PAPER : DEC. 2013

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. When data and acknowledgement are sent in the same frame, this is called as
   (a) Piggy packing (b) Piggy backing (c) Back packing (d) Good packing
2. Encryption and decryption is the responsibility of _____ layer
   (a) Physical (b) Network (c) Application (d) Datalink
3. An analog signal carries 4 bits in each signal unit. If 1000 signal units are sent per second, then baud rate and bit rate of the signal are _____ and _____
   (a) 4000 bauds\sec and 1000 bps (b) 2000 bauds\sec and 1000 bps
   (c) 1000 bauds \ sec and 500 bps (d) 1000 bauds \ sec and 4000 bps
4. The VLF and LF bands use _____ propagation for communication
   (a) Ground (b) Sky (c) Line of sight (d) Space
5. Using the RSA public key crypto system, if p = 13, q = 31 and d = 7, then the vlaue of e is
   (a) 101 (b) 103 (c) 105 (d) 107
6. FAN IN of a component A is defined as
   (a) Number of components that can call or pass control to component A
   (b) Number of components that are called by component A
   (c) Number of components related to component A
   (d) Number of components dependent on component A
7. The relationship of data elements in a module is called
   (a) Coupling (b) Modularity (c) Cohesion (d) Granularity
8. Software Configuration Management is the discipline systematically controlling
   (a) the changes due to the evolution of work products as the project proceeds
   (b) the changes due to defects (bugs) being found and then fixed
   (c) the changes due to requirement changes
   (d) all of the above
9. Which one of the following is not a step of requirement engineering?
   (a) Requirement elicitation (b) Requirement analysis
   (c) Requirement design (d) Requirement documentation
10. Testing of software with actual data and in actual environment is called
    (a) Alpha testing (b) Beta testing (c) Regression testing (d) None of the above
11. The student marks should not be greater than 100. This is
    (a) Integrity constraint (b) Referential constraint
    (c) Over-defined constraint (d) Feasible constraint
12. GO BOTTOM and SKIP-3 commands are given one after another in a database file of 30 records. It shifts the control to
    (a) 28^{th} record (b) 27^{th} record (c) 3^{rd} record (d) 4^{th} record
13. An ER Model includes
    (1) An ER diagram portraying entity types
    (2) Attributes for each entity type
    (3) Relationships among entity types
    (4) Semantic integrity constraints that reflects the business rules about data not captured in the ER diagram
    (a) I, II, III and IV (b) I and IV (c) I, II and IV (d) I and III

14. Based on the cardinality ratio and participation _____ associated with a relationship type, choose either the Foreign Key Design, the Cross Referencing Design or Mutual Referencing Design
(a) Entity (b) Constraints (c) Rules (d) Keys

15. Data Integrity control uses _____
(a) Upper and lower limits on numeric data
(b) Passwords to prohibit unauthorised access to files.
(c) Data dictionary to keep the data
(d) Data dictionary to find last access of data

16. What does the following declaration mean?
int (*ptr) [10];
(a) ptr is an array of pointers of 10 integers
(b) ptr is a pointer to an array of 10 integers
(c) ptr is an array of 10 integers
(d) none of the above.

17. Which of the following has compilation error in C?
(a) int n = 32; (b) char ch = 65;
(c) float f = (float) 3.2; (d) none of the above

18. Which of the following operators can not be overloaded in C++?
(a) *? (b) + = (c) = = (d) : :

19. _____ allows to create classes which are derived from other classes, so that they automatically include some of its "parent's" members, plus its own members.
(a) Overloading (b) Inheritance (c) Plymorphism (d) Encapsulation

20. The correct way to round off a floating number x to an integer value is
(a) y = (int) (x + 0.5) (b) y = int (x + 0.5) (c) y = (int) x + 0.5 (d) y = (int) ((int) x + 0.5)

21. What is the value of postfix expression?
a b c d + – * (where a = 8, b = 4, c = 2 and d = 5)
(a) –3/8 (b) –8/3 (c) 24 (d) –24

22. If the queue is implemented with a linked list, keeping track of a front pointer and rear pointer, which of these pointers will change during an insertion into a non-empty queue?
(a) Neither of the pointers change (b) Only front pointer changes
(c) Only rear pointer changes (d) Both of the pointers changes

23. _____ is often used to prove the correctness of a recursive function
(a) Diagonalization (b) Communitivity
(c) Mathematical Induction (d) Matrix Multiplication

24. For any B-tree of minimum degree $t \geq 2$, every node other than the root must have atleast _____ keys and every node can have at most _____ keys
(a) t –1, 2t + 1 (b) t + 1, 2t + 1 (c) t –1, 2t–1 (d) t + 1, 2t–1

