Q.P. Code :00898

[Time: $2\frac{1}{2}$ Hours] **[Marks:75]**

Please check whether you have got the right question paper.

N.B:
1. All Questions are compulsory.
2. Make **suitable assumptions** whenever necessary and **state the assumption** made.
3. Answer to the **same question** must be **written together**.
4. Numbers to the **right** indicate **marks**.
5. Draw neat labeled diagrams whenever **necessary.**
6. Use **Non-programmable** calculators is allowed.

Q.1 Attempt **any three** of the following. **15**

a. Explain the importance of completeness and correctness in effective communication.
b. What are the different roles of Manager? Explain.
c. What are the different forms of non-verbal communication? Explain with examples.
d. Explain the different types of spontaneous gestures.
e. Discuss the cross-cultural communication strategies.
f. What are the different criteria for selection of appropriate technology for business communication? Explain.

Q.2 Attempt **any three** of the following. **15**

a. Discuss the factors to be considered at the planning stage of business writing.
b. You are applying for admission to a management college. You are required to write a composition of about 300 words stating your objective in seeking the admission. Draft your objective.
c. What is audience analysis? What is it critical? How can it be effectively used by an organization while issuing instructions?
d. What is listening? What are its different types? Explain.
e. "Language plays an important part in ineffective presentation". Agree or disagree? Justify your view.
f. Explain the different non-verbal aspects in an interview.

Q.3 Attempt **any three** of the following. **15**

a. What is a conference? How it is planned and conducted? Explain.
b. List and explain the different formats of group discussion.
c. What is briefing? What are its different types? Explain each in brief.
d. Discuss the preparatory steps involved in team presentations.
e. Explain direct and indirect selling.
f. Discuss the human resource communication in Indian industries.

Q.4 Attempt **any three** of the following. **15**

a. State and explain the different traits to be