PGCET-2013

002

DAY and TIME	COURSE	SUBJECT
DAY-1 10.30 am to 12.30 pm **SESSION : FORENOON**	**ME/M.Tech/M.Arch/MBA** (Infrastructure Management) courses offered by VTU/ UVCE/UBDTCE	**COMPUTER SCIENCE ENGINEERING**
MAXIMUM MARKS	**TOTAL DURATION**	**MAXIMUM TIME FOR ANSWERING**
100	**150 MINUTES**	**120 MINUTES**

MENTION YOUR PGCET NO.						QUESTION BOOKLET DETAILS	
						VERSION CODE	**SERIAL NUMBER**
						A - 1	**118589**

DOs :
1. Check whether the PGCET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. Ensure whether the circles corresponding to course and the specific branch have been shaded on the OMR answer sheet.
3. This Question Booklet is issued to you by the invigilator after the **2nd Bell i.e., after 10.25 a.m.**
4. The Serial Number of this question booklet should be entered on the OMR answer sheet.
5. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
6. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts :
1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. The 3rd Bell rings at 10.30 a.m., till then;
   * Do not remove the paper seal / polythene bag of this question booklet.
   * Do not look inside this question booklet.
   * Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 75 (items) questions and each question will have one statement and four answers. (Four different options / responses.)
2. After the 3rd Bell is rung at 10.30 a.m., remove the paper seal / polythene bag of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 120 minutes:
   * Read each question (item) carefully.
   * Choose one correct answer from out of the four available responses (options / choices) given under each question / item. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **only one response** for each item.
   * **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**
4. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
5. After the **last Bell is rung at 12.30 pm,** stop marking on the OMR answer sheet and affix your **left hand thumb impression** on the OMR answer sheet as per the instructions.
6. Hand over the **OMR ANSWER SHEET** to the room invigilator as it is.
7. After separating the top sheet, the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
8. Preserve the replica of the OMR answer sheet for a minimum period of **ONE year.**
9. Only **Non-programmable** calculators are allowed.

Marks Distribution	
PART-I : 50 QUESTIONS CARRY ONE MARK EACH (1 TO 50)	
PART-II : 25 QUESTIONS CARRY TWO MARKS EACH (51 TO 75)	

002-A1   **002-A1**   **[Turn Over**

Space For Rough Work

COMPUTER SCIENCE & ENGINEERING
PART – I

Each question carries one mark.

$50 \times 1 = 50$

1. n bits in operation code imply that there are _____ possible distinct operators.
   (A) 2n
   (B) 2^n
   (C) n/2
   (D) n^2

2. In which addressing mode the operand is given explicitly in the instruction ?
   (A) Absolute
   (B) Immediate
   (C) Indirect
   (D) Direct

3. For a pipelined CPU with a single ALU, consider the following situations :
   1.   The J+1th instruction uses the result of the Jth instruction as an operand
   2.   The execution of a conditional jump instruction
   3.   The Jth and J + 1th instructions require the ALU at the same time
   Which of the above can cause a hazard ?
   (A) 1 & 2 only
   (B) 2 & 3 only
   (C) 3 only
   (D) All the three

4. Which of the following is incorrect ?
   1.   In the programmed I/O method, the CPU waits for the I/O devices.
   2.   In the Interrupt driven I/O device informs the CPU of its ready status via an interrupt.
   3.   In DMA, the CPU sends its I/O to the DMA controller which manages the entire transaction.
   (A) 1 and 2
   (B) 2 and 3
   (C) 1, 2 and 3
   (D) None of the above

5. 0 0 1 1 0 1 0 1 1 0 1 0 0 1 0 0, the excess-3 code shown is equivalent to decimal
   (A) 2391
   (B) 0271
   (C) 5642
   (D) 0358