25. Given two sorted list of size 'm' and 'n' respectively. The number of comparision needed in the worst case by the merge sort algorithm will be
(a) m × n (b) max (m, n) (c) min (m ,n) (d) m + n – 1

26. Given the following statements:
S1: SLR uses follow information to guide reductions. In case of LR and LALR parsers, the look-aheads are associated with the items and they make use of the left context available to the parser.
S2: LR grammar is a large, subclass of context free grammar as compared to that SLR and LALR grammars.
Which of the following is true?
(a) S_1 is not correct and S_2 is not correct (b) S_1 is not correct and S_2 is correct
(c) S_1 is correct and S_2 is not correct (d) S_1 is correct and S_2 is correct.

27. The context free grammar for the language

$L = \{a^n b^m \mid n \le m+3, n \ge 0, m \ge 0\}$ is

(a) $S \to aaa\ A;\ A \to aAb \mid B,\ B \to Bb \mid \lambda$
(b) $S \to aaaA \mid \lambda,\ A \to aAb \mid B,\ B \to Bb \mid \lambda$
(c) $S \to aaaA \mid aa\ A \mid \lambda,\ A \to aAb \mid B,\ B \to Bb \mid \lambda$
(d) $S \to aaaA \mid aa\ A \mid aA \mid \lambda,\ A \to aAb \mid B,\ B \to Bb \mid \lambda$

28. Given the following statements:

S_1 : If L is a regular language then the language $\{uv \mid u \in L, v \in L^R\}$ is also regular

S_2 : $L = \{ww^R\}$ is regular language.

Which of the following is true?
(a) S_1 is not correct and S_2 is not correct.
(b) S_1 is not correct and S_2 is correct.
(c) S_1 is correct and S_2 is not correct
(d) S_1 is correct and S_2 is correct.

29. The process of assigning load addresses to the various parts of the program and adjusting the code and data in the program to reflect the assigned addresses is called _____
(a) Symbol resolution (b) Parsing
(c) Assembly (d) Relocation

30. Which of the following derivations does a top-down parser use while parsing an input string? The input is scanned from left to right.
(a) Leftmost derivation (b) Leftmost derivation traced out in reverse
(c) Rightmost derivation traced out in reverse (d) Rightmost derivation

31. The dual of a Boolean expression is obtained by interchanging
(a) Boolean sums and boolean products
(b) Boolean sums and boolean products or interchanging 0's and 1's
(c) Boolean sums and boolean products and interchanging 0's and 1's
(d) Interchanging 0's and 1's

32. Given that $(292)_{10} = (1204)_x$ in some number system *x*. The base *x* of that number system is
(a) 2 (b) 8 (c) 10 (d) None of the above.

33. The sum of products expansion for the function

$F(x, y, z) = (x + y)\bar{z}$ is given as

(a) $\bar{x}\,\bar{y}z + xy\bar{z} + \bar{x}y\bar{z}$ (b) $xyz + xy\bar{z} + x\bar{y}\,\bar{z}$ (c) $x\bar{y}\,\bar{z} + \bar{x}\,\bar{y}\,\bar{z} + xy\bar{z}$ (d) $xy\bar{z} + x\bar{y}\,\bar{z} + \bar{x}y\bar{z}$

34. Let P(m, n) be the statement "m divides n" where the universe of discourse for both the variables is the set of positive integers. Determine the truth values of each of the following propositions:

(I) $\forall m\ \forall n\ P(m, n)$ (II) $\exists m\ \forall n\ P(m, n)$
(a) Both I and II are true (b) Both I and II are false
(c) I-false and II-true (d) I-true and II-false

35. Big-O estimate for

$f(x) = (x+1)\log(x^2+1) + 3x^2$ is

given as

(a) O(x logx) (b) $O(x^2)$ (c) $O(x^3)$ (d) $O(x^2 \log x)$

36. How many edges are there in a forest of t-trees containing a total of n vertices?
(a) n + t (b) n – t (c) n*t (d) n^t

37. Let f and g be the functions from the set of integers to the set integers defined by

$f(x) = 2x + 3$ and $g(x) = 3x + 2$

Then the composition of f and g and g and f is given as

(a) 6x + 7, 6x + 11 (b) 6x + 11, 6x + 7 (c) 5x+ 5, 5x + 5 (d) None of the above

38. If *n* and *r* are non-negative integers and $n \geq r$, then $p(n + 1, r)$ equals to

(a) $\frac{p(n,r)(n+1)}{(n+1-r)}$ (b) $\frac{p(n,r)(n+1)}{(n-1+r)}$ (c) $\frac{p(n,r)(n-1)}{(n+1-r)}$ (d) $\frac{p(n,r)(n+1)}{(n+1+r)}$

39. A graph is non-planar if and only if it contains a subgraph homomorphic to

(a) $K_{3,2}$ or K_5 (b) $K_{3,3}$ and K_6 (c) $K_{3,3}$ or K_5 (d) $K_{2,3}$ and K_5

40. Which of the following statements are true?

(I) A circuit that adds two bits, producing a sum bit and a carry bit is called half adder.

