ISRO Technical Paper 2009

1 A full binary tree with n leaves contains?

2. The expression 1*2^3*4^5*6 will be evaluated as?

3 The feature in object oriented programming that follows he same operation to be carried out differently ,depending on the object, is?

4. icroistructions stored in the control mamory of a processor have a width of 26 bits. Each microinstructionsion. is divided into three fields: a microoperation field of 13 bits, a next address field(x), and a MUX select field(y).There are 8 status bits in the inputs of the MUX. How many bits are there in the X and Y fields, and what is the size of the control memory in number of words?

5.   A cpu has 24-bit instructions. A program starts at address 300(in decimal).Which one of the following is a legal program counter (all values in decimal)?

6.   Consider a disk pack with 16 surfaces,128 tracks per surface and 256 sectors per track.512 bytes of data are stores in a bit serial manner in a sector.The capacity of the disk and the number of bits required to specify a particular in the disk are respectively.

7.   Consider a pipelined processor with the following four stages   IF:Instruction Fetch   ID:Instruction Decode and Operand Fetch EX:Execute   WB:Write Back The IF,ID and WB stages take one clock cycle each to complete the operation.The ADD and SUB instructions need 1 clock cycle and the MUL instruction need 3 clock cycles in the EX stage.Operand forwarding is used in the pipelined processor.What is y the number of clock cycles taken to complete the following sequence of instructions?   ADD R2,R1,R0   R2ßR1+R0
                          MUL R4,R3,R2   R4ßR3+R2
                          SUB   R6,R5,R4   R6ßR5+R4

8.   The use of multiple register windows with overlap causes a reduction in the number of memory accesses for   1.Function locals and parameters   2.Registers saves and restores   3.Instruction fetches

9.   A processor that has carry, overflow and sign flag bits as part of its program status word(PSW) performs addition of the following two 2's complement numbers 0100101 and 11101001.After the execution of this addition operation, the status of the carry, overflow and sign flags, respectively will be

10.   The two numbers given below are multiplied using the Booth's algorithm.
Multiplicand:0101 1010 1110 1110   Multiplier:0111 0111 1011 1101   How many additions/Subtractions are required for the multiplication of the above two numbers?

11.	The addition of 4-bit, two's complement,binary numbers 1101 and 0100 results in

12.	Which of the following statements about relative addressing mode is FALSE?	1.It enables reduced instruction size	2.It allows indexing of array element with same instruction	3.It enables easy relocation of data	4.It enables f asters address calculation than absolute addressing

13.	Substitution of values for names(whose values are constants) is done?

14.	A root alpha (symbol) of equation f(x) =0 can be computed to any degree of accuracy if a 'good' initial approximation x0 is chosen for which?

15.	Which of the following statement is correct? Ans.delta(Uk Vk)=Uk+1 delta Vk+Vk+1 delta Uk

16.	The shift operator E is defined as E[f(xi)]=f(xi+h) and E-1[f(xi)]=f(xi-h) Then delta(forward difference) in terms of E is ?

17.	The formula (integration symbol) Sxnx0------------------Ans:Trapezoidal rule.

18.	The cubic polynomial y(x) which takes the following values:y(0)=1,y(1)=0,y(2)=1 and y(3)=10 is x^3-2x^2+1.

19.	x=a cos(t), y=b sin(t) is the parametric form of?

20.	The value of x at which y is minimum for y=x^2-3x+1 is ans:3/2.

21.	Some formula given from IT and Numerical Methods

22.	If G is a graph with e edges and n vertices the sum of the degrees of all vertices in G is?

23.	Let G be an arbitary graph with n nodes and k components.If a vertex is removed from G, the number of components in the resultant graph must necessarily lie between.

24.	A graph in which all nodes are of equal degree, is known as

25.	If in a graph G there is one and only one path between every pair of vertices then G is a

26.	A simple graph (a graph without parallel edge or loops) with n vertices and k components can have at most.

27.	Consider the polynomial p(x)=a0+a1x+a2x^2+a3x^3,where ai!=0,for all i.	The minimum number of multiplications needed to evaluate p on an input x is

28.	Consider the following code written in a pass-by-reference language like FORTRAN.	Subroutine swap(ix,iy)	it=ix

L1:ix=iy

L2:iy=it

end

ia=3

ib=8

call swap(ia,ib+5)

print*,ia,ib

end

S1:The compiler will generate code to allocate a temporary nameless cell, initialize it to 13, and pass the address of the cell to swap

S2:On execution the code will generate a runtime error on line L1

S3:On execution the code will generate a runtime error on line L2

S4:The program will print 13 and 8

S5:The program will print 13 and -2

Exactly the following set of statements is correct

29.   A square matrix A is called orthogonal if A'A=?

30.   If two adjacent rows of a determinant are interchanged, the value of the determinant?

31.   If det((3,3)(x,5))=3 then the value of x is?

32.   If A,B,C are any three matrices , then A'+B'+C' is equal to?

33.   problem to solve determinant of a 3x3 matrices?

34.   Let f(x) be the continuous probability density function of a random variable x.The probability that a<x<=b, is?

35.   If the mean of a normal frequency distribution of 1000 items is 25 and its standard deviation is 2.5, then its maximum ordinate is?

36.   If the pdf of a poisson distribution is given by $f(x)=(e^{-2} *2^x)/x!$, then its mean is?

37.   Activities which ensure that the software that has been built, is traceable to ustomer

requirement is covered as part of?

38.   A testing method, which is normally used as the acceptance test for a software system, is?

39.   The 'Command' used to change contents of one database using the contents of another database by linking them on a common key field is called?

40.   A locked database file can be?

41.   Which of the following contains complete record of all activity that affected the contents of a database during a certain period of time?

