SUBJECT CODE	SUBJ	PAPER						
A-04-03 COMPUTER SC								
HALL TICKET N	UMBER		QUESTION BOOKLET					
			NUMBER					
OMR SHEET N	UMBER	1						
DURATION MAXIMUM MAR	KS	NUMBER OF PAGES	NUMBER OF QUESTIONS					
2 HOUR 30 MINUTES 150		16	75					
This is to certify that, the entries made in the above portion are correctly written and verified.								
andidates Signature			d Signature of Invigilator					
Instructions for the Candidates		అభ్యర్థల	ుకు సూచనలు					
 Write your Hall Ticket Number in the space provided on to of this page. This paper consists of seventy five multiple-choice t questions. At the commencement of examination, the question book be given to you. In the first 5 minutes, you are requested to given to you. In the first 5 minutes, you are requested to be given to you. In the first 5 minutes, you are requested to be given to you. In the first 5 minutes, you are requested to be given to you. In the first 5 minutes, you are requested to be given to you. In the first 5 minutes, you are requested to be given to you. In the first 5 minutes, you are requested to be given to you. In the first 5 minutes, you are requested to be given to you. In the first 5 minutes, you are requested to be given to you. In the first 5 minutes, you are requested to the booklet and compulsorily examine it as below: (i) To have access to the Question Booklet, tear off the seal on the edge of this cover page. Do not accept a twithout sticker-seal and do not accept an open bool (ii) Tally the number of pages and number of questint the booklet with the information printed on the page. Faulty booklets due to pages/questions m or duplicate or not in serial order or any discrepancy should be got replaced immediatel correct booklet from the invigilator within the p of 5 minutes. Afterwards, neither the Question B will be replaced nor any extra time will be given (iii) After this verification is over, the Test Booklet. Numb should be entered in the OMR Sheet and the OMR Sheet and the OMR Sheet and the OMR Sheet is the has four alternative responses marked (A), (and (D). You have to darken the circle as indicated below correct response against each item. Example: (A) (B) (D) 	klet will o open e paper booklet klet. ions in cover issing other ly by a period ooklet ber Sheet B), (C)	 ఈ పశ్చ ప్రతము డెభైఐదు బహ్యా పరీక్ష (స్రారంభమున ఈ ప్రశ్నాష) నివిషములలో <u>ఈ ప్రశ్నాషత్రమున</u> <u>సరిచూసుకోండి.</u> (i) ఈ ప్రశ్న పథ్రమును చూడు చించండి. స్ట్రిక్కర్ సీలులేని వ మీరు అంగీకరించవద్దు. (ii) కవరు పేజి పై ముదించిన స సంబంధించి గానీ లేదా సూచి కాకపోవుట లేదా ప్రశ్ను ప్రశ్న సంబంధించి గానీ లేదా సూచి కాకపోవుట లేదా ప్రశ్ను ప్రశ్న పర్యవేక్షకునికి తిరిగి ఇచ్చివేసి దా అదనంతరం ప్రశ్నపత్రము మ (iii) పై విధంగా నరిచాసుకొన్న త అదేవిధంగా OMR ప్రత్యమనం లుగా ఇవ్వుబడ్డాయి. ప్రత్యేషన్నయ లుగా ఇవులుగు ప్రత్యామ్నాయ లుగా ఇవులుగు ప్రత్యామ్నాయ 	ంలో మీ హాల్ టికెట్ నంబరు రాయండి. సైచ్ఫిక ప్రశన్ధలను కలిగి ఉంది. తము మీకు ఇవ్వబడుతుంది. మొదటి ఇ <u>ం తెరిచి కింద తెలిపిన అంశాలను తప్పనిస</u> కానికి కవర్పేజి అంచున ఉన్న కాగితపు సీల పురియు ఇదివరకే తెరిచి ఉన్న పశ్నాపత్రము సమాచారం ప్రకారం ఈ ప్రశ్నపత్రములేని 1 సంఖ్యను సరిచూసుకోండి. పీజీల సంఖ ంచిన సంఖ్యలో ప్రశ్నలు లేకపోవుల లేదా నిజ బప్రడిలో లేకపోవుల లేదా ఏనైనా తేడాలుంగ పడ్రాన్ని వెంటనే మొదటి ఐదు నిమిషాల్లో ప నికి బదులుగా సరిగ్గా ఉన్న ప్రశ్నపత్రాన్ని తీసుకో ఇర్రబడదు అదనపు సమయం ఇవ్వబడదు. ర్వాత ప్రశ్నాపత్రమ పైనిర్హిష్టలంలో రాయవ ప్రతిస్పందనలు (A), (B), (C) మరియు 5 ప్రతిస్పందనను ఎన్నుకొని కింద తెలిపిన విధ సంఖ్యకు ఇవ్వబడిన నాలుగు వృత్పాల్లో స బాల్ పాయింట్ పెన్తతో కింద తెలిపిన విధ					
where (C) is the correct response.		ఉదాహరణ : (A) (B)						
 Your responses to the items are to be indicated in the OMR A Sheet given to you. If you mark at any place other than circle in the Answer Sheet, it will not be evaluated. Read instructions given inside carefully. Rough Work is to be done in the end of this booklet. If you write your name or put any mark on any part of the Answer Sheet, except for the space allotted for the response. 	n in the e OMR elevant	ఇవ్వబడిన వృత్తాల్లోనే పూరించి గుర్తి గుర్తిస్తే మీ పతిన్నందన మూల్యాంక 6. ప్రశ్న పత్రము లోపల ఇచ్చిన సూచి 7. చిత్తుపనిని ప్రశ్నపత్రము చివర ఇచ్చి	రలను జాగ్రత్తగా చదవండి.					
 entries, which may disclose your identity, you will render you liable to disqualification. The candidate must handover the OMR Answer Sheet invigilators at the end of the examination compulsories must not carry it with you outside the Examination Ha candidate is allowed to take away the carbon copy of Sheet and used Question paper booklet at the end 	t to the ily and all. The f OMR	మీ గుర్తింపును తెలిపే విధంగా మీ పే గానీ చేసినట్లయితే మీ అనర్హతకు కి 9. పరీక్ష పూర్తయిన తర్వాత మీ OMR	రు రాయడం గానీ లేదా ఇతర చిహ్నాలను పేట్ట మిరే బాధ్యులవుతారు. ప త్రాన్ని తప్పనిసరిగా పరీక్ష పర్యవేక్షకుడికి ఇవె ళ్లకూడదు. పరీక్ష పూర్తయిన తరువాత అభ్యర క్క కార్బన్ కాపీని తీసుకువెళ్లపచ్చు.					
examination.). Use only Blue/Black Ball point pen.). Use of any calculator or log table etc., is prohibited. 2. There is no negative marks for incorrect answers.	. 1		ు, ఎల్క్రానిక్ పరికరాలు మొదలగునవి పరీక్షగు					
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COMPUTER SCIENCE AND APPLICATIONS