(II) A circuit that adds two bits, producing a sum bit and a carry bit is called full adder

(III) A circuit that adds two bits and a carry bit producing a sum bit and a carry bit is called full adder.

(IV) A device that accepts the value of a Boolean variable as input and products its complement is called an inverter.

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

41. Active X controls are Pentium binary programs that can be embedded in _____

(a) Word pages (b) URL pages (c) Script pages (d) Web pages

42. Match the folloiwng

List-I	**List-II**
(A) Wireless Application Environment	(i) HTTP
(B) Wireless Transaction Protocol	(ii) IP
(C) Wireless Datagram Protocol	(iii) Scripts
(D) Wirelsss	(iv) UDP

Codes:

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

43. Which of the following is widely used inside the telephone system for long-haul data traffic?

(a) ISDN (b) ATM (c) Frame Relay (d) ISTN

44. The document standards for EDI were first developed by large business house during the 1970s and are now under the control of the following standard organization

(a) ISO (b) ANSI (c) ITU-T (d) IEEE

45. Electronic Data Interchange Software consists of the following four layers

(a) Business application, internal format conversion, Network translator, EDI envelope

(b) Business application, internal format conversion, EDI translator, EDI envelope

(c) Application layer, transport layer, EDI translator, EDI envelope

(d) Application layer, transport layer, IP layer, EDI envelope

46. Consider a preemptive priority based scheduling algorithm based on dynamically changing priority. Larger priority number implies higher priority. When the process is waiting for CPU in the ready queue (but not yet started execution), its priority changes at a rate a = 2. When it starts running, its priority changes at a rate b = 1. All the processes are assigned priority vlaue 0 when they enter ready queue. Assume that the following processes want to execute:

Process ID	Arrival Time	Service Time
P1	0	4
P2	1	1
P3	2	2
P4	3	1

The time quantum q = 1. When two processes want to join ready queue simultaneously, the process which has not executed recently is given priority. The finish time of processes P1, P2, P3 and P4 will respectively be

(a) 4, 5, 7 and 8 (b) 8, 2, 7 and 5 (c) 2, 5, 7 and 8 (d) 8, 2, 5 and 7

47. The virtual address generated by a CPU is 32 bits. The translation Lookaside Buffer (TLB) can hold total 64 page table entries and a 4-way set assocaitive (i.e. with 4–cache lines in the set). The page size is 4 KB. The minimum size of TLB tag is

(a) 12 bits (b) 15 bits (c) 16 bits (d) 20 bits

48. Consider a disk queue with request for input/output to block on cylinders 98, 183, 37, 122, 14, 124, 65, 67 in that order. Assume that disk head is initially positioned at cylinder 53 and moving towards cylinder number 0. The total number of head movements using Shortest Seek Time First (SSTF) and SCAN algorithms are respectively.

(a) 236 and 252 cylinders (b) 640 and 236 cylinders
(c) 235 and 640 cylinders (d) 235 and 252 cylinders

49. How much space will be required to store the bit map of a 1.3 GB disk with 512 bytes block size?

(a) 332.8 KB (b) 83.6 KB (c) 266.2 KB (d) 256.6 KB

50. Linux operating system uses

(a) Affinity Scheduling (b) Fair Preemptive Scheduling
(c) Hand Shaking (d) Highest Penalty Ratio Next

PAPER : DEC. 2013

UGC-NET COMPUTER SCIENCE & APPLICATIONS (87)

PAPER-III

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

1. If the primal Linear Programming problem has unbounded solution, then it's dual problem will have
   (a) Feasible solution (b) Alternative solution
   (c) No feasible solution at all (d) No bounded solution at all

