ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.

Ph.D. (COMPUTER SCIENCE AND ENGINEERING)

COURSE CODE : 106

Register Number :

Signature of the Invigilator
(with date)

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) or (E) 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.

Directions for the Questions 1 to 5: Assume that a pool of jobs to be executed with one processor with following specifications:

Job	Execution Time	Priority
A	11	4
B	1	3
C	2	2
D	1	5
E	5	1

The jobs are assumed to have arrived in the order A, B, C, D, E, but all have arrived in "instantaneous succession" at time t = 0. Here the unit of the time is second Larger priority numbers indicate higher priority. Note that the terms "turnaround time" and "response time" are interchangeable for this problem, since each job consists of only one CPU burst.

1. Using the First-Come First-Served (FCFS) scheduling algorithm, the Turnaround (Response) Time and the Waiting Time of the Job 'A' is ———————— seconds respectively.

(A) 11 and 0 (B) 12 and 11

(C) 14 and 12 (D) 15 and 14

(E) None of the above

2. Using the First-Come First-Served (FCFS) scheduling algorithm, the Turnaround (Response) Time and the Waiting Time of the Job 'B' is ———————— seconds respectively.

(A) 11 and 0 (B) 12 and 11

(C) 14 and 12 (D) 15 and 14

(E) None of the above

3. Using the First-Come First-Served (FCFS) scheduling algorithm, the Turnaround (Response) Time and the Waiting Time of the Job 'C' is ———————— seconds respectively.

(A) 11 and 0 (B) 12 and 11

(C) 14 and 12 (D) 15 and 14

(E) None of the above

4. Using the First-Come First-Served (FCFS) scheduling algorithm, the Turnaround (Response) Time and the Waiting Time of the Job 'D' is ———————— seconds respectively.

(A) 11 and 0 (B) 12 and 11

(C) 14 and 12 (D) 15 and 14

(E) None of the above

5. Using the First-Come First-Served (FCFS) scheduling algorithm, the Turnaround (Response) Time and the Waiting Time of the Job 'E' is ———————— seconds respectively.

(A) 11 and 0
(B) 12 and 11
(C) 14 and 12
(D) 15 and 14
(E) None of the above

6. Match the following :

(a)	Disk scheduling	1.	Round-robin
(b)	Batch processing	2.	SCAN
(c)	Time sharing	3.	LIFO
(d)	Interrupt processing	4.	FIFO

Matches :

	(a)	(b)	(c)	(d)
(A)	3	4	2	1
(B)	4	3	2	1
(C)	2	4	1	3
(D)	1	4	3	2

(E) None of the above

7. ———————— is one of pre-emptive scheduling algorithm.

(A) RR
(B) FCFS
(C) SSF
(D) Priority based
(E) None of the above

8. Top-down design does not require

(A) step-wise refinement
(B) loop invariants
(C) flow charting
(D) modularity
(E) None of the above

9. At any given time Parallel Virtual Machine (PVM) has ———————— send buffer and ———————— receive buffer.

(A) One-one
(B) One-two
(C) Two-two
(D) Two-one
(E) None of the above

10. An undirected graph possesses an eulerian circuit if and only if it is connected and its vertices are

(A) All of even degree
(B) All of odd degree
(C) Of any degree
(D) ALL of the above
(E) None of the above

11. The minimum number of edges in a connected graph with 'n' vertices is equal to

(A) n (n – 1)
(B) n (n – 1)/2
(C) n^2
(D) n – 1
(E) None of the above

12. The decimal number equivalent of (4057.06)8 is

(A) 2095.75
(B) 2095.075
(C) 2095.937
(D) 2095.0937
(E) None of the above

13. Back propagation is a learning technique that adjusts weights in the neural network by propagating weight changes

(A) Forward from source to sink
(B) Backward from sink to source
(C) Forward from source to hidden nodes
(D) Backward from since to hidden nodes
(E) None of the above