Paper – III

 The following numbers are inserted into an empty binary search tree in the given order: 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree (tree height is the maximum distance of a leaf node from the root) ?

(A) 2	(B) 3
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- (C) 4 (D) 6
- 2. What is the time complexity of the following recursive function ?

int DoThisThing (int n) {

if (n <= 2) return 1;

else return (DoThisThing

(floor(sqrt(n))) +n); }

- (A) Θ (n²)
- (B) Θ (n log₂ n)
- (C) Θ ($\log_2 n \log_2 n$)
- (D) Θ (log₂ n)

- 3. Let w be the minimum weight among all the edge weights in an undirected connected graph. Let e be a specific edge of weight w. Which of the following is FALSE?
 - (A) There is a minimum spanning tree containing e
 - (B) If e is not in a minimum spanning tree T after that in the cycle formed by adding e to T, all edges have the same weight.
 - (C) Every minimum spanning tree has an edge of weight w
 - (D) e is present in every minimum tree has an edge of weight w.
- 4. Algorithm for 0/1 knapsack Problem of3 instances can be designed using

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- (A) Greedy Method
- (B) Divide-and-Conquer
- (C) Dynamic Programming
- (D) All the above

- 5. Dijkstra algorithm is for finding
 - (A) Shortest paths from single source to several sinks.
 - (B) Minimum spanning tree for a graph
 - (C) Sorted list of nodes in a undirected graph with negative edge weights
 - (D) All the above
- 6. The problems 3-SAT and 2-SAT are
 - (A) both in P
 - (B) both NP-complete
 - (C) NP-complete and in P respectively
 - (D) undecidable and NP-complete respectively
- 7. Suppose A and B are two sets of strings from ∑*. Further suppose that B is a subset of A. Which of the following statement must always be true for A and B?
 - I. If A is finite then B is finite
 - II. If A is regular then B is regular
 - III. If A is context free then B is context free