2. Given the problem to maximize $f(x), X = (x_1, x_2, ...x_n)$
   Subject to m number inequality constraints, $g_i(x) \le b_i, i = 1, 2, ...m$
   including the non-negativity constraints $x \ge 0$.
   Which of the following conditions is a Kuhn-Tucker necessary condition for a local maxima at $\bar{x}$?
   (a) $\frac{\partial L(\bar{X}, \bar{\lambda}, \bar{S})}{\partial x_j} = 0, j = 1,2,.....m$ (b) $\bar{\lambda}_i \left[g_i(\bar{X}) - b_i \right] = 0, i = 1, 2, ...m$
   (c) $g_i(\bar{X}) \le b_i, i = 1, 2, ...m$ (d) All of these

3. The following Linear Programming problem has:
   Max $Z = x_1 + x_2$
   Subject to $x_1 - x_2 \ge 0$
   $3x_1 - x_2 \le -3$
   and $x_1, x_2 \ge 0$
   (a) feasible solution (b) no feasible solution
   (c) unbounded solution (d) single point as solution

4. Given a flow graph with 10 nodes, 13 edges and one connected components, the number of regions and the number of predicate (decision) nodes in the flow graph will be
   (a) 4, 5 (b) 5, 4 (c) 3, 1 (d) 13, 8

5. Function points can be calculated by
   (a) UFP * CAF (b) UFP * FAC (c) UFP * Cost (d) UFP * Productivity

6. Match the following:

List-I	**List-II**
(A) Data coupling	(i) Module A and Module B have shared data
(B) Stamp coupling	(ii) Dependency between modules is based on the fact they communicate by only passing of data
(C) Common coupling	(iii) When complete data structure is passed from one module to another
(D) Content coupling	(iv) When the control is passed from one module to the middle of another.

Codes:

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

7. A process which defines a series of tasks that have the following four primary objectives is known as
(1) To identify all items that collectively define the software configuration
(2) To manage changes to one or more of these items.
(3) To facilitate the construction of different versions of an application
(4) To ensure that software quality is maintained as the configuration evolves over time
(a) Software Quality Management Process (b) Software Configuration Management Process
(c) Software Version Managment Process (d) Software Change Management Process

8. One weakness of boundary value analysis and equivalence partitioning is
(a) They are not effective
(b) They do not explore combinations of input circumstances.
(c) They explore combinations of input circumstances
(d) None of the above.

9. Which once of the following is not a software myth?
(a) Once we write the program and get it to work, our job is done.
(b) Project requirements continually change, but change can be easily accommodated because software is flexible.
(c) If we get behind schedule, we can add more programmers and catch up
(d) If an organization does not understand how to control software projects internally, it will invariably struggle when it outsources software projects.

10. Match the following with respect to relationship between objects and classes:

List-I	**List-II**
(A) State diagram	(i) Useful for both abstract modelling and for designing actual program
(B) Object diagram	(ii) Describes object classes
(C) Class diagram	(iii) Useful for documenting test cases
(D) Instance diagram	(iv) Describing the behaviour of a single class of objects.

Codes:

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

11. Match the following style rules for reusability:

List-I	**List-II**
(A) Keep methods coherent	(i) Write a method to get the last element of a list
(B) Keep methods small	(ii) Maintain parallel structure when possible
(C) Keep methods consistent	(iii) Breaking a method into smaller parts
(D) Provide uniform coverage	(iv) Performs a single function or a group of closely related functions

Codes:

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

12. Which is the protocol for performing RPCs between applications in a language and system independent way?
(a) Hyper Text Transmission Protocol (HTTP)
(b) Simple Network Management Protocol (SNMP)
(c) Simple Object Access Protocol (SOAP)
(d) Simple Mail Transfer Protocol (SMTP)

13. The document that is used by XSLT to indicate, how to transform the elements of the XML document to another format is
(a) HTML page (b) DOC type procedure
(c) Style sheet (d) Stored procedure

14. Which of the following concepts means adding new concepts to a program as it runs?
(a) Data hiding (b) Dynamic loading (c) Dynamic typing (d) Dynamic binding

15. Which of the following correctly describes overloading of functions?
(a) Virtual polymorphism (b) Transient polymorphism
(c) Ad-hoc polymorphism (d) Pseudo polymorphism

16. Match the following with respect to programming languages:

List-I	**List-II**
(A) Structured Language	(i) JAVA
(B) Non-structured Language	(ii) BASIC
(C) Object oreinted Programming	(iii) PASCAL
(D) Interpreted Programming Language	(iv) FORTRAN

Codes:

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

17. The compiler converts all operands upto the type of the largest operand is called
(a) Type promotion (b) Type evaluation (c) Type conversion (d) Type declaration

18. C++ actually supports the following two complete dynamic system
(a) One defined by C++ and the other not defined by C
(b) One defined by C and one specific to C++
(c) Both are specific to C++
(d) Both of them are improvements of C

19. Important advantage of using new delete operators in C++ is
(a) Allocation of memory
(b) Frees the memory previously allocated
(c) Initialization of memory easily
(d) Allocation of memory and frees and memory previously allocated.