Space For Rough Work

6. What logic gate is represented by the circuit shown below ?
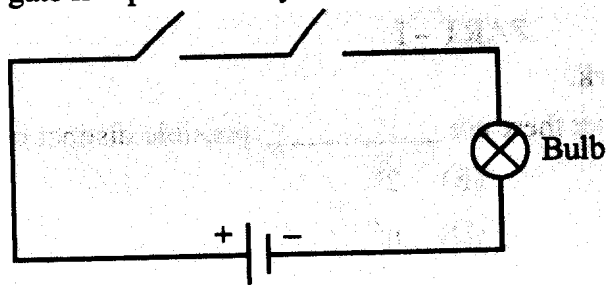
   (A) AND
   (C) NOR
   (B) NAND
   (D) EQUIVALENCE

7. The minterms corresponding to decimal number 15 is

   (A) ABCD
   (B) $\overline{ABCD}$
   (C) A' + B' + C' + D'
   (D) A + B + C + D

8. How many different trees are possible with 10 nodes ?
   (A) 1014
   (B) 1200
   (C) 50
   (D) 68

9. In an AVL tree, at what condition the balancing is to be done ?
   (A) Pivotal value is equal to zero
   (B) Pivotal value not equal to zero
   (C) If the pivotal is greater than 1 or less than 1
   (D) If the pivotal value is infinity

10. A 3-ary tree in which every internal node has exactly 3 children. The number of leaf nodes in such a tree with 6 internal nodes will be
    (A) 10
    (B) 11
    (C) 12
    (D) 13

11. The number of nodes in the largest maximal independent set of the complete bipartite graph K(4, 2) is
    (A) 2
    (B) 3
    (C) 4
    (D) 6

Space For Rough Work

12. A full binary tree with n non-leaf nodes contains
   (A) Log 2n nodes
   (B) n + 1 nodes
   (C) 2n nodes
   (D) 2n + 1 nodes

13. Algorithm which solves the all pairs shortest path problem is
   (A) Dijkstra's algorithm
   (B) Floyd's algorithm
   (C) Prim's algorithm
   (D) Warshall's algorithm

14. The height of a binary tree is the maximum number of edges in any root to leaf path. The maximum number of nodes in a binary tree of height h is
   (A) 2^h
   (B) $2^{h-1} - 1$
   (C) $2^{h+1} - 1$
   (D) 2^{h+1}

15. The algorithm design technique used in the quick sort algorithm is
   (A) Dynamic programming
   (B) Backtracking
   (C) Divide and Conquer
   (D) Greedy method

16. How many distinct binary search trees can be created out of 4 distinct keys ?
   (A) 42
   (B) 24
   (C) 14
   (D) 5

17. The following numbers are inserted into an empty binary search tree in the given order: 10, 1, 3, 5, 15, 12, and 16. What is the height of the binary search tree (the height is the maximum distance of a leaf node from the root) ?
   (A) 4
   (B) 6
   (C) 2
   (D) 3

18. What is the purpose of flow control ?
   (A) To ensure that data is retransmitted if an acknowledgment is not received.
   (B) To reassemble segments in the correct order at the destination device.
   (C) To provide a means for the receiver to govern the amount of data sent by the sender.
   (D) To regulate the size of each segment.

Space For Rough Work

19. Acknowledgements, sequencing, and flow control are characteristics of which OSI layer ?

(A) Layer 2   (B) Layer 3

(C) Layer 4   (D) Layer 7

20. What is the powerful, centralized computer system that performs data storage and processing tasks on behalf of clients and other network devices ?

(A) Client   (B) Host computer

(C) Terminal   (D) Network

21. Error control is needed at the transport layer because of potential errors occurring

(A) from transmission line noise.

(B) in routers.

(C) from out-of-sequence delivery.

(D) from packet losses.

22. Which of the following is responsible for approving standards and allocating resources in the Internet ?

(A) Internet Architecture Board (IAB)

(B) Internet Engineering Task Force (IETF)

(C) Inter NIC

(D) None of above

23. Which of the following is true when describing a multicast address ?

(A) Packets addressed to a unicast address are delivered to a single interface.

(B) Packets are delivered to all interfaces identified by the address. This is also called a one-to-many address.

(C) Identifies multiple interfaces and is only delivered to one address. This address can also be called one-to-one-of-many.

(D) These addresses are meant for non-routing purposes, but they are almost globally unique so it is unlikely they will have an address overlap.