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- (A) I only
- (B) II only
- (C) III only
- (D) All the above

8. Which of the following languages will be equivalent ?

 $L_1 = \{0^n 1^n / n \ge 1\}, L_2 = S \rightarrow 0S1 | 01; L_3 = 01 | 0^+011^+$

- (A) L_2 and L_3
- (B) L_3 and L_1
- (C) L_1 and L_2
- (D) L_1 , L_2 and L_3
- 9. Consider a DFA accepting all strings over {a, b} such that number of a's and b's are even. What is the minimum number of states such DFA will have?
 - (A) 2 (B) 4
 - (C) 6 (D) 8
- 10. Which one of the following is FALSE?
 - (A) There is a unique minimal DFA for every regular language.
 - (B) Every NFA can be converted to an equivalent PDA.
 - (C) Complement of every context-free language is recursive.
 - (D) Every non-deterministic PDA can be converted to an equivalent deterministic PDA

- 11. A shift reduce parser carries out the actions specified within braces immediately after reducing with the corresponding rule of grammar : S→xxW {print "1"}, S→Y {print "2"}, W→Sz {print "3"}. What is the translation of xxxxyzz using the syntax directed translation scheme described by the above rules
 - (A) 11231
 - (B) 33211
 - (C) 11233
 - (D) 23131
- 12. Let S be an NP-complete problem Q and R be two other problems not known to be in NP. Q is polynomial-time reducible to S and S is polynomial-time reducible to R. Which one of the following statements is true?
 - (A) R is NP-complete
 - (B) R is NP-hard
 - (C) Q is NP-complete
 - (D) Q is NP-hard
- Degree of Membership of x in Union of fuzzy sets A and B is defined as
 - (A) $\mu_{AUB}(x) = Max \{\mu_A(x), \mu_B(x)\}$
 - (B) $\mu_{AUB}(x) = \{x/x \text{ is in A or } x \text{ is in B or in both}\}$
 - (C) $\mu_{AUB}(x) = \mu_{A}(x). \mu_{B}(x)$
 - (D) $\mu_{AUB}(x) = Min \{\mu_A(x), \mu_B(x)\}$

- 14. The inner product and outer product of two fuzzy vectors a = (0.5, 0.2, 1.0, 0.8) and b = (0.8, 0.1, 0.9, 0.3) are respectively
 - (A) 1.56 and 0.44
 - (B) 0.5 and 0.5
 - (C) 0.9 and 0.2
 - (D) 1.56 and 8.44
- 15. Logistic sigmoid function is
 - (A) same as ramp function
 - (B) $1/(1+e^{-kx})$ with k is the steepness parameter
 - (C) $-1 + 2/(1+e^{-kx})$ with k is the steepness parameter
 - (D) None of the above
- 16. Given the statements
 - I. Simple Perceptions are single layer feed-forward networks
 - II. Simple Perceptions use binary activation functions
 - III. Simple Perception has output unit which has an activation 1, 0, -1
 - (A) I and II are correct
 - (B) I, II, III are correct
 - (C) II and III are correct
 - (D) I and III are correct

- **17.** Consider the grammar $E \rightarrow E + n |E \times n| n$. For a sentence n + n, the handles in the right-sentential form of the reduction are
 - (A) n, E + n and E + n x n
 - (B) n, E + n and E + E x n
 - (C) n, n + n and $n + n \times n$
 - (D) n, E +n and E x n
- 18. With reference to classes and member functions in C++, identify the FALSE statement among the following:
 - (A) Only the member functions can have access to private data members and private functions.
 - (B) Member functions can be defined inside or outside the class.
 - (C) A static member function can have access to the static members declared in any class.
 - (D) The keyword const is appended to the function prototype of a member function that does not alter any data in the class.