20. Match the following control strategic of prolog:

List-I	**List-II**
(A) Forward movement	(i) Variable can be done with a constant, another variable or a function.
(B) Unification	(ii) The entire conjunctive goal is executed.
(C) Deep back-tracking	(iii) Previous sub goal to find alternative solutions
(D) Shallow back-tracking	(iv) Chooses sub goal with possible unifier.

Codes:

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

21. Given the following statements:

S_1: The grammar $S \rightarrow aSb \mid bSa \mid SS \mid a$ and $S \rightarrow aSb \mid bSa \mid a$ are not equivalent

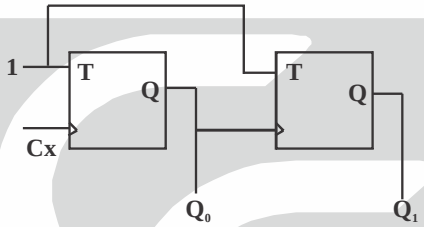
S_2: The grammar $S \rightarrow SS \mid SSS \mid aSb \mid bSa \mid \lambda$ and $S \rightarrow SS \mid aSb \mid bSa \mid \lambda$ are equivalent.

Which of the following is true?

(a) S_1 is correct and S_2 is not correct. (b) Both S_1 and S_2 are correct

(c) S_1 is not correct and S_2 is correct (d) Both S_1 and S_2 are not correct.

22. What are the final values of Q_1 and Q_0 after 4 clock cycles, if initial values are 00 in the sequential circuit shown below:



(a) 11 (b) 10 (c) 01 (d) 00

23. High level knowledge which relates to the use of sentences in different contexts and how the context affect the meaning of the sentences?

(a) Morphological (b) Syntactic (c) Semantic (d) Pragmatic

24. The objective of _____ procedure is to discover at least one _____ that causes two literals to match.

(a) Unification, validation (b) Unification, substitution

(c) Substitution, unification (d) Minimax, maximum

25. If h* represents an estimate of the cost of getting from the current node N to the goal node and h represents actual cost of getting from the current node to the goal node, then A* algorithm gives an optimal solution if

(a) h* is equal to h (b) h* overestimates h (c) h* underestimates h (d) none of these

26. The mean-end analysis process centers around the detection of differences between the current state and goal state. Once such a difference is isolated, an operator that can reduce the difference must be found. But perhaps that operator can not be applied to the current state. So, a sub-problem of getting to a state in which it can be applied is set up. The kind of backward chaining in which operators are selected and then sub goals are set up to establish the precondition of operators is called

(a) backward planning (b) goal stack planning

(c) operator subgoaling (d) operator overloading

27. In alpha-beta pruning, _____ is used to cut off the search at maximizing level only and ____ is used to cut off the search at maximizing level only.

(a) alpha, beta (b) beta, alpha (c) alpha, alpha (d) beta, beta

28. If A and B are two fuzzy sets with membership functions

$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$

Then the value of $\mu_{A \cap B}$ will be

(a) {0.2, 0.5, 0.6, 0.7, 0.9} (b) {0.2, 0.5, 0.2, 0.1, 0.8}
(c) {0.1, 0.5, 0.6, 0.1, 0.8} (d) {0.1, 0.5, 0.2, 0.1, 0.8}

29. The height h(A) is a fuzzy set A is defined as

$$h(A) = \text{sub } A(x)$$
$$x \in A$$

Then the fuzzy set A is called normal when
(a) h(A) = 0 (b) h(A) < 0 (c) h(A) = 1 (d) h(A) < 1

30. An artificial neuron receives n inputs $x_1, x_2, ...x_n$ with weights $w_1, w_2, ...w_n$ attached to the input links. The weighted sum _____ is computed to be passed on to a non-linear filter ϕ called activation function to release the output.

(a) Σw_i (b) Σx_i (c) $\Sigma w_i + \Sigma x_i$ (d) $\Sigma w_i\, x_i$

31. Consider the formula in image processing

$R_D = 1 - \frac{1}{C_R}$, where $C_R = \frac{n_1}{n_2}$

C_R is called as compression ratio n_1 and n_2 denotes the number of information carrying units in two datasets that represent the same information. In this situation R_D is the called as relative _____ of the first data set.
(a) Data compression (b) Data redudancy
(c) Data relation (d) Data representation

32. Find the false statement:
(a) In modern cryptography, symmetric key algorithms use same key both for encyption and decryption
(b) The symmetric cipher DES (Data Encyption Standard) was widely used in the industry for security product.
(c) The AES (Advanced Encryption Standard) cryptosystem allows variable key lengths of size 56 bits and 124 bits
(d) Public key algorithms use two different keys for encryption and decryption.