Space For Rough Work

24. Which of the following is TRUE for the language { a^P : P is Prime} ?
    (A) It is not accepted by Turing Machine.
    (B) It is regular but not context free.
    (C) It is context free but not regular.
    (D) It is neither regular nor context free but accepted by Turing Machine.

25. Fortran is
    (A) Regular language
    (B) Context free language
    (C) Context sensitive language
    (D) None of the above

26. The equivalent regular expression for the regular expression (aa+bb+ab+ba)*
    (A) ((a+b).(a+b))*   (B) (aba+bab+bb)*
    (C) ((a+b)+(a+b))*   (D) None of the above

27. Turing machine is capable of accepting
    (A) Only Regular Languages and Context Free Languages
    (B) Only Context Sensitive Languages
    (C) Recursively Enumerable Languages only
    (D) All four categories of Languages

28. Context grammar is ambiguous if
    (A) the grammar contains useless non-terminals
    (B) it produces more than one parse tree for same sentence
    (C) some production has two non-terminals side by side on right hand side
    (D) None of the above

29. In the design of lexical analyzer
    (A) Only finite automata is used
    (B) Only regular expression is used
    (C) Both finite automata and regular expression are used
    (D) Both finite automata and regular expression not are used

Space For Rough Work

30. The string 1101 does not belong to the set represented by

(A) 110*(0+1)

(B) 1(0+1)*101

(C) (10)*(01)*(00+11)*

(D) (00+(11)*0)*

31. The macro processor must perform

(A) recognize macro definitions and macro calls

(B) save the macro definitions

(C) expand Macro calls

(D) all of these

32. Relocation bits used by relocating loader are specified by

(A) relocating loader itself

(B) linker

(C) assembler

(D) microprocessor

33. A computer cannot 'boot' if it does not have

(A) Compiler

(B) Loader

(C) Operating System

(D) Assembler

34. Linker is

(A) same as loader

(B) required to create a load module

(C) user source code as input

(D) always used before programs are executed

35. The order of the Power set of a Set of order n is

(A) n

(B) 2n

(C) n^2

(D) 2^n

36. Which of the following statements is FALSE ?

(A) The set of rational numbers is an Abelian group under addition.

(B) The set of rational integers is an Abelian group under addition.

(C) The set of rational numbers form an Abelian group under multiplication.

(D) None of the above.

Space For Rough Work

37. If every element of a group G is its own inverse, then G is
    (A) Finite
    (B) Infinite
    (C) Cyclic
    (D) Abelian

38. A self-complemented distributive lattice is called
    (A) Boolean Algebra
    (B) Modular Lattice
    (C) Complete Lattice
    (D) Self Dual Lattice

39. Hasse diagrams are drawn for
    (A) Partially ordered sets
    (B) Lattices
    (C) Equivalence relations
    (D) None of the above

40. The number of different permutations of the word BANANA is
    (A) 720
    (B) 60
    (C) 120
    (D) 360

41. Which of the following is not a fundamental process state ?
    (A) Ready
    (B) Terminated
    (C) Executing
    (D) Blocked

42. Poor response time is usually caused by
    (A) Process busy
    (B) High I/O rates
    (C) High paging rates
    (D) Any of the above

43. SSTF stands for
    (A) Shortest-Seek-Time-First scheduling
    (B) Small-Small-Time-First
    (C) Simple-Seek-Time-First scheduling
    (D) Small-Simple-Time-First

44. Virtual memory is
    (A) simple to implement
    (B) used in all major commercial operating systems
    (C) less efficient in utilization of memory
    (D) useful when fast I/O devices are not available

Space For Rough Work

002

9

A-1

45. To avoid race condition, the maximum number of processes that may be simultaneously inside the critical section is

(A) zero

(B) one

(C) two

(D) more than two

46. _____ is a technique of improving the priority of process waiting in Queue for CPU allocation.

(A) Starvation

(B) Ageing

(C) Revocation

(D) Relocation

47. In the _____ Normal form, a composite attribute is converted to individual attributes.

(A) First

(B) Second

(C) Third

(D) Fourth

48. The relational model is based on the concept that data is organized and stored in two-dimensional tables called _____.