14. Prototyping is used to

(A) test the software as an end product
(B) expand design details
(C) refine and establish requirements gathering
(D) complete the end product with minimal set of functionalities
(E) none of the above

15. Which one of these are not software maintenance activity?

(A) Error correction
(B) Adaptation
(C) Implementation of Enhancement
(D) Establishing scope
(E) None of the above

16. A data mart may contain

(A) Summarised data
(B) De-normalized data
(C) Aggregate departmental data
(D) All of the above
(E) None of the above

17. The number of 1's present in the binary representation of $10 \times 256 + 5 \times 16 + 5$ is

(A) 5
(B) 6
(C) 7
(D) 8
(E) None of the above

18. The goal of operator overloading is

(A) To help the user of a class
(B) To help the developer of a class
(C) To help define friend function
(D) All of the above
(E) None of the above

19. The amortized cost of insertion operation in splay tree is

(A) O(log(n+1))
(B) O(log(n))
(C) O(n+1)
(D) O(n)
(E) None of the above

20. Which of the following is the process by which a user's privileges ascertained?

(A) Authorization
(B) Authentication
(C) Access Control
(D) All of the above
(E) None of the above

21. The basic variants of time-stamp based method of concurrency control are

(A) Total time stamp-ordering
(B) Partial time stamp-ordering
(C) Multiversion Time stamp-ordering
(D) All of the above
(E) None of the above

22. How many maximum number of stacks that can be implemented in single dimensional linear array of size 'n'?

(A) 1
(B) n/2
(C) n
(D) 2n
(E) None of the above

23. The number of different trees with 8 nodes is

(A) 256 (B) 255

(C) 248 (D) 64

(E) None of the above

24. When the priority queue is represented by max heap, the insertion and deletion of an element can be performed in (queue containing n elements)

(A) O(n) and O(1) respectively (B) O(n) and O(n) respectively

(C) O(1) and O(1) respectively (D) O(1) and O(n) respectively

(E) None of the above

25. Which of the following switching techniques is most suitable for interactive traffic?

(A) Circuit switching (B) Message switching

(C) Packet switching (D) All of the above

(E) None of the above

26. Which of the following can be accessed by transfer vector approach of linking?

(A) External data segments (B) External subroutine

(C) Data located in other procedure (D) All of the above

(E) None of the above

27. By means of a data flow diagram, the analyst can detect

(A) Task duplication (B) Unnecessary delays

(C) Task overlapping (D) All of the above

(E) None of the above

28. "M-Commerce" refers to

(A) A myth which does not exist in reality

(B) The ability of business to reach potential customers wherever they are

(C) The ability to have large capacity of memory storage dealing trade and commerce

(D) All of the above

(E) None of the above

29. Maximum number of edges in a n- Node undirected graph without self loop is

(A) n^2 (B) $n(n-1)$

(C) $n(n+1)$ (D) $n(n-1)/2$

(E) None of the above

30. A station in a network in a network forward incoming packets by placing them on its shortest output queue. What routing algorithm is being used?

(A) Hot potato routing
(B) Flooding
(C) Static routing
(D) Delta routing
(E) None of the above

31. What is the order of each of the following tasks respectively?

(i) Inserting a single item into a binary search tree containing n items, in the average case

(ii) Performing a Towers of Hanoi algorithm with n disks

(A) $O(2^n)$ & $O(\text{Log } 2^n)$
(B) $O(\text{Log } n^2)$ & $O(2^n)$
(C) $O(n^2)$ & $O(n^2)$
(D) $O(2^n)$ & $O(n^2)$
(E) None of the above

32. Emergency fixes known as patches are result of

(A) Adaptive maintenance
(B) Perfective maintenance
(C) Corrective maintenance
(D) All of the above
(E) None of the above