- **19.** Identify TRUE statement among the following with reference to inheritance concept in C++.
 - (A) A new class derived from base class using inheritance is known as super class.
 - (B) The private members of base class can be inherited.
 - (C) A member declared protected is accessible by any class immediately derived from it.
 - (D) An abstract class is one that is used to create objects.
- 20. Constructor in a OOP language
 - (A) helps us to construct objects of a class
 - (B) is a member function that initialize the objects of a class
 - (C) must be declared in a private section
 - (D) can be a virtual function
- 21. Which of the following is true?
 - (A) Optimal solution of Linear Programming Problem can always be identified only in middle of feasible region
 - (B) Optimal solution of Liner Programming Problem can always be identified with one of the feasible corner points of solution space
 - (C) Solution space of Linear Programming is always bounded
 - (D) Solution space of Linear Programming has finite number of solutions

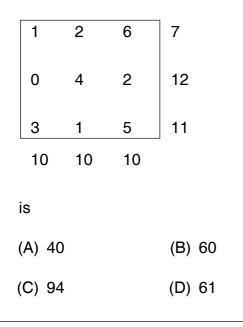
22. The optimal value of z for the following Linear Programming Problem is

Maximize $z = 5x_1 + 6x_2$

Subject to $x_1 - 2x_2 \ge 2$

 $-2x_1 + 3x_2 > = 2$

- x_1, x_2 are unrestricted in sign
- (A) 86
- (B) 86
- (C) unbounded solution
- (D) 6
- 23. The starting solution using least-cost method for the following transportation model



- 24. Which of the following statements are true?
 - I. Primal simplex method starts with feasible but not optimal
 - II. Dual simplex method starts infeasible but optimal
 - III. Primal simplex method starts with infeasible but optimal
 - IV. Dual simplex method starts feasible and optimal
 - (A) II and III only
 - (B) I, II and III only
 - (C) I and II only
 - (D) I, II, III and IV
- 25. The method used for in developing necessary Kuhn-Tucker conditions for identifying stationery points of non-linear constrained problem with constraints
 - (A) Min-Cut
 - (B) Lagrangean
 - (C) Vogel

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(D) Gomory's Cutting Plane

- 26. The following four statements were sought to bring out the similarities between the concept of a Table and that of a Relation (in Relational model of data). One of them is incorrect. Identify the INCORRECT choice.
 - (A) The number of rows in a table is the same as the cardinality of a relation
 - (B) The number of columns of a table is the same as the degree of a relation
 - (C) The tenth row of a Table is the 10thTuple of a Relation
 - (D) The column headings of a Table is the same as the Attribute names of a Relation
- 27. For a database relation R (a, b, c, d) where the domain of a, b, c, d include only atomic values. Only the following functional dependencies and those that can be inferred from them hold: a→ b, b→ d. The relation is
 - (A) in first normal form but not in second normal form
 - (B) in second normal form but not in third normal form
 - (C) in third normal form
 - (D) None

28. Consider the schedule consisting of sequence of Read (r) and Write (w) operations. Subscript of r and w denote two transactions 1 and 2.

$$\begin{split} r_1(A): w_1(A); r_2(A); w_2(A); r_1(B); w_1(B); \\ r_2(B); w_2(B) \end{split}$$

This schedule is of _____ serializable.

- (A) Time stamp
- (B) Non-serial
- (C) Conflict
- (D) Serial
- 29. Query By Example (QBE) is based on
 - (A) Tuple Calculus
 - (B) Domain Calculus
 - (C) SQL
 - (D) All of the above
- 30. A trigger is
 - (A) a statement that enables to start any DBMS
 - (B) a statement that is executed by the user when debugging an application program
 - (C) a condition the system tests for the validity of the user
 - (D) a statement that is executed automatically by the system as a side effect of modification to the database

- 31. RAID model is best suited for
 - (A) Extremely short development cycle
 - (B) Extremely large development cycle
 - (C) Suitable for any kind of development
 - (D) None of the above
- **32.** A level 0 Data Flow Diagram (DFD) is called
 - (A) Bubble chart
 - (B) Process chart
 - (C) ER Diagram
 - (D) Context diagram
- **33.** Which one of the following is equivalent for quality control in Software ?
 - (A) Defect prevention
 - (B) Variation control
 - (C) Defect removal
 - (D) Cost control
- **34.** Degree of Cohesion of objects can be determined by
 - (A) Total fan_in of all objects / Total fan_out
 - (B) Total fan_out of all objects / Total fan_in
 - (C) Total fan_out of all objects / Total objects
 - (D) Total fan_in / Total objects

