for cylinders 1, 36, 16, 34, 9 and 12 in that order. The number of arm motions using shortest seek first algorithm is
(a) 111 (b) 112 (c) 60 (d) 61
52. An operating system has 13 tape drives. There are three processes P1, P2 and P3. Maximum requirement of P1 is 11 tape drives, P2 is 5 tape drives and P3 is 8 tape drives. Currently, P1 is allocated 6 tape drives, P2 is allocated 3 tape drives and P3 is allocated 2 tape drives. Which of the following sequences represent a safe state ?
(a) P2 P1 P3 (b) P2 P3 P1 (c) P1 P2 P3 (d) P1 P3 P2
53. Monitor is an Interprocess Communication (IPC) technique which can be described as
(a) It is higher level synchronization primitive and is a collection of procedures, variables and data structures grouped together in a special package.
(b) It is a non-negative integer which apart from initialization can be acted upon by wait and signal operations.
(c) It uses two primitives, send and receive which are system calls rather than language constructs.
(d) It consists of the IPC primitives implemented as system calls to block the process when they are not allowed to enter critical region to save CPU time.
54. In a distributed computing environment, distributed shared memory is used which is
(a) Logical combination of virtual memories on the nodes.
(b) Logical combination of physical memories on the nodes.
(c) Logical combination of the secondary memories on all the nodes.
(d) All of the above
55. Equivalent logical expression for the Well Formed Formula (WFF), $\sim (\forall x) F[x]$ is
(a) $\forall x(\sim F[x])$ (b) $\sim (\exists x) F[x]$ (c) $\exists x (\sim F[x])$ (d) $\forall x F[x]$
56. An A* algorithm is a heuristic search technique which
(a) Is like a depth-first search where most promising child is selected for expansion
(b) Generates all successor nodes and computes an estimate of distance (cost) from start node to a goal node through each of the successors. It then chooses the successor with shortest cost.
(c) Saves all path lengths (costs) from start node to all generated nodes and chooses shortest path for further expansion.
(d) None of the above
57. The resolvent of the set of clauses
(A \vee B, \sim A \vee D, C \vee \sim B) is
(a) A \vee B (b) C \vee D (c) A \vee C (d) A \vee D
58. Match the following :
- | | |
|--|---|
| <p>List – I</p> <p>A. Script</p> <p>B. Conceptual Dependencies</p> <p>C. Frames</p> <p>D. Associative Network</p> | <p>List – II</p> <p>i. Directed graph with labelled nodes for graphical representation of knowledge</p> <p>ii. Knowledge about objects and events is stored in record like structures consisting of slots and slot values.</p> <p>iii. Primitive concepts and rules to represent natural language statements</p> <p>iv. Frame like structures used to represent stereotypical patterns for commonly occurring events in terms of actors, roles, props and scenes</p> |
|--|---|



Codes :

	A	B	C	D
(a)	iv	ii	i	iii
(b)	iv	iii	ii	i
(c)	ii	iii	iv	i
(d)	i	iii	iv	ii

59. Match the following components of an expert system :

List – I

- A. I/O interface
- B. Explanation module
- C. Inference engine
- D. Knowledge base

List – II

- i. Accepts user's queries and responds to question through I/O interface
- ii. Contains facts and rules about the domain
- iii. Gives the user, the ability to follow inferencing steps at any time during consultation
- iv. Permits the user to communicate with the system in a natural way

Codes :

	A	B	C	D
(a)	i	iii	iv	ii
(b)	iv	iii	i	ii
(c)	i	iii	ii	iv
(d)	iv	i	iii	ii

60. A computer based information system is needed :

- I. as it is difficult for administrative staff to process data.
- II. due to rapid growth of information and communication technology.
- III. due to growing size of organizations which need to process large volume of data.
- IV. as timely and accurate decisions are to be taken.

Which of the above statement(s) is/are true ?

- (a) I and II (b) III and IV (c) II and III (d) II and IV

61. Given the recursively enumerable language (L_{RE}), the context sensitive language (L_{CS}), the recursive language (L_{REC}), the context free language (L_{CF}) and deterministic context free language (L_{DCF}). The relationship between these families is given by

- (a) $L_{CF} \subseteq L_{DCF} \subseteq L_{CS} \subseteq L_{RE} \subseteq L_{REC}$ (b) $L_{CF} \subseteq L_{DCF} \subseteq L_{CS} \subseteq L_{REC} \subseteq L_{RE}$
 (c) $L_{DCF} \subseteq L_{CF} \subseteq L_{CS} \subseteq L_{RE} \subseteq L_{REC}$ (d) $L_{DCF} \subseteq L_{CF} \subseteq L_{CS} \subseteq L_{REC} \subseteq L_{RE}$

62. Match the following :

List – I

- A. Context free grammar
- B. Regular grammar
- C. Context sensitive grammar
- D. Unrestricted grammar

List – II

- i. Linear bounded automaton
- ii. Pushdown automaton
- iii. Turing machine
- iv. Deterministic finite automaton

Codes :

