

ENTRANCE EXAMINATION FOR ADMISSION, MAY 2011.

Ph.D. (COMPUTER SCIENCE)

COURSE CODE : 106

Register Number :

\_\_\_\_\_  
*Signature of the Invigilator*  
(with date)

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COURSE CODE : 106

Time : 2 Hours

Max : 400 Marks

*Instructions to Candidates :*

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you -1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. Where was India's first computer installed and when?
  - (A) Indian Institute of Technology, Delhi, 1977
  - (B) Indian Institute of Science, Bangalore, 1971
  - (C) Indian Iron & Steel Co. Ltd., 1968
  - (D) Indian Statistical Institute, Calcutta, 1955
  - (E) None of the above
  
2. Which of the following file organization is most efficient for a file with a high degree of file activity?
  - (A) Sequential
  - (B) ISAM
  - (C) VSAM
  - (D) B-Tree Index
  - (E) None of the above
  
3. How many address lines are needed to address each machine location in a  $1024 \times 8$  memory chip?
  - (A) 10
  - (B) 11
  - (C) 8
  - (D) 12
  - (E) None of the above
  
4. In Bucket sort, the set of keys mapped to the same bucket is called
  - (A) Collisions
  - (B) Hash clash
  - (C) Congestion
  - (D) All of the above
  - (E) None of the above
  
5. The amortized cost of insertion operation in splay tree is
  - (A)  $O(\log(n+1))$
  - (B)  $O(\log(n))$
  - (C)  $O(n+1)$
  - (D) All of the above
  - (E) None of the above
  
6. Which is also known as problem oriented language?
  - (A) High level language
  - (B) Machine language
  - (C) Assembly language
  - (D) Low level language
  - (E) None of the above
  
7. When converting binary tree into extended binary tree, all the original nodes in binary tree are
  - (A) Internal nodes on extended tree
  - (B) External nodes on extended tree
  - (C) Vanished on extended tree
  - (D) All of the above
  - (E) None of the above

8. The post order traversal of a binary tree is DEBFCA. Find out the pre order traversal
- (A) ABFCDE (B) ADBFEC  
(C) ABDECF (D) All of the above  
(E) None of the above
9. The \_\_\_\_\_ determines whether the project should go forward.
- (A) Feasibility assessment (B) Opportunity identification  
(C) System evaluation (D) All of the above  
(E) None of the above
10. Which of the following communications lines is best suited to interactive processing applications?
- (A) Narrow band channel (B) Simplex lines  
(C) Full duplex lines (D) All of the above  
(E) None of the above
11. A remote batch-processing operation in which data is solely input to a central computer would require
- (A) Telegraph line (B) Simplex lines  
(C) Mixed bad channel (D) All of the above  
(E) None of the above
12. Typically, adjacency lists are
- (A) Ordered (B) Unordered  
(C) Random (D) All of the above  
(E) None of the above
13. The loss in signal power as light travels down the fiber is called
- (A) Attenuation (B) Progragation  
(C) Scattering (D) All of the above  
(E) None of the above
14. A data terminal serves as a(n)
- (A) Effector (B) Sensor  
(C) Both (A) and (B) (D) Neither (A) nor (B)  
(E) None of the above

15. The main source of loss in transmission is due to
- (A) Attenuation
  - (B) Resistance
  - (C) External forces
  - (D) All of the above
  - (E) None of the above
16. Which of the following registers is used to keep track of address of the memory location where the next instruction is located?
- (A) Memory Address Register
  - (B) Memory Data Register
  - (C) Instruction Register
  - (D) Program Register
  - (E) None of the above
17. Sort/Report generators
- (A) are faster than index/report generators
  - (B) require more disk space than indexed/report generators
  - (C) do not need to sort before generating report
  - (D) both (A) and (B)
  - (E) none of the above
18. An audit trail
- (A) is used to make backup copies
  - (B) is the recorded history of operations performed on a file
  - (C) can be used to restore lost information
  - (D) all of the above
  - (E) none of the above
19. The relational database environment has all of the following components except
- (A) users
  - (B) separate files
  - (C) database
  - (D) query languages
  - (E) none of the above
20. Which of the following is not characteristic of COBOL
- (A) it is a very standardized language
  - (B) it is a very efficient in terms of coding and execution
  - (C) it has limited facilities for mathematical notation
  - (D) it is very readable language
  - (E) none of the above