- 35. Prototyping model is
 - (A) linear sequential model
 - (B) an iterative model
 - (C) an evolutionary model
 - (D) none
- **36.** Hamming distance of 5 can detect and correct errors in
 - (A) five bits
 - (B) three bits
 - (C) two bits
 - (D) one bit only
- **37.** Which of the following statements are true for Huffman Code ?
 - Huffman Coding
 - I. is an entropy encoding algorithm
 - II. is used for lossless data compression
 - III. makes use of a variable-length code
 - (A) II and III only
 - (B) I and II only
 - (C) I and III only
 - (D) All of these

- **38.** Find the statement(s) which is/are NOT applicable to BSC (*Binary Symmetric Channel*)
 - I. it can transmit only one of two symbols (0 and 1)
 - II. The transmission is assumed to be perfect, with the receiver getting the right bit.
 - III. Many problems in communication theory can be reduced to a BSC because it is one of the simplest noisy channels to analyze.
 - (A) III only
 - (B) II only
 - (C) I and III only
 - (D) II and III only
- 39. The IP delivery service is
 - (A) reliable, connection-oriented
 - (B) non-routable
 - (C) unreliable, connectionless
 - (D) none of the above
- **40.** What is the best description of switches and hubs from the list below?
 - (A) Hubs are faster than switches
 - (B) Switches setup virtual circuits and reduce network bandwidth
 - (C) More networking devices can be added to a hub
 - (D) Hubs support spanning trees, switches do not

- **41.** The best data structure to check whether an arithmetic expression has balanced parenthesis is
 - (A) Queue
 - (B) Stack
 - (C) Tree
 - (D) Graph
- **42.** In Hierarchical routing for 400 router subnet, the optimal number of levels is
 - (A) 20 (B) 400
 - (C) 3 (D) 6
- **43.** A device that merges several low-speed asynchronous signals into one high-speed synchronous circuit is called
 - (A) A de-multiplexer
 - (B) A concentrator
 - (C) A buffer
 - (D) A decoder
- **44.** While using Internet you can secure the communication best by using
 - (A) encoding
 - (B) encryption
 - (C) VOIP
 - (D) e-FAX

- 45. Page fault occurs when
 - (A) there is a mismatch between requested data and available data
 - (B) OS is finding fault with a page which is already loaded into memory
 - (C) OS is looking for a page which is not yet defined by the programmer/user
 - (D) OS is looking for a page which is not loaded into main memory
- **46.** Which of the following is correct with respect to *mailbox* in Inter-Process Communication ?
 - (A) Only the owner process can send messages to a *mailbox*
 - (B) No process other than the owner can send or receive messages to/from a mailbox
 - (C) Only the owner process can receive messages from a *mailbox*
 - (D) Any process can receive messages from a *mailbox*
- 47. A critical region is
 - (A) One which is enclosed by a pair of P and V operation on semaphores
 - (B) A program segment where shared resources are accessed
 - (C) A program segment that often causes unexpected system crashes
 - (D) A program segment that has not been proved bug-free

- **48.** Which of the following is NOT a valid deadlock prevention scheme?
 - (A) Release all resources before requesting a new resource
 - (B) Number all resources uniquely and never request a lower numbered resource than the last requested
 - (C) Never request a resource after releasing the resource
 - (D) Request and be allocated all required resources before execution
- 49. Thrashing
 - (A) reduces page I/O
 - (B) decreases the degree of multiprogramming
 - (C) implies excessive I/O
 - (D) improve the system performance
- **50.** In the relation instance given below, which of the following functional dependencies are satisfied on it.

		Α	В	С	
		1	4	2	
		1	5	3	
		1	6	3	
		3	2	2	
(A)	AB →	C and	a C →	А	
(B)	BC →	A and	B→	С	
(C)	BC →	A and	$A \rightarrow$	С	
(D)	AC \rightarrow	B and	a B →	А	

- 51. The minimum time delay between the initiation of two independent memory opertaions is called
 - (A) access time
 - (B) cycle time
 - (C) transfer time
 - (D) latency time
- 52. The first operating system used in Microprocessors is
 - (A) Zenix
 - (B) DOS
 - (C) CP/M
 - (D) Multics
- 53. A micro-programmed control unit
 - (A) is faster than a hard-wired control unit
 - (B) is useful when very small programs are to be run
 - (C) facilitates easy implementation of new instructions
 - (D) usually refers to the control unit of a micro-processor