33. The post order traversal of a binary tree is DEBFCA Find out the preorder traversal

(A) ABFCDE
(B) ADBFEC
(C) ABDECF
(D) ABDCEF
(E) None of the above

34. B+ tree are preferred to binary tree in database because

(A) Disk capacities are greater than memory capacities
(B) Disk access much slower than memory access
(C) Disk data transfer rates are much less than memory data transfer rate
(D) Disk are more reliable than memory
(E) None of the above

35. What deletes the èntire file except the file structure?

(A) ERASE
(B) DELETE
(C) ZAP
(D) PACK
(E) None of the above

36. Consider a disk drive that has a capacity of 8 Gigabytes (assume 1GB = 1,000,000,000 bytes). If that drive has 5 platters (assume that both sides are used), 10,000 tracks per surface, and an average of 200 sectors per track, how many bytes are in each sector?

(A) 800 bytes per sector
(B) 400 bytes per sector
(C) 200 bytes per sector
(D) 100 bytes per sector
(E) None of the above

37. On receiving an interrupt from an I/O device, the CPU

(A) Halts for predetermined time
(B) Branches off to the interrupt service routine after completion of the current instruction
(C) Branches off to the interrupt service routine immediately
(D) Hands over control of address bus and data bus to the interrupting device
(E) None of the above

38. Consider a logical address space of 8 pages of 1024 words mapped with memory of 32 frames. How many bits are there in the physical address?

(A) 9 bits
(B) 11 bits
(C) 13 bits
(D) 15 bits
(E) None of the above

39. If an integer needs two bytes of storage, then the maximum value of unsigned integer is

(A) $2^{16} - 1$
(B) $2^{15} - 1$
(C) 2^{16}
(D) 2^{15}
(E) None of the above

40. Negative numbers cannot be represented in

(A) Signed magnitude form
(B) 1's complement form
(C) 2's complement form
(D) All of the above
(E) None of the above

41. Handoff is the mechanism that

(A) Transfer an ongoing call from one transceiver to another transceiver
(B) Transfer an ongoing call from one base station to another
(C) Dropping an ongoing call and initiating a new call
(D) Migrating one call to another
(E) None of the above

42. Consider the grammar

$S \rightarrow ABCc \mid Abc$

$BA \rightarrow AB$

$Bb \rightarrow bb$

$Ab \rightarrow ab$

$Aa \rightarrow aa$

Which of the following sentences can be derived by this grammar?

(A) abc
(B) aab
(C) abcc
(D) abbc
(E) none of the above

43. Identify the incorrect statement :

(A) The ATM adoption layer is not service dependent
(B) Logical connections in ATM are referred to as virtual channel connections
(C) ATM is streamlined protocol with minimal error and flow control capabilities
(D) ATM is also known as cell delays
(E) None of the above

44. Software risk estimation involves following two tasks :

(A) Risk magnitude and risk impact
(B) Risk probability and risk impact
(C) Risk maintenance and risk impact
(D) Risk development and risk impact
(E) None of the above

45. To compare, overlay or cross analyze to maps in GIS

(A) Both maps must be in digital form
(B) Both maps must be at the same equivalent scale
(C) Both maps must be on the same coordinate system
(D) All of the above
(E) None of the above

46. Web Mining is not used in which of the following areas?

(A) Information filtering
(B) Crime fighting on the internet
(C) Online transaction processing
(D) Click stream analysis
(E) None of the above

47. The number of nodes in a complete binary tree of height h (with roots at level 0) is equal to

(A) $2^0+2^1+\ldots\ldots 2^h$
(B) $2^0+2^1+\ldots\ldots 2^{h-1}$
(C) $2^0+2^1+\ldots\ldots 2^{h+1}$
(D) $2^1+\ldots\ldots 2^{h+1}$
(E) None of the above

48. The complexity of Bubble sort algorithm and merge sort algorithm is _____ respectively.

(A) O(n) and O(log n)
(B) O(log n) and $O(n^2)$
(C) $O(n^2)$ and O(n log n)
(D) O(n log n) and $O(n^2)$
(E) None of the above