21. In the evaluation of a computer language, all of the following characteristics should be considered except?
- (A) application oriented features                      (B) efficiency  
 (C) readability    (D) software development aids  
 (E) none of the above
22. To increase the value of  $c$  by one, which of the following statement is wrong?
- (A)  $c++$ ;                      (B)  $c = c + 1$ ;                      (C)  $c + 1 \Rightarrow c$ ;                      (D)  $c += 1$   
 (E) none of the above
23. When following piece of code is executed, what will happen?
- ```
b = 3;
a = b++;
```
- (A) a contains 3 and b contains 4                      (B) a contains 4 and b contains 4  
 (C) a contains 4 and b contains 3                      (D) a contains 3 and b contains 3  
 (E) none of the above
24. An alternate for socket is
- (A) User Datagram Protocol (UDP)                      (B) Packet  
 (C) Stub                                                              (D) Remote Procedure Call (RPC)  
 (E) None of the above
25. The physical location of a record is determined by a mathematical formula that transforms a file key into a record location in
- (A) tree file                                                      (B) an indexed file  
 (C) a hashed file                                                      (D) a sequential file  
 (E) none of the above
26. Which of the following is not a logical database structure?
- (A) Tree                                                              (B) Relational  
 (C) Network                                                              (D) Chain  
 (E) None of the above
27. Let  $R_1$  and  $R_2$  be regular sets defined over the alphabet  $\Sigma$ . Then
- (A)  $R_1 \cap R_2$  is not regular                      (B)  $R_1 \cup R_2$  is regular  
 (C)  $\Sigma^* - \Sigma$  is not regular                      (D)  $R_1^*$  is not regular  
 (E) None of the above

28. Let  $r = (1+0)^*$ ,  $S = 11^*0$  and  $t = 1^*0$  be three regular expressions. What is true?  
 (A)  $L(s) \leq L(r)$  and  $L(s) \leq L(t)$  (B)  $L(r) \leq L(s)$  and  $L(s) \leq L(t)$   
 (C)  $L(t) \leq L(s)$  and  $L(r) \leq L(s)$  (D)  $L(t) \leq L(s)$  and  $L(s) \leq L(r)$   
 (E) None of the above
29. Let  $\Sigma = \{a, b, c, d, e, f\}$ . the number of strings in  $\Sigma^*$  of length 4 such that no symbol is used more than once in a string is  
 (A) 35 (B) 360 (C) 720 (D) 36  
 (E) None of the above
30. A  $1024 \times 4$  bit ROM is used in two dimensional addressing. How many NAND gates are required?  
 (A) 1024 (B) 4096 (C) 164 (D) 128  
 (E) None of the above
31. In the negative logic system,  
 (A) the more negative of the two logic levels represents a logic '1' state.  
 (B) the more negative of the two logic levels represents a logic '0' state.  
 (C) all input and output voltage levels are negative.  
 (D) the output is always complement of the intended logic function.  
 (E) none of the above
32. A R-S latch is a  
 (A) combinational circuit (B) synchronous sequential circuit  
 (C) one bit memory element (D) one clock delay element  
 (E) none of the above
33. The subdivision of the physical layer permits  
 (A) a common LAN technology to operate over different types of media  
 (B) low-cost access to higher network layers  
 (C) application independent interfaces  
 (D) all of the above  
 (E) none of the above
34. Which of the following transmission media is not readily suitable to CSMA operation?  
 (A) Radio (B) Optical fibers  
 (C) Coaxial cable (D) Twisted pair  
 (E) None of the above