	A	B	C	D
(a)	ii	iv	iii	i
(b)	ii	iv	i	iii
(c)	iv	i	ii	iii
(d)	i	iv	iii	ii

63. According to pumping lemma for context free languages :
 Let L be an infinite context free language, then there exists some positive integer m such that any $w \in L$ with $|w| \geq m$ can be decomposed as $w = u v x y z$
- (a) with $|vxy| \leq m$ such that $uv^i xy^i z \in L$ for all $i = 0, 1, 2$
 - (b) with $|vxy| \leq m$, and $|vy| \geq 1$, such that $uv^i xy^i z \in L$ for all $i = 0, 1, 2, \dots$
 - (c) with $|vxy| \geq m$, and $|vy| \leq 1$, such that $uv^i xy^i z \in L$ for all $i = 0, 1, 2, \dots$
 - (d) with $|vxy| \geq m$, and $|vy| \geq 1$, such that $uv^i xy^i z \in L$ for all $i = 0, 1, 2, \dots$

64. Given two spatial masks

$$S_1 = \begin{bmatrix} 0 & 1 & 0 \\ 1 & -4 & 0 \\ 0 & 1 & 0 \end{bmatrix} \text{ and } S_2 = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -8 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

The Laplacian of an image at all points (x, y) can be implemented by convolving the image with spatial mask. Which of the following can be used as the spatial mask ?

- (a) Only S_1 (b) Only S_2 (c) Both S_1 and S_2 (d) None of these
65. Given a simple image of size 10×10 whose histogram models the symbol probabilities and is given by

P_1	P_2	P_3	P_4
a	b	c	d

The first order estimate of image entropy is maximum when

- (a) $a = 0, b = 0, c = 0, d = 1$ (b) $a = \frac{1}{2}, b = \frac{1}{2}, c = 0, d = 0$
 - (c) $a = \frac{1}{3}, b = \frac{1}{3}, c = \frac{1}{3}, d = 0$ (d) $a = \frac{1}{4}, b = \frac{1}{4}, c = \frac{1}{4}, d = \frac{1}{4}$
66. A Butterworth lowpass filter of order n, with a cutoff frequency at distance D_0 from the origin, has the transfer function $H(u, v)$ given by

(a) $\frac{1}{1 + \left[\frac{D(u, v)}{D_0} \right]^{2n}}$ (b) $\frac{1}{1 + \left[\frac{D(u, v)}{D_0} \right]^n}$ (c) $\frac{1}{1 + \left[\frac{D_0}{D(u, v)} \right]^{2n}}$ (d) $\frac{1}{1 + \left[\frac{D_0}{D(u, v)} \right]^n}$

67. If an artificial variable is present in the 'basic variable' column of optimal simplex table, then the solution is
- (a) Optimum (b) Infeasible (c) Unbounded (d) Degenerate
68. The occurrence of degeneracy while solving a transportation problem means that
- (a) Total supply equals total demand (b) Total supply does not equal total demand
 - (c) The solution so obtained is not feasible (d) None of these



69. Five men are available to do five different jobs. From past records, the time (in hours) that each man takes to do each job is known and is given in the following table :

		Jobs				
		I	II	III	IV	V
Men	P	2	9	2	7	1
	Q	6	8	7	6	1
	R	4	6	5	3	1
	S	4	2	7	3	1
	T	5	3	9	5	1

Find out the minimum time required to complete all the jobs.

- (a) 5 (b) 11 (c) 13 (d) 15
70. Consider the following statements about a perception :
- I. Feature detector can be any function of the input parameters.
 II. Learning procedure only adjusts the connection weights to the output layer.
 Identify the correct statement out of the following :
- (a) I is false and II is false (b) I is true and II is false
 (c) I is false and II is true (d) I is true and II is true
71. A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$
 (a) Core (b) Support (c) Crossover (d) α -cut
72. Match the following learning modes w.r.t. characteristics of available information for learning :
- | List – I | List – II |
|------------------|--|
| A. Supervised | i. Instructive information on desired responses, explicitly specified by a teacher. |
| B. Recording | ii. A priori design information for memory storing |
| C. Reinforcement | iii. Partial information about desired responses, or only “right” or “wrong” evaluative information. |
| D. Unsupervised | iv. No information about desired responses |
- Codes :**
- | | A | B | C | D |
|-----|----|-----|-----|----|
| (a) | i | ii | iii | iv |
| (b) | i | iii | ii | iv |
| (c) | ii | iv | iii | i |
| (d) | ii | iii | iv | i |
73. Which of the following versions of Windows O.S. contain built-in partition manager which allows us to shrink and expand pre-defined drives ?
 (a) Windows Vista (b) Windows 2000 (c) Windows NT (d) Windows 98
74. A Trojan horse is
 (a) A program that performs a legitimate function that is known to an operating system or its user and also has a hidden component that can be used for nefarious purposes like attacks on message security or impersonation.
 (b) A piece of code that can attach itself to other programs in the system and spread to other systems when programs are copied or transferred.
 (c) A program that spreads to other computer systems by exploiting security holes like weaknesses in facilities for creation of remote processes.
 (d) All of the above
75. Which of the following computing models is not an example of distributed computing environment?
 (a) Cloud computing (b) Parallel computing
 (c) Cluster computing (d) Peer-to peer computing