49. Inverted files are characterized by

(A) Each record contains multiple index fields
(B) Embedded tags
(C) An external index table with an entry for each keyword
(D) All of the above
(E) None of the above

50. If 'h' is any hashing function and is used to hash 'n' keys in to a table of size 'm', where n<=m, the expected number of collisions involving a particular key 'x' is :

(A) Less than 1
(B) Less than n
(C) Less than m
(D) Less than n/2
(E) None of the above

51. Let A be an adjacency matrix of a graph G. The ij^{th} entry in the matrix A^K, gives

(A) The number of paths of length K from vertex V_i to vertex V_j
(B) Shortest path of K edges from vertex V_i to vertex V_j
(C) Length of a Eulerian path from vertex V_i to vertex V_j
(D) Length of a Hamiltonian cycle from vertex V_i to vertex V_j
(E) None of the above

52. What is the following code segment doing?

```
void fn( ){
char c;
cin.get(c);
if (c != '\n') {
fn( );
cout.put(c);
}
}
```

(A) The string entered is printed as it is
(B) The string entered is printed in reverse order
(C) It will go in an infinite loop
(D) It will print an empty line
(E) None of the above

53. The searching technique that takes O(1) time to find a data is

(A) Linear Search
(B) Binary Search
(C) Hashing
(D) Tree Search
(E) None of the above

54. The number of interchanges required to sort 5, 1, 6, 2 4 in ascending order using Bubble Sort is

(A) 6
(B) 5
(C) 7
(D) 8
(E) None of the above

55. The solution of the recurrence relation $a_n = 2a_{n-1}+1$ with initial condition $a_1 = 1$ is

(A) 2^n+1
(B) 2^n-1
(C) $2^{n-1}+1$
(D) All of the above
(E) None of the above

56. Merging 4 sorted files containing 50, 10, 25 and 15 records will take ———— time.

(A) O (100)
(B) O (200)
(C) O (175)
(D) O (125)
(E) None of the above

57. For an undirected graph with n vertices and e edges, the sum of the degree of each vertex is equal to

(A) 2n
(B) (2n-1)/2
(C) 2e
(D) $e^2/2$
(E) None of the above

58. A B-tree of minimum degree t can maximum ———— pointers in a node

(A) t–1
(B) 2t–1
(C) 2t
(D) t
(E) None of the above

59. The goal of hashing is to produce a search that takes

(A) O(1) time
(B) $O(n^2)$ time
(C) O(log n) time
(D) O(n log n) time
(E) None of the above

60. A shift reduce parser carries out the actions specified within braces immediately after reducing with the corresponding rule of grammar.

$S \rightarrow xxW$ { print " 1" }

$S \rightarrow y$ { print "2" }

$W \rightarrow Sz$ { print "3" }

What is the translation of xxxxyzz using the syntax directed translation scheme described by the above rules?

(A) 23131 (B) 11233

(C) 11231 (D) 33211

(E) None of the above

61. A file produced by a spreadsheet

(A) Is generally stored on disk in an ASCII text format

(B) Can be used as it by the DBMS

(C) Can be used for graphic

(D) All of the above

(E) None of the above

62. Data integrity control

(A) Is used to set upper and lower limits on numeric data

(B) Requires the use of passwords to prohibit unauthorized access to the file

(C) Has the data dictionary keep the date and time of last access last back-up, and most recent modification for all files

(D) All of the above

(E) None of the above

63. The physical location of a record is determined by a mathematical formula that transforms a file key into a record location in