35. Which of the following systems provides the longest digital transmission distances?
- (A) Voiceband modem (B) Local Area Network  
 (C) Computer bus (D) Digital PBX  
 (E) None of the above
36. Suppose you're transmitting the 7-bit character whose decimal value is 65 using 8-bit odd parity. What is the binary value of the character?
- (A) 10000010 (B) 10000000 (C) 11000001 (D) 10000011  
 (E) None of the above
37. Services offered by session layer
- (A) Dialog Management (B) Synchronization  
 (C) Activity management (D) All of the above  
 (E) None of the above
38. Which one of the following statements could replace the ????? in the below to cause the string 1-2-3-10-5 to be printed when it is executed?
- ```
int x[]={1,2,3,4,5};
int u;
int *ptr = x;
?????
for (u=0;u<5;u++)
{
printf ("%d-",x [u]);
}
printf("\n");
```
- (A) \*(ptr + 3)= 10 (B) \*ptr + 3 =10 (C) \*(ptr[3])=10 (D) (\*ptr)[3] = 10  
 (E) none of the above
39. With what do you replace the???? to make the function shown below return the correct answer?
- ```
long factorial (long x)
{
??????
return x * factorial (x-1);
}
```
- (A) if (x == 0) return 1; (B) if (x<=1) return 1;  
 (C) if (x == 0 ) return 0; (D) return 1;  
 (E) none of the above

40. What will be output if you will execute the following c code?

```
#include<stdio.h>

void main(){
    int array[2][3]={5,10,15,20,25,30};
    int (*ptr)[2][3]=&array;
    printf("%d\t",***ptr);
    printf("%d\t",***(ptr+1));
    printf("%d\t",**(*ptr+1));
    printf("%d\t",*(**(*ptr+1)+2));
}
```

- (A) 5 Garbage value      20 30      (B) 5 15      20 25  
(C) 5 15      20 30      (D) Compilation error  
(E) None of the above

41. What will be output of the following c code?

```
#include<stdio.h>

int main(){
    static int i;
    for(++i;++i;++i) {
        printf("%d ",i);
        if(i==4) break;
    }
    return 0;
}
```

- (A) 34      (B) 44      (C) 24      (D) 12  
(E) None of the above

42. Which of the following is not correct about User\_Defined Exceptions?

- (A) Must be declared  
(B) Must be raised explicitly  
(C) Raised automatically in response to an Oracle error  
(D) All of the above  
(E) None of the above

43. Embedded pointer provides
- (A) a secondary access path (B) a physical record key  
 (C) an inverted index (D) all of the above  
 (E) none of the above
44. Assume that, in the suppliers relation below, each supplier and each street within a city has a unique name, and (sname, city) forms a candidate key. No other functional dependencies are implied other than those implied by primary and candidate keys. Which one of the following is TRUE about the above schema?
- Consider the following relational schema :
- Suppliers(sid:integer, sname:string, city:string, street:string)  
 Parts(pid:integer, pname:string, color:string)  
 Catalog(sid:integer, pid:integer, cost:real)
- (A) The schema is in BCNF  
 (B) The schema is in 3NF but not in BCNF  
 (C) The schema is in 2NF but not in 3NF  
 (D) The schema is not in 2NF  
 (E) None of the above
45. A relation R is defined as R (S#, STATUS, CITY, SNAME) where S# is the primary key. If R decomposed into two relations R<sub>1</sub> and R<sub>2</sub>, which of the following is not a loss less decomposition.
- (A) R<sub>1</sub>(S#,STATUS), R<sub>2</sub>(S#, CITY, SNAME)  
 (B) R<sub>1</sub>(S#,STATUS), R<sub>2</sub>(STATUS, CITY, SNAME)  
 (C) R<sub>1</sub>(S#,STATUS, CITY), R<sub>2</sub>(CITY, SNAME)  
 (D) R<sub>1</sub>(S#,STATUS, SNAME), R<sub>2</sub>(CITY, STATUS)  
 (E) None of the above
46. A data link between the head office of a financial organization and one of its branches runs continuously at 2.048 Mbps. Between the hours of 0900 and 1700 it is noted that there are 295 bits received in error. Determine the bit error rate.
- (A)  $5 \times 10^8$  (B)  $5 \times 10^{-8}$  (C)  $5 \times 10^{-9}$  (D)  $2 \times 10^{-7}$   
 (E) None of the above
47. The first Network Access System was developed by
- (A) Xerox (B) Microsoft (C) IBM (D) HP  
 (E) None of the above