33. The message 11001001 is to be transmitted using the CRC polynomial $x^3 + 1$ to protect it from errors. The message that should be transmitted is
(a) 110010011001 (b) 11001001
(c) 1100100110001001 (d) 11001001011

34. _____comparisons are necessary in the worst case to find both the maximum and minimum of n numbers

(a) 2n–2 (b) n + floor (lgn)–2 (c) floor $\left(\frac{3n}{2}\right) - 2$ (d) 2lg n–2

35. Let A and B be two n×n matrices. The efficient algorithm to multiply the two matrices has the time complexity
(a) $O(n^3)$ (b) $O(n^{2.81})$ (c) $O(n^{2.67})$ (d) $O(n^2)$

36. The recurrence relation $T(n) = m\,T\left(\frac{n}{2}\right) + n^2$ is satisfied by

(a) $O(n^2)$ (b) $O(n^{1g\,m})$ (c) $O(n^2 \lg n)$ (d) O(n 1g n)

37. The longest common subsequence of the sequences X = <A, B, C, B, D, A, B> and Y = <B, D, C, A, B, A> has length
(a) 2 (b) 3 (c) 4 (d) 5

38. Assuming there are n keys and each key is in the range [0, m –1]. The run time of bucket sort is
(a) O(n) (b) O(n lgn) (c) O(n lgm) (d) O(n + m)

39. A _____ complete subgraph and a _____ subset of vertices of a graph G = (V, E) are a clique and a vertex cover respectively.
(a) Minimal, maximal (b) minimal, minimal (c) maximal, maximal (d) maximal, minimal

40. Pumping lemma for context-free language states:
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 $w = uvxy\,z$ with $|vxy|$ _____ and $|vy|$ _____ such that $uv^i\, xy^i\, Z \in L$ for all $i = 0,1,2,.....$
(a) $\leq m, \leq 1$ (b) $\leq m, \geq 1$ (c) $\geq m, \leq 1$ (d) $\geq m, \geq 1$

41. The Greibach normal form grammar for the language $L = \{a^n b^{n+1} \mid n \geq 0\}$ is
(a) $S \rightarrow aSB, B \rightarrow bB \mid \lambda$ (b) $S \rightarrow aSB, B \rightarrow bB \mid b$
(c) $S \rightarrow aSB \mid b, B \rightarrow b$ (d) $S \rightarrow a\,Sb \mid b$

42. Given the following statements:
S_1 : Every context-sensitive language L is recursive
S_2: There exists a recursive language that is not context sensitive.
(a) S_1 is not correct and S_2 is not correct (b) S_1 is not correct and S_2 is correct
(c) S_1 is correct and S_2 is not correct (d) S_1 is correct and S_2 is correct.

43. What is the bit rate for transmitting uncompressed 80×600 pixel colour frames with 8 bits/pixel at 40 frames/second?
(a) 2.4 Mbps (b) 15.36 Mbps (c) 153.6 Mbps (d) 1536 Mbps

44. In IPv 4, the IP address 200.200.200.200 belongs to
(a) Class A (b) Class B (c) Class C (d) Class D

45. Which layer of OSI reference model is responsible for decomposition of messages and generation of sequence numbers to ensure correct re-composition from end to end of the network?
(a) Physical (b) Data link (c) Transport (d) Application

46. A client-server system uses a satellite network, with the satellite at a height of 40, 000 kms. What is the best-case delay in response to a request? (Note that the speed of light in air is 3, 00, 000 km/second).
(a) 133.33 m sec (b) 266.67 m sec (c) 400.00 m sec (d) 533.33 m sec

47. The start and stop bits are used in serial communcation for
(a) error detection (b) error correction
(c) synchronization (d) slowing down the communication

48. _____ is a type of transmission impairment in which the signal looses strength due to the resistance of the transmission medium.
(a) Attenuation (b) Distortion (c) Noise (d) Decibel

49. Match the following

List-I	**List-II**
(A) indexed addressing	(i) is not used when an operand is moved from memory into a register or from a register to memory.
(B) Direct addressing	(ii) memory address is computed by adding up two reg isters plus an (optional) offset.
(C) Register addressing	(iii) Addressing memory by giving a register plus a context offset.
(D) Base-indexed addressing	(iv) can only be used to access global variables whose address is known at compile time.

