01. Booklungs are found in :

(1) Amoeba (2) Polystomella

(3) Euglypha (4) Arachnids

02. Silk is obtained from :

(1) Adult moth (2) Caterpillar stage

(3) Egg (4) Cocoon

03. Neurogenic heart is found in :

(1) Human beings (2) Rat

(3) Rabbit (4) Invertebrates

04. Epiphysis is also known as :

(1) Pineal (2) Pituitary

(3) Thyroid (4) Hypothalamus

05. Simplest and smallest form of amino acid is :

(1) Glycine (2) Proline

(3) Lysine (4) Argenine

06. PCOS is related to :

(1) Ovary (2) Uterus

(3) Testes (4) Oviduct

07. Seminogelin is secreted by :

(1) Epididymis (2) Seminal Vesicle

(3) Thecal cells (4) Oviduct

08. First cleavage in frog is :

(1) Horizontal (2) Meridional

(3) Equatorial (4) Latitudinal

09. Which of the following is nuclear receptor ?

(1) AR (2) GPCR

(3) IR (4) MT1

10. Cryptorchidism is related to :

(1) Testes (2) Thyroid

(3) Ovary (4) Pancreas

11. Consider the following C program :

```
# define int char
main ()
{
int i=65;
printf (" sizeo f (i) = % d" , sizeof(i));
}
```

The output of the program will be :

(1) sizeof=1 (2) sizeof(1)

(3) sizeof (i)=1 (4) 1

12. Consider the following c program :

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

The output of the progrm will be :

(1) 14 (2) 10

(3) 1 (4) 0

13. A RAM chip has capacity of 1024 words of 8 bits each (1K×8). The number of 2×4 decoders with enable line needed to construct a 16K ×16 RAM from 1K×8 RAM is

(1) 4 (2) 5

(3) 6 (4) 7

14. The instructions which copy information from one location to another either in the processor's internal register set or in the external main memory are called :

(1) Data transfer instructions.

(2) Program control instructions.

(3) Input-output instructions.

(4) Logical instructions.

15. The wrong statements/s regarding interrupts and subroutines among the following is/are .....

i. The sub-routine and interrupts have a return statement

ii. Both of them alter the content of the PC

iii. Both are software oriented

iv. Both can be initiated by the user

(1) i,ii and iv (2) ii and iii

(3) iv (4) iii and iv

16. When simplified with Boolean Algebra, the expression (x+y) (x+z) simplifies to

(1) x (2) x+x(y+z)

(3) x(1+yz) (4) x+yz

17. How many 1's are present in the binary representation of 3×512+7×64+5×8+3

(1) 8 (2) 9

(3) 10 (4) 11

18. The output of D-flip flop :

(1) Same as input. (2) complement of input.

(3) not depend on input. (4) depend on past input and clock.

19. Which of the following services use TCP ?

(1) sftp (2) smtp

(3) http (4) all of the above

20. Given memory partition of 100K, 500K, 200K, 300K, and 600K (in order) and processes of 212K, 417K, 70K, and 96K (in order); using the first-fit partition algorigthm, in which partition would be the process requiring 96K be placed :

(1) 500K (2) 300K

(3) 200K (4) 600K

21. Consider the following segment of C program

```
man()
    {
        int i, j;
        j=0;
        for (i=0; i<=5, i=i+2/3)
          {
            j=j+1;
          }
}
```

The number of times the body of for loop is executed:

(1) 9 (2) 8

(3) infinite (4) 11

22. Among the following which one is the worst case recurrence relation and worst case time complexity of Quick Sort:

(1) Recurrence is T (n) = T(n-2) +O(n) and time complexity is $O(n^2)$

(2) Recurrence is T(n) =T(n-1)+O(n) and time complexity is $O(n^2)$

(3) Recurrence is T(n) = 2T (n/2) +O(n) and time complexity is O(n log n)

(4) Recurrence is T(n) =T(n/10) +T (9n/10) +O(n) and time complexity is O(n log n)

23. The preorder traversal of a binary tree is DEBFCA. The root node of binary tree is :

(1) B (2) C

(3) A (4) D

24. Chromatic number of bipartite graph is :

(1) 4 (2) 2

(3) 3 (4) 1

25. Let T (n) be the function defined by T(0)=1 and T(n)= T(n-1) +n,n>=1. which of the following is true:

(1) $T(n)=O(n^2)$ (2) $T(n) =O(\sqrt{n})$

(3) $T(n)=O(\log_2 n)$ (4) T(n) =O(n)

26. In AVL tree, difference between height of left and right subtrees is :

(1) less than 1 (2) equal to 1

(3) less than equal to 1 (4) greater than equal to 1.

27. A and B are two logical statements. Statement B is logical equivalent to statement A iff :

(1) $(A \rightarrow B) \wedge (B \rightarrow A)$ is tautology.

(2) $(A \rightarrow B) \mid\mid (B \rightarrow A)$ is tautology.

(3) $A \rightarrow B$ is contradiction.

(4) $A \rightarrow B$ is tautology.