48. A file is downloaded to a home computer using a 56 kbps modem connected to an Internet Service Provider. If the download completes in 2 minutes, estimate the maximum size of data downloaded.
- (A) 26.88 Mbit      (B) 6.72 Mbit.      (C) 336 Kbit.      (D) 13.44 Mbit.  
 (E) None of the above
49. A security measure to stop unauthorized access to documents is
- (A) Network access control  
 (B) Business continuity/disaster recovery  
 (C) Backup/restore  
 (D) Physical access restriction  
 (E) None of the above
50. Separate Read/Write heads are required in which of these memory access schemes.
- (A) Random Access      (B) Sequential Access  
 (C) Direct Access      (D) All of the above  
 (E) None of the above
51. Which of the following is not an advantage of the database approach?
- (A) Elimination of data redundancy  
 (B) Ability of associate deleted data  
 (C) Increased security  
 (D) All of the above  
 (E) None of the above
52. A database is said to possess an anomaly when
- (A) Updating involves changing more than one record  
 (B) Related data is deleted when a record is removed  
 (C) It is not possible to fill in all mandatory fields when a record is added  
 (D) All of the above  
 (E) -None of the above
53. Report generators are used to
- (A) store data input by a user      (B) retrieve information from files  
 (C) answer queries      (D) both (B) and (C)  
 (E) none of the above

54. A record management system
- (A) can handle many files of information at a time
  - (B) can be used to extract information stored in a computer file
  - (C) always uses a list as its model
  - (D) both (A) and (B)
  - (E) none of the above
55. Predict the output or error(s) for the following :
- ```
void main()
{
    int const * p=5;
    printf("%d",++(*p));
}
```
- (A) Syntax error
  - (B) Cannot modify a constant value
  - (C) Invalid pointer declaration
  - (D) All of the above
  - (E) None of the above
56. Bootstrapping is also know as
- (A) East booting
  - (B) Cold booting
  - (C) Hard booting
  - (D) All of the above
  - (E) None of the above
57. When inorder traversing a tree resulted E A C K F H D B G; the preorder traversal would return
- (A) FAEKCDHGB
  - (B) FAEKCDHGB
  - (C) EAFKHDCBG
  - (D) FEAKDCHBG
  - (E) None of the above
58. Which of the following is the formal specification language?
- (A) C
  - (B) B
  - (C) UML
  - (D) All of the above
  - (E) None of the above
59. Prototyping is a \_\_\_\_\_ software development method.
- (A) Waterfall model based
  - (B) Formal model based
  - (C) Evolutionary model based
  - (D) All of the above
  - (E) None of the above

60. System testing is a \_\_\_\_\_ method.
- (A) Validation (B) Verification  
(C) White box testing (D) All of the above  
(E) None of the above
61. Code coverage metrics are used in \_\_\_\_\_ testing methods
- (A) Black-box (B) White-box  
(C) Random (D) All of the above  
(E) None of the above
62. A function that calls itself for its processing is known as
- (A) Inline Function (B) Nested Function  
(C) Recursive Function (D) All of the above  
(E) None of the above
63. In Semaphores, special variable of Primitive Signal(s) is used
- (A) To receive a signal (B) To transmit a signal  
(C) To communicate a signal (D) All of the above  
(E) None of the above
64. The Java compiler translates source code into
- (A) Machine code (B) Assembly code  
(C) Byte code (D) All of the above  
(E) None of the above
65. In C++ when a variable is declared as static in inside a function then
- (A) The Value of the variable is retained between the function calls  
(B) There is no difference between the static variable and the global variable  
(C) The value of the variable cannot be changed  
(D) All of the above  
(E) None of the above
66. What is the appropriate pairing of items in the two columns, listing various activities encountered in a software life cycle?
- |                         |                                       |
|-------------------------|---------------------------------------|
| P. Requirements capture | 1. Module Development and Integration |
| Q. Design               | 2. Domain analysis                    |
| R. Implementation       | 3. Structural Behavioral Modeling     |
| S. Maintenance          | 4. Performance Tuning                 |
- (A) P-3, Q-2, R-4, S-1 (B) P-2, Q-3, R-1, S-4  
(C) P-3, Q-2, R-1, S-4 (D) All of the above  
(E) None of the above