(A) a tree file (B) an indexed file

(C) a hashed file (D) a sequential file

(E) None of the above

64. Which type of file is part of the Oracle database?

(A) Control file (B) Password file

(C) Parameter files (D) Archived log files

(E) None of the above

65. When is the SGA created in an Oracle database environment?

(A) When the database is created

(B) When a user process is started

(C) When the database is mounted

(D) When the instance is started

(E) None of the above

66. A network that requires human intervention of route signals is called a

(A) Bus Interface network

(B) Ring network

(C) Star Optional network

(D) T-switched network

(E) None of the above

67. Consider the following languages:

$L_1 = \{WW \mid W \in \{a, b\}^*\}$

$L_2 = \{ ww^R \mid w \in \{a, b\}^* , w^R$ is the reverse of w$\}$

$L_3 = \{ 0^{2i} \mid I$ is an integer$\}$

$L_4 = \{ 0^{i2} \mid I$ is an integer$\}$

Which of the following are regular?

(A) Only L_1 and L_2

(B) Only L_2, L_3, and L_4

(C) Only L_3 and L_4

(D) Only L_3

(E) None of the above

68. If digital data rate of 9600 bps is encoded using 8-level phase shift keying method, the modulation rate is?

(A) 1200 bands

(B) 3200 bands

(C) 4800 bands

(D) 9600 bands

(E) None of the above

69. Which of the following is not a standard RS-232C signal?

(A) RTS

(B) CTS

(C) DSR

(D) VDR

(E) None of the above

70. Which of the following is / are non-polling system?

(A) TDMA

(B) Stop and wait

(C) Continuous ARQ

(D) All of the above

(E) None of the above

71. Manchester encoding is principally designed to?

(A) Ensure that the line remains unbalanced

(B) Have more than one symbol per bit period

(C) Increase the bandwidth of a signal transmitted on the medium

(D) Ensure that a transition occurs in the center of each bit period

(E) None of the above

72. ———————— supports Data Rate Upto 1000 Mbps Gigabyte Ethernet.

(A) CAT 1

(B) Thinnet

(C) CAT 5d

(D) CAT 5e

(E) None of the above

73. TCP/IP is also well known as

(A) OSI Model

(B) TAT Model

(C) DOD Model

(D) TIP Model

(E) None of the above

74. IPX/SPX is used in

(A) Novell's Netware Network

(B) Mac–Macintosh

(C) Apple

(D) Microsoft

(E) None of the above

75. The area of coverage of satellite radio beam is known as?

(A) Footprint

(B) Circular polarization

(C) Beam width

(D) Identity

(E) None of the Above

76. Which of the following is wrong example of network layer ?

(A) X.25 Level 2-ISO

(B) Source Routing and Domain Naming Usenet

(C) Internet Protocol(IP) - ARPANET

(D) X-25 Packet Level Protocol (PLP) - ISO

(E) None of the above

77. Which of the following does not belong to the context free grammer?

(A) Terminal symbol

(B) Non-terminal symbol

(C) Start symbol

(D) End symbol

(E) None of the above

78. HDLC is

(A) Bit oriented
(B) Code transparent
(C) Code dependent
(D) All of the above
(E) None of the above

79. Adaptive or dynamic directory used in packet routing changes

(A) Within each user session
(B) Immediately next user session
(C) At system generation times only
(D) All of the above
(E) None of the above

80. The receive equalizer reduce delay distortions using

(A) Tapped delay lines
(B) Gearshift
(C) Descrambler
(D) Difference engine
(E) None of the above

81. Context free languages are closed under

(A) Union, intersection, Concatenation
(B) Intersection, complement, kleene star
(C) Union, kleene star, Concatenation
(D) Complement, kleene star, Concatenation
(E) None of the above

82. Let R be a symmetric and transitive relation on a set A Then

(A) R is reflexive and hence a partial order
(B) R is reflexive and hence an equivalence relation
(C) R is not reflexive and hence not an equivalence relation
(D) All of the above
(E) None of the above

83. A Pushdown automata is.....if there is at most one transition applicable to each configuration.

(A) Deterministic
(B) Non Deterministic
(C) Finite
(D) Non Finite
(E) None of the above