(A) Fields

(B) Records

(C) Relations

(D) Keys

49. _____ specifies a search condition for a group or an aggregate.

(A) GROUP BY Clause

(B) HAVING Clause

(C) FROM Clause

(D) WHERE Clause

50. How DOM differs from SAX ?

(A) DOM is not event driven and builds up the whole memory.

(B) SAX is event driven and requires less space.

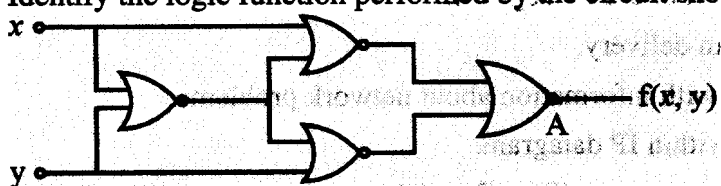(C) DOM and SAX are packages.

(D) None of these.

Space For Rough Work

PART – II

Each question carries two marks.   25 × 2 = 50

51. If memory access takes 20 ns with cache and 110 ns without it, then the hit ratio (cache uses a 10 ns memory) is
    (A) 93%   (B) 90%
    (C) 87%   (D) 88%

52. A hard disk with a transfer rate of 10 M bytes/second is constantly transferring data to memory using DMA. The Processor runs at 600 MHz. and takes 300 and 900 clock cycles to initiate and complete DMA transfer respectively. If the size of the transfer is 20 K bytes, what is the percentage of processor time consumed for the transfer operation ?
    (A) 0.1 %   (B) 5.0 %
    (C) 1.0 %   (D) 0.5 %

53. In serial communication employing 8 data bits, a parity bit and 2 stop bits, the minimum baud rate required to sustain a transfer rate of 3000 characters per second is
    (A) 2400 baud   (B) 19200 baud
    (C) 4800 baud   (D) 1200 baud

54. What is the content of Stack Pointer (SP) ?
    (A) Address of the current instruction
    (B) Address of the next instruction
    (C) Address of the top element of the stack
    (D) Size of the stack

55. $[(A+A'B)(A+A'B')][(CD+C'D')+(C \oplus D)] =$
    (A) B   (B) A
    (C) 0   (D) 1

56. Identify the logic function performed by the circuit shown

    (A) Exclusive OR   (B) Exclusive NOR
    (C) NAND   (D) NOR

Space For Rough Work

57. Suppose a circular queue of capacity (n-1) elements is implemented with an array of n elements. Assume that the insertion and deletion operations are carried out using REAR and FRONT as array index variables, respectively. Initially, REAR=FRONT=0.The conditions to delete , queue full and queue empty are

(A) full:(REAR+1)mod n==FRONT
empty:REAR==FRONT

(B) full:(REAR+1)mod n==FRONT
empty:(FRONT+1)MOD N==REAR

(C) full:REAR==FRONT
empty:(REAR+1)mod n==FRONT

(D) full:(FRONT+1)mod n==REAR
empty:REAR==FRONT

58. The recurrent relation capturing the optimal execution time of the Towers of Hanoi problem with n discs is

(A) $T(n)=2T(n-2)+2$ (B) $T(n)= 2T(n-1)+n$

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

59. Name the sorting which takes a list of integers and puts each element on a smaller list, depending techniques takes the value of its least significant byte. Then the small lists are concatenated, and the process is repeated for each most significant byte until the list is sorted.

(A) Radix sort   (B) Quick sort

(C) Heap sort   (D) Merge sort

60. Which statements are true regarding ICMP packets ?

1. They acknowledge receipt of a TCP segment.
2. They guarantee datagram delivery.
3. They can provide hosts with information about network problems.
4. They are encapsulated within IP datagram.

(A) 1 only   (B) 2 and 3

(C) 3 and 4   (D) 2, 3 and 4

Space For Rough Work

61. Why does the data communication industry use the layered OSI reference model ?

1. It divides the network communication process into smaller and simpler components, thus aiding component development, design, and troubleshooting.

2. It enables equipment from different vendors to use the same electronic components, thus saving research and development funds.

3. It supports the evolution of multiple competing standards and thus provides business opportunities for equipment manufacturers.

4. It encourages industry standardization by defining what functions occur at each layer of the model.

(A) 1 only   (B) 1 and 4

(C) 2 and 3   (D) 3 only

62. What are two purposes for segmentation with a bridge ?

1. To add more broadcast domains.

2. To create more collision domains.

3. To add more bandwidth for users.

4. To allow more broadcasts for users.

(A) 1 only   (B) 2 and 3

(C) 2 and 4   (D) 4 only

63. Consider the languages:

$L1 = \{a^n b^n c^m : n,m > 0\}$ and $L2 = \{a^n b^m c^n : n,m > 0\}$. Which of the following statements is FALSE ?

(A) $L1 \cap L2$ is a context free language

(B) $L1.L2$ is a context free language

(C) $L1$ and $L2$ are context free languages

(D) $L1 \cap L2$ is a context sensitive language

64. Which one of the following is not decidable ?

(A) Given a Turing Machine M, a string s and an integer k, M accepts s within k steps.

(B) Equivalence of two Turing Machines.

(C) Languages accepted by given finite state machine is non- empty.

(D) Languages accepted by a context free grammar is non- empty.

Space For Rough Work

65. A bottom-up parser generates
    (A) LMD
    (B) RMD
    (C) RMD in reverse
    (D) LMD in reverse

66. Backtracking is a problem associated with
    (A) Topdown Parsing
    (B) Bottomup Parsing
    (C) Both (A) and (B)
    (D) None of the above

67. The function f: Z→ z is given by $f(x)=x^2$ is
    (A) One-to-one
    (B) On to
    (C) One to One and onto
    (D) None of the above

68. A U B = A∩ B if and only if
    (A) A is empty set
    (B) B is empty set
    (C) A and B are non-empty sets
    (D) A and B are empty sets

69. Every finite subset of lattice has
    (A) a LUB and a GLB
    (B) Many LUBs and a GLB
    (C) Many LUBs and many GLBs
    (D) Either some LUBs and some GLBs

70. Consider an XML file called intro.xml and a document type definition (DTD) file intro.dtd as follows:
    Intro.xml
    < ?xml version = "1.0" ?>
    <!DOCTYPE myMessage SYSTEM "intro.dtd">
    <myMessage>
    <message>Welcome to XML</message>
    </myMessage>
    Intro.dtd
    <!ELEMENT myMessage(message)>
    <!ELEMENT message(#PCDATA)>
    A validating parser will classify intro.xml as
    (A) Well-formed and validated
    (B) Well-formed but not validated
    (C) Validated but not well-formed
    (D) Neither validated not well-formed

Space For Rough Work

71. Let S and Q be two semaphores initialized to 1, where P0 and P1 processes the following statements wait(S);

P0		P1
wait(Q);		wait(Q);
........;		wait(S);
signal(S);	0	.............;
signal(Q);		signal(Q);
		signal(S);

respectively. The above situation depicts a _____ .

(A) Semaphore   (B) Deadlock

(C) Signal   (D) Interrupt

72. If the Disk head is located initially at 32, find the number of disk moves required with FCFS if the disk queue of I/O blocks requests are 98, 37,14,124,65,67.

(A) 310   (B) 324

(C) 315   (D) 321

73. Consider a logical address space of 8 pages of 1024 words mapped into 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

74. Using the SQL GROUP BY phrase with a SELECT statement can help detect which of the following problems ?

(A) The multivalue, multicolumn problem

(B) The inconsistent values problem

(C) The missing values problem

(D) The general-purpose remarks column problem

75. A system uses FIFO policy for page replacement. It has 4 page frames with no pages loaded to begin with. The system first accesses first 100 distinct pages in some order and then access the same 100 pages but now in the reverse order. How many page faults will occur ?

(A) 196   (B) 192

(C) 197   (D) 195

Space For Rough Work

SEAL

A-1