Codes:

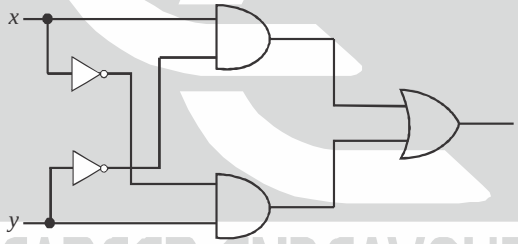
	A	B	C	D
(a)	ii	i	iv	iii
(b)	ii	iv	i	iii
(c)	iii	iv	i	ii
(d)	iii	i	iv	ii

50. Which of the following is a design criteria for instruction formats?
(a) The size of instructions
(b) The number of bits in the address fields.
(c) The sufficient space in the instruction format to express all the operations desired.
(d) All of these

51. Synchronization is achieved by a timing device called a _____ which generates a periodic train of _____
(a) clock generator, clock plus (b) master generator, clock pulse
(c) generator, clock (d) master clock generator, clock pulse

52. Serial access memories are useful in applications where
(a) Data consists of numbers
(b) Short access time is required
(c) Each stored word is processed differently
(d) None of these

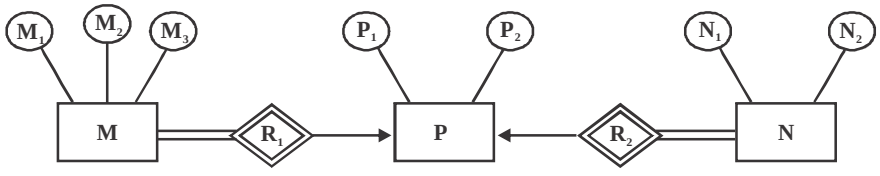
53. What will be the output of the following logic diagram?



(a) x OR y (b) x AND y (c) x XOR y (d) x XNOR y

54. The essential difference between traps and interrups is
(a) traps are asynchronous and interrupts are synchronous with the program
(b) traps are synchronous and interrupts are asynchronous with the program
(c) traps are synchronous and interrupts are asynchronous with the I/O devices
(d) None of these

55. Consider the following ER diagram.



The minimum number of tables required to represent M, N, P, R_1, R_2 is
(a) 2 (b) 3 (c) 4 (d) 5

56. Consider the following schemas:
Branch = (Branch-name, Assests, Branch-city)
Customer = (Customer-name, Bank name, Customer-city)
Borrow = (Branch-name, loan number, customer account-number)
Deposit = (Branch-name, Account-number, Customer-name, Balance)

Using relational Algebra, the Query that finds customers who have balance more than 10, 000 is _____

(a) $\pi_{customer-name}\left(\sigma_{blance>1000}(Deposit)\right)$ (b) $\sigma_{customer-name}\left(\sigma_{blance>1000}(Deposit)\right)$

(c) $\pi_{customer-name}\left(\sigma_{blance>1000}(Borrow)\right)$ (d) $\sigma_{customer-name}\left(\pi_{blance>1000}(Borrow)\right)$

57. Find the false statement:
(a) The relationship construct known as the weak relationship type was defined by Dey, Storey and Barron (1999)
(b) A weak relationship occurs when two relationship types are linked by either event-precedent sequence or condition-precedent sequence.
(c) Conceptual model is not accurate representation of "Universe of interest".
(d) Ternary, Quaternary and Quintary relationships are shown through a series of application scenario's and vignette's.

58. Consider the table:
Student(stuid, name, course, marks).
Which one of the following two queries is correct to find the highest marks student in course 5?
Q_1. Select S.stuid From student S Where not exists (select * from student e where e course = '5' and e marks $\geq$ s marks)
Q_2. Select s.stu.id From student S Where s.marks > any (select distinct marks from student S where s.course=5)
(a) Q_1 (b) Q_2 (c) Both Q_1 and Q_2 (d) Neither Q_1 nor Q_2

59. Armstrong (1974) proposed systematic approach to derive functional dependencies. Match the following w.r.t. functional dependencies:

List-I	**List-II**
(A) Decomposition rule	(i) If $X \to Y$ and $Z \to W$ then $\{X, Z\} \to \{Y, W\}$
(B) Union rule	(ii) If $X \to Y$ and $\{Y, W\} \to Z$ then $\{X, W\} \to Z$
(C) Composition rule	(iii) If $X \to Y$ and $X \to Z$ then $X \to \{Y, Z\}$
(D) Pseudo transitivity rule	(iv) If $X \to \{Y, Z\}$ then $X \to Y$ and $X \to Z$