28. Predicate expression $(\exists x)\ (A(x) \rightarrow B(x))$ is equivalent to :

(1) $(\exists x)A(x) \rightarrow (\forall x)B(x)$ (2) $(\forall x)A(x) \rightarrow (\exists x)B(x)$

(3) $(\exists x)A(x) \rightarrow (\exists x)B(x)$ (4) $(\forall x)A(x) \rightarrow (\forall x)B(x)$

29. For LR(0) automaton, consider the following augmented grammar :

$E \rightarrow E$

$E \rightarrow E+T \mid T$

$T \rightarrow T \rightarrow T*F \mid F$

$F \rightarrow (E)$ id

If I is the set of two items $\{E \rightarrow T, T \rightarrow T*F\}$, then GOTO (I, *) contains the items :

(1) $T \rightarrow T*.\ F, F \rightarrow (E), F \rightarrow .id$ (2) $T \rightarrow T*.F, F \rightarrow (.E), F \rightarrow .id$

(3) $T \rightarrow T*.F., F \rightarrow (E)., F \rightarrow .id$ (4) $T \rightarrow T*F., F \rightarrow (E)., F \rightarrow .id$

30. Grammar corresponding production rules {S → CC, C → aC, C → d} is :

(1) LL(1)
(2) SLR (1) but not LL (1)
(3) LALR (1) but not SLR (1)
(4) LR (1) but not LALR (1)

31. A bottom-up parser generates :

(1) Leftmost derivation
(2) Right most derivation
(3) Leftmost derivation in reverse
(4) Rightmost derivation in reverse

32. S → aB | bA, A → a as bAA, B → b bs aBB, generates strings of terminal that have :

(1) odd number of a' s and b's
(2) even number of a's and b's
(3) equal number of a's and b's
(4) not equal number of a's and b's

33. Postfix expression equivalent of infix expression (A-B) * (D/E) is :

(1) ABDE*/-
(2) ABDE-/*
(3) AB-DE/*
(4) None of these

34. An operating system implements a policy that requires a process to release all resources before making a request for another resources. Select the TRUE statement from the following :

(1) Both starvation and deadlock can occur

(2) Starvation can occur but deadlock cannot occur

(3) Starvation cannot occur but deadlock can occur

(4) Neither starvation nor deadlock can occur

35. Consider three processes (process id 0, 1,2 respectively) with compute time bursts 2,4 and 8 time units. All processes arrive at time zero. Consider the longest remaining time first (LRTF) scheduling algorithm. In LRTF ties are broken by giving priority to the process with the lowest process id. The average turnaround time is :

(1) 13 units (2) 14units

(3) 15units (4) 16units

36. Page fault occurs when :

(1) When a requested page is in memory

(2) When a requested page is not in memory

(3) When a page is corrupted

(4) When an exception is thrown

37. Relationships among relationships can be represented in an E-R model using :

(1) aggregation (2) association

(3) weak entity sets (4) weak relationship sets

38. Which one of the following statements about normal forms is FALSE ?

(1) BCNF is stricter than 3NF

(2) Lossless, dependency-preserving decomposition into 3NF is always possible

(3) Lossless, dependency-preserving decomposition into BCNF is always possible

(4) Any relation with two attributes is in BCNF

39. Let E1 and E2 be two entities in an E/R diagram with simple single-valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one-to-many and R2 is many-to-many. R1and R2 do not have any attributes of their own. Minimum number of tables required to represent this situation in the relational model is :

(1) 2 (2) 5

(3) 4 (4) 3

40. A single packet on a data link layer is known as :

(1) Path (2) Frame

(3) Block (4) Group

Short Answer Questions

Note: Attempt any **five** questions. Write answer in **150-200** words. Each question carries **16** marks. Answer each question on separate page, after writing Question Number.

01. Give data structure in which linear list is implemented using random access. Using this representation/ data structure write an algorithm for inserting and deleting an element form the list.

02. Suppose the following list of letters is inserted in order into an empty binary search tree:

J,R,D,G,T,E,M,H,P,A,F,Q

i. Find the final binary tree.

ii. Give sequential representation of the tree in (i).

iii. Find the inorder, preorder, and postorder traversal of binary tree.

iv. Consider the binary tree (i), give tree after the node M and D is deleted.

03. (a) i. How structure differ from array ?

ii. How structure, union, and bit filed differ from each other.

(b). Define a structure called *cricket* that will describe the information *player name, team name, batting average.* Using structure cricket, declare an array player with *5* elements.

(c). In what ways does a switch statement is differ from if statement. Write a C program for marks range to grade conversion using switch and case, for following data:

Marks Range	**Grade**
< 40	E
40 - 54	D
55 - 69	C
70 - 85	B
> 85	A

04. Construct LR (1) parsing table for the given grammar :

$S \rightarrow CC$,
$C \rightarrow aC$,
$C \rightarrow d$

05. Define deterministic and nondeterministic finite automaton (DFA and NDFA). Consider the finite state machine, $M=(Q, \sum, \delta, q_0, F)$, where $Q = \{q_0, q_1, q_2, q_3\}$, $\sum = \{0, 1\}$, $F = \{q_0\}$, and transition function δ is given in following table :

	Input	
State	0	1
q_0	q_2	q_1
q_1	q_3	q_0
q_2	q_0	q_3
q_3	q_1	q_2

Give the entire sequence of states for the input string 110001.

06. Consider a main memory with five page frames and the following sequence of page references: 3,8,2,3,9,1,6,3,8,9,3,6,2,1,3. Calculate the number of page faults by using page replacement policies (i) First-in-First Out (FIFO) and (ii) Least Recently Used (LRU).

07. Represent following facts using proposition. And find what rules of inference is used in each of these argument :

(i) Alice is mathematics major. Therefore, Alice is either mathematics major or a computer science major.

(ii) Jerry is mathematics major and a computer science major. Therefore, Jerry is mathematics major.

(iii) If, I go swimming, then, I will stay in the sun too long. If, I stay in the sun too long, then I will sun burn. Therefore, if I go swimming, then I will sun burn.

08. Explain the concept of primary key, and normalization in the context of relational database system.

09. Describe major phases of waterfall model of software development ? Which phase consumes maximum effort ?

10. Explain how TCP is a reliable protocol when it works on top of IP which is unreliable.