67. Function point provide an objective measure of the application system's \_\_\_\_\_ that can be used to capture different kinds of application systems
- (A) Size
  - (B) Complexity
  - (C) Function oriented attributes
  - (D) All of the above
  - (E) None of the above
68. To implement all functions of the basic logic functions, it suffices to have
- (A) OR
  - (B) NOT
  - (C) AND and NOT
  - (D) All of the above
  - (E) None of the above
69. Consider relations R1 and R2 with  $n_1$  and  $n_2$  number of tuples. Which of the following operations results in  $n_1 * n_2$  number of tuples in the result?
- (A) Union
  - (B) Cartesian Product
  - (C) Natural Join
  - (D) All of the above
  - (E) None of the above
70. Binary search algorithm cannot be applied to
- (A) sorted linked list
  - (B) sorted binary trees
  - (C) sorted linear array
  - (D) All of the above
  - (E) None of the above
71. Which of the following devices operate at the Data Link layer of the OSI model?
- (A) A Hub
  - (B) A NIC
  - (C) A Switch
  - (D) A Router
  - (E) None of the above
72. Which of the following is not true about indexes in database?
- (A) Indexes can be created and dropped using SQL queries
  - (B) Indexes do not consumes extra space
  - (C) Speeds up execution of search queries
  - (D) Must be updated for every row insert and for every update of the key column
  - (E) None of the above

73. Which database structure consists of a set of two or more related tables with a minimum of one shared field between them?
- (A) Hierarchical (B) Network  
(C) Object-oriented (D) Relational  
(E) None of the above
74. Which of the following IEEE 802 standards pertain to token ring?
- (A) IEEE 802.5 (B) IEEE 802.3  
(C) IEEE 802.2 (D) IEEE 802.11  
(E) None of the above
75. Utility used to run applications on a computer at a remote location is
- (A) ODI (B) Telnet  
(C) ARP (Address Resolution Protocol) (D) All of the above  
(E) None of the above
76. Which of the following risks could result from inadequate software baselining?
- (A) Scope creep (B) Sign-off delays  
(C) Software integrity violations (D) Inadequate controls  
(E) None of the above
77. Which of the following is a dynamic analysis tool for the purpose of testing software modules?
- (A) Black box test (B) Desk checking  
(C) Structured walk-through (D) Design and code  
(E) None of the above
78. Which of the following are SCSI issues?
- (A) Unique ID settings (B) Parity  
(C) Passive and active termination (D) All of the above  
(E) None of the above

79. In reentrancy, activation means
- (A) each queue instance
  - (B) each execution instance
  - (C) each memory instance
  - (D) each page instance
  - (E) none of the above
80. FIFO anomaly means
- (A) the execution time decreases even when more frames are allocated to a process' virtual memory.
  - (B) the execution time increases even when more frames are allocated to a process' virtual memory.
  - (C) the execution time increases even when less frames are allocated to a process' virtual memory.
  - (D) the execution time decreases even when less frames are allocated to a process' virtual memory.
  - (E) none of the above
81. Syntax errors and Semantic errors can be detected at
- (A) compile time and compile time respectively
  - (B) compile time and run time respectively
  - (C) run time and compile time respectively
  - (D) run time and run time respectively
  - (E) none of the above
82. Binary semaphores are used
- (A) to implement mutual exclusion and synchronize concurrent processes
  - (B) to implement mutual exclusion only
  - (C) to synchronize concurrent processes only
  - (D) to avoid the circular queue only
  - (E) none of the above

83. Thrashing means

- (A) processor spends less time in swapping pages, rather than executing instructions.
- (B) processor spends same time in swapping pages, as same as executing instructions.
- (C) processor spends most of its time swapping pages, rather than executing instructions.
- (D) processor spends less time in paging, rather than executing instructions.
- (E) none of the above