Codes:

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

60. Match the following:

List-I	**List-II**
(A) Secondary index	(i) Functional dependency
(B) Non-procedural Query language	(ii) B-tree
(C) Closure of set of attributes	(iii) Relational Algebraic Operation
(D) Natural JOIN	(iv) Domain Calculus

Codes:

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

61. Which of the following is not true with respect to a trackball and/or spaceball?
(I) A trackball is a two dimensional positioning device while as a spaceball provides six degrees of freedom
(II) Unlike the trackball a spaceball does not actually move
(III) A trackball is a three dimensional positioning device while as a spaceball provides six degrees of freedom
(a) I and II (b) II and III (c) II only (d) III only

62. Which of the following statement(s) is (are) true?
(I) Two successive translations are additive
(II) Two successive rotations are additive
(III) Two successive scaling operations are multiplicative
(a) I and II (b) I and III, (c) II and III (d) All the above.

63. Given below are three basic rules
(I) Squash and Stretch (II) Slow-in and Slow-out (III) To stage the action properly
These rules are applied in case of
(a) Rendering (b) Morphing (c) Animation (d) All the above

64. Which of the following points lies on the same side as the origin, with refernce to the line $3x + 7y = 2$?
(a) (3, 0) (b) (1, 0) (c) (0.5, 0.5) (d) (0.5, 0)

65. The transformation matrix required for conversion of CMY colour model to RGB colour model is given as

(a) $\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} C \\ M \\ Y \end{bmatrix} - \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ (b) $\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} C \\ M \\ Y \end{bmatrix} - \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ (c) $\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} - \begin{bmatrix} C \\ M \\ Y \end{bmatrix}$ (d) $\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} C \\ M \\ Y \end{bmatrix} - \begin{bmatrix} 0.5 \\ 0.5 \\ 0.5 \end{bmatrix}$

66. What steps shall be required to rotate an object about the point P_1 (as shown in figure 1) and its placement such that what was at P_1 is now reduced and is at P_2 (as shown in figure 2)?

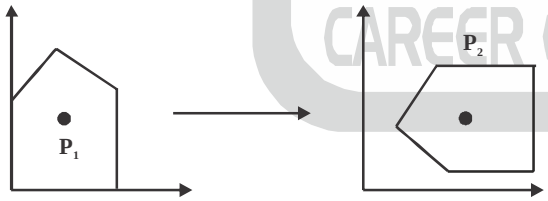


Figure-1 Figure-2

(I) Translate P1 to origin (II) Scale as required
(III) Rotate (IV) Translate to the final position P_2.
(a) I, II and III (b) II, III and IV (c) I, III and IV (d) All of the above.

67. In unix, how do you check that two given strings a and b are equal?
(a) test $a – eq $b (b) test $a – equal $b (c) test $a = $b (d) Sh-C test $a = = $b

68. In windows 2000 operating system all the processor-dependent code is isolated in a dynamic link library called
(a) NTFS file system (b) Hardware abstraction layer
(c) Microkernel (d) Process Manager

69. To place a sound into a word document, following feature of windows is used:
(a) Clip board (b) Task switching (c) C win App (d) OLE

70. Translation Look-aside Buffer (TLB) is
(a) a cache-memory in which item to be searched is compared one-by-one with the keys
(b) a cache-memory in which item to be searched is compared with all the keys simultaneously
(c) An associative memory in which item to be searched is compared one-by-one with the keys
(d) An associative memory in which item to be searched is compared with all the keys simultaneously.

71. Simplest way of deadlock recovery is
(a) Roll back (b) Preempt resource
(c) Lock one of the processes (d) Kill one of the processes

72. The directory structure used in Unix file system is called
(a) Hierarchical directory (b) Tree structured directory
(c) Directed acyclic graph (d) Graph structured directory.

73. Which statement is not true about process 0 in the Unix operating system?
(a) Process 0 is called init process
(b) Process 0 is not created by fork system call
(c) After forking process 1, process 0 becomes swapper process
(d) Process 0 is a special process created when system boots

74. Which of the following commands would return process_id of sleep command?
(a) Sleep 1 and echo $? (b) Sleep 1 and echo $#
(c) Sleep 1 and echo $× (d) Sleep 1 and echo $!

75. Possible thread states in Windows 2000 operating system include:
(a) Ready, running and waiting
(b) Ready, standby, running, waiting, transition and terminated
(c) Ready, running, waiting transition and terminated
(d) Standby, running, transition and terminated.