- **54.** The interrupt vector address for TRAP 8085 in 8085 is
 - (A) 0000h (B) 0024h
 - (C) 0018h (D) 002ch
- 55. Von Neumann architecture is
 - (A) SISD (B) SIMD
 - (C) MIMD (D) MISD
- **56.** Which of the following devices has a relative origin ?
 - (A) joystick
 - (B) track ball
 - (C) mouse
 - (D) touch screen
- **57.** For a database relation R(X, Y, Z, P), where the domains of X, Y, Z, and P include only atomic values, and only the following functional dependencies and those that can be inferred from them hold: $X \rightarrow Z$, $Y \rightarrow P$.

The relation is

- (A) in first normal form but not in second normal form
- (B) in second normal form but not in third normal form
- (C) in third normal form
- (D) none of the above

- 58. Author-ware is a software for
 - (A) Software for book writing
 - (B) Creating multimedia documents
 - (C) Graphics creating
 - (D) Author's Database
- **59.** Raster Systems display a picture from a definition in a
 - (A) Display file program
 - (B) Frame grabber
 - (C) Frame buffer
 - (D) Display buffer
- **60.** The best suited hidden surface algorithm to deal with non-polygonal, non-planar surface patches is
 - (A) Painter's algorithm
 - (B) z-buffer algorithm
 - (C) Ray tracing
 - (D) Scan-line algorithm
- **61.** One of the most noticeable factors that limit processor chip's speed is
 - (A) Heat built on chip
 - (B) Large size of monitor
 - (C) Infrequent use of the Computer System
 - (D) Size of hard disk

- **62.** Any given Boolean expression can be implemented by using
 - (A) NAND and NOR gates only
 - (B) NAND gates only
 - (C) NOR gates only
 - (D) OR gates only
- **63.** The main disadvantage of DRAM over SPAM is
 - (A) High package density
 - (B) Costly
 - (C) External memory refresh logic is required
 - (D) High power consumption
- **64.** A micro-processor with a clock frequency of 100 MHz will have a clock period of
 - (A) 1 ns
 - (B) 10 ns
 - (C) 10000 ns
 - (D) 1000 ns
- **65.** The ALE line of an 8085 microprocessor is used to
 - (A) latch the output of an I/O instruction into an external latch.
 - (B) latch the 8 bits of address line AD7-ADO into external latch
 - (C) deactivate the chip-select signal from memory devices
 - (D) find the interrupt enable status of the TRAP interrupt

- **66.** The surface of the drum on which toner stucks is
 - (A) photogenic
 - (B) photoconductive
 - (C) photosensitive
 - (D) photonic
- 67. In clipping algorithm of Cohen & Sutherland using region codes, a line is already clipped if the
 - (A) logical OR of the end point code is0000
 - (B) logical OR of the end point code is not0000
 - (C) logical AND of the end point code is0000
 - (D) logical AND of the end point code is not 0000
- **68.** The refresh rate below which picture flickers is
 - (A) 20 (B) 25
 - (C) 30 (D) 35

- 69. Plasma panels are based on
 - (A) Liquit Crystal display
 - (B) Non-emissive display
 - (C) Gas discharge display
 - (D) Absorbing display
- **70.** Which of the following point lies on the same side of the origin, with reference to the line 3x + 7y = 2?
 - (A) (3,0)
 - (B) (1,0)
 - (C) (0.5, 0.5)
 - (D) (0.5, 0)
- **71.** Which of the following class allows creation of only one object ?
 - (A) Virtual class
 - (B) Abstract class
 - (C) Singleton class
 - (D) Friend class

- **72.** Which of the following concept is appropriate in determining what method to invoke at run time ?
 - (A) dynamic typing
 - (B) dynamic binding
 - (C) dynamic loading
 - (D) data hiding
- **73.** A horn clause with exactly one positive literal is called
 - (A) A definite clause
 - (B) A goal clause
 - (C) A fact
 - (D) A twist horn

- 74. BNF is a meta language for
 - (A) specifying the semantics of a language
 - (B) specifying the context free grammar
 - (C) describing how a program works
 - (D) shell programming
- **75.** As the number of entries in the Hash table increases, the number of collisions
 - (A) decreases
 - (B) remains same
 - (C) increases
 - (D) randomly changes

Space for Rough Work