84. What is the Output of the program?

```
main()
{
    char *p;
    printf("%d %d ",sizeof(*p),sizeof(p));
}
```

- (A) 1 2
- (B) 2 3
- (C) 3 4
- (D) Error
- (E) None of the above

85. What is the Output of the program?

```
main()
{
    int i=10;
    i=!i>14;
    printf("i=%d",i);
}
```

- (A) i=10
- (B) i=14
- (C) i=0
- (D) error
- (E) none of the above

86. What is the Output of the program?

```
main()
{
int i=5;
printf("%d%d%d%d%d%d",i++,i--,++i,--i,i);
}
```

- (A) 64544 (B) 45545  
(C) 54544 (D) 45465  
(E) None of the above

87. What is the Output of the program?

```
#include<stdio.h>
#define a 10
main()
{
#define a 50
printf("%d",a);
}
```

- (A) 10 (B) 50  
(C) 60 (D) Error  
(E) None of the above

88. In case of precondition to a member function,

- (A) It is a condition that must be true on entry to a member function.  
(B) A class is used correctly if preconditions are never false.  
(C) An operation is not responsible for doing anything sensible if its precondition fails to hold.  
(D) All of the above  
(E) None of the above

89. In case of post-condition to a member function,
- (A) It is a condition that must be true on exit from a member function if the precondition was valid on entry to that function.
  - (B) A class is implemented correctly if post-conditions are never true.
  - (C) An operation is not responsible for doing anything sensible if its precondition fails to hold.
  - (D) All of the above
  - (E) None of the above
90. Whether Linked List is linear or Non-linear data structure?
- (A) According to Access strategies Linked list is a linear one and according to Storage Linked List is a linear one.
  - (B) According to Access strategies Linked list is a linear one and according to Storage Linked List is a Non-linear one.
  - (C) According to Access strategies Linked list is a non-linear one and according to Storage Linked List is a Non-linear one.
  - (D) According to Access strategies Linked list is a non-linear one and according to Storage Linked List is a linear one.
  - (E) None of the above
91. Arm-stickiness mostly affects
- (A) High-density multi-surface disks
  - (B) Low-density multi-surface disks
  - (C) High-density single-surface disks
  - (D) Low-density single-surface disks
  - (E) None of the above
92. Stipulations of C2 level security include
- (A) Discretionary Access Control
  - (B) Identification and Authentication
  - (C) Auditing and Resource reuse
  - (D) All of the above
  - (E) None of the above

93. Busy waiting causes

- (A) Repeated execution of a loop of code while waiting for an event to occur
- (B) CPU is not engaged in any real productive activity during this period
- (C) Process does not progress toward completion
- (D) All of the above
- (E) None of the above

94. What is the Output of the program?

```
#define f(g,g2) g##g2

main()
{

int var12=100;

printf("%d",f(var,12));

}
```

- (A) Address of the Variable var 12
- (B) 1
- (C) 100
- (D) Error
- (E) None of the above

95. If two base classes have no overlapping methods or data they are said to be

- (A) Orthogonal base classes
- (B) Compositional base classes
- (C) Aggregation base classes
- (D) All of the above
- (E) None of the above

96. Pick the odd one out

The E-R model is used to specify

- (A) The entities of the database
- (B) The relationships between the entities of the database
- (C) The functional requirements of the enterprise
- (D) All of the above
- (E) None of the above

97. The database design is called as

- (A) Conceptual design
- (B) Logical design
- (C) Physical design
- (D) All of the above
- (E) None of the above

98. With respect to an E-R model the term 'account' signifies

- (A) Entity
- (B) Attribute
- (C) Relation
- (D) All of the above
- (E) None of the above

99. Statement-A : A minimum spanning tree is a spanning tree organized so that the total edge weight between nodes is minimized.

Statement-B : Minimum spanning tree of a graph gives the shortest distance between any 2 specified nodes.

- (A) Statement A is True and Statement B is False.
- (B) Statement A is True and Statement B is True.
- (C) Statement A is False and Statement B is True.
- (D) Statement A is False and Statement B is False.
- (E) None of the above

100. While designing the Business Continuity Plan (BCP) for an airline reservation system, the MOST appropriate method of data transfer/backup at an offsite location would be

- (A) shadow file processing
- (B) electronic vaulting
- (C) hard-disk mirroring
- (D) hot-site provisioning
- (E) none of the above