84. Radius of a graph, denoted by rad(G) is defined by

(A) max {e(v): v belongs to V }

(B) min { e(v): v belongs to V}

(C) max { d(u,v): u belongs to v, u does not equal to v }

(D) min { d(u,v): u belongs to v, u does not equal to v }

(E) none of the above

85. The complete graph K, has... different spanning trees?

(A) n^{n-2} (B) n*n

(C) n^n (D) n^2

(E) None of the above

86. Polyhedral is

(A) A simple connected graph

(B) A plane graph

(C) A graph in which the degree of every vertex and every face is atleast 3

(D) All of the above

(E) None of the above

87. If X and Y be the sets. Then the set (X – Y) union (Y – X) union (X intersection Y) is equal to

(A) X union Y (B) X^c union Y^c

(C) X intersection Y (D) X^c intersection Y^c

(E) None of the above

88. A bilinear transformation can be simulated by the transformation

(A) Rotation (B) Stretching

(C) Inversion and translation (D) All of the above

(E) None of the above

89. Consider the relation A → FC, C → Q, B → P. Find 3NF relations

(A) AB, BP, AC, CQ (B) AB, BP, ACQF

(C) AB, BP, ACF, CQ (D) All of the above

(E) None of the above

90. The memory address of fifth element of an array can be calculated by the formula

(A) LOC (Array [5] = Base (Array) + w (5-lower bound), where w is the number of words per memory cell for the array

(B) LOC (Array [5]) = Base (Array [5]) + (5-lower bound), where w is the number of words per memory cell for the array

(C) LOC (Array [5]) = Base (Array [4]) + (5-Upper bound), where w is the number of words per memory cell for the array

(D) All of the above

(E) None of the above

91. Name of the rendering engine used in FireFox browser is

(A) Mozilla

(B) DrawFox

(C) Gecko

(D) Kecro

(E) None of the above

92. In the raster scan method for transformation, a 90° rotation can be performed by

(A) Reversing the order of bits within each row in the frame buffer

(B) By performing XOR on the frame buffer location

(C) By coping each row of the block into a column in the new frame buffer location

(D) All of the above

(E) None of the above

93. Obliquee projection with an angle of 450 to the horizontal plane is called as ?

(A) Cabinaet projection

(B) Isometric projection

(C) Cavalier projection

(D) All of the above

(E) None of the above

94. PHIGS means

(A) Programmers Hierarchical Interactive Graphics Standard

(B) Programmers Hidimension Interactive Graphics Standard

(C) High Performance Interactive Graphics Standard

(D) Performance High Interactive Graphics Standard

(E) None of the above

95. An attack technique that forces a web site to echo client-supplied data, which execute in a user's web browser is called

(A) Cross-Site Scripting
(B) Spin Lock
(C) Man in the Middle Attack
(D) Spiral Replication Threat
(E) None of the above

96. If G is a complete graph on four vertices the G is

(A) Hamiltonian and Eulerian
(B) Neither Hamiltonian nor Eulerian
(C) Hamiltonian but not Eulerian
(D) Eulerian but not Hamiltonian
(E) None of the above

97. Which one of the following is a pure virtual function?

(A) Virtual void funct(int n);
(B) Virtual void funct()=0;
(C) Virtual funct(int n);
(D) Virtual void funct (int n)=0;
(E) None of the above

98. Identify the user interface that is introduced in windows vista

(A) AERO
(B) CRISP
(C) GLORY
(D) All of the above
(E) None of the above

99. Which of the following is an advantage of NTFS over FAT?

(A) It permits the server to be used as both server and work- station.
(B) It alleviates the need for data backups.
(C) It utilizes the disk space far more efficiently than FAT.
(D) It directly accesses the system hardware
(E) All of the above

100. Peephole optimization is a form of

(A) Loop optimization
(B) Local optimization
(C) Constant folding
(D) Data flow analysis
(E) None of the above