42.   Purpose of 'Foreign Key' in a table is to ensure?

43.   Which of the following scenarios may lead to an irrecoverable error in a databse system?

a.A transaction writes a data item after it is read by an uncommitted transaction.

b.A transaction reads a data item after it is read by an uncommitted transaction.

c .A transaction reads a data item after it is wriiten by a committed transaction.

d.A transaction reads a data item after it is written by an un committed transaction.

44.Use of IPSEC in tunnel mode results in?

45.Special software to create a job queue is called a?

46.Process is?

47.When a process is rolled back as a result of dead lock the difficulty which arises is?

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

49.Compared to CISC processors,RISC processors contain?

50.Which of the following is/are true of the auto increment addressing mode?

 1.It is useful in creating self relocating code

 2.If it is included in an instruction set architecture, then an additional ALU is required for effective address calculation.

 3.The amount of increment depends on the size of the data item accessed.

51.The subnet mask for a particular network is 255.255.31.0 Which of the following pairs of ip addresses could belong to this network?

1. 172.57.88.62 and 172.56.87.23

2. 10.35.28.2 and 10.35.29.4

3. 191.203.31.87 and 191.234.31.88

4. 128.8.129.43 and 128.8.161.55

52. In networking, UTP stands for?

53. The address resolution protocol(ARP) is used for?

54. Which of the following is a MAC address?

   1. 192.166.200.50

   2. 00056A:01A5CCA7FF60

   3. 568, Airport Road

   4. 01:A1:BB:A7:FF:60

55. what is the primary purpose of a VLAN?

56. SHA-1 is which algorithm?

57. Advanched Encryption Standard(AES) is based on which algorithm?

58. The primary purpose of an operating system is?

59. Find valid process transition in an operating system?

 a. Wake up: ready à running

 b. Dispatch: ready à running

 c. Block: ready à running

 d. Timer run out: à blocked

60. Match the following?

 A. Disk check   1. Round Robin

     B. Batch processing   2. Scan

     C. Time sharing   3. LIFO

D.Stack operation   4. FIFO.

61.A page fault is?

62. Using larger block size in a fixed block size file system leads to?

63.Which of the following statement   is not true?

a. An ISR is invoked on completion of I/O in synchronous I/O but not in onasynchronous I/O

b. In both synchronous and asynchronous I/O an ISR (Interrupt Service Routines)is invoked after completion of the I/O

c.A process making a synchronous I/O call waits until I/O is complete,but a process making an asynchronous I/O call does not wait for completion of the I/O.

d.In the case of synchronous I/O, the process waiting for the completion of I/O is woken up by the ISR that is invoked after the completion of I/O.

64.Consider three CPU-intensive processes,which require 10,20, and 30 time units and arrive at times 0,2, and 6, respectively. How many context switches are needed if the operating system implement a shortest remaining time first scheduling algorithm?Do not count the context switches at time zero and at the end.

65.The performance of Round Robin algorithm depends heavily on?

66.Consider a system having "n" resource of same type. These resources are shared by 3 processes A,B,C. These have peak demands of 3,4 and 6 respectively. For what value of "n" deadlock won't occur?

67.Consider a set of 5 processes whose arrival time, CPU time needed and the priority are given below

Given some values…………………………………..

(smaller the number, higher the priority)

If the CPU scheduling policy is priority scheduling without pre-emption, the average waiting time will be?

68.The range of integers that can be represented by an n-bit 2's complement number system is?

69.The switching expressions corresponding to $f(A,B,C,D)=sigma(1,4,5,9,11,12)$ is?

70.Consider the following Boolean function of four variables $f(w,x,y,z)=sigma(1,3,4,6,9,11,12,14)$, The function is?

71.In which addressing mode, the effectives address of the operand is generated by adding a constant

value to the content of a register?

a. Absolute mode

b.Indirect mode

c. Immediate mode

d. Index mode

72.A certain microprocessor requires 4.5 microseconds to respond to an interrupt. Assuming that the three interrupts I1,I2 and I3 require the following execution time after the interrupt is recognized:

i. I1 requires 25 micro seconds

ii. I2 requires 35 micro seconds

iii. I3 requires 20 microseconds

I1 has the highest priority and I3 has the lowest. What is the possible range of time for I3 to be executed assuming that it may or may not occur simultaneously with other interrupts?

73. The process of organizing the memory into two banks to allow 8- and 16-bit data operation is called?

74. Suppose the numbers 7,5,1,8,3,6,0,9,4,2 are inserted in that order into an initially empty binary search tree. The binary search tree uses the usual ordering on natural numbers. What is the inorder traversal sequence of the resultant tree?

75. A data structure is required for storing a set of integers such that each of th following operations can be done in (log n) time, here n is the number of elements in the set.

1. Deletion of the smallest element.

2. Insertion of an element if it is not already present in the set.

Which of the following data structures can be used for the prpose?

a.   A heap can be used but not a balanced binary search tree.

b.   A balanced binary search tree can be used but not a heap

c.   Both balanced binary search tree and heap can be used

d.   Neither balanced binary search tree nor heap can be used.

76. 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(the height is the maximum distance of a

leaf node from the root)?

77. Assume that the operators +,-,x are left associative and ^ is right associative. The order of precedence(from highest to lowest) is ^,x,+,-.The postfix expression corresponding to the infix expressions a+bxc-d^e^f is.

78. The infix expression A+(B-C)*D is correctly represented in prefix notation as?

79. A one dimensional array A has indices 1…75.Each element is a string and takes up three memory words. The array is stored at location 1120decimal. The starting address of A[49] is?

80. The five items:A,B,C,D and Eare pushed in a stack, one after the other starting from A.The stack is popped four times and each element is inserted in a queue.Then two elements are deleted from the queue and pushed back on the stack. Now one item is popped from the stack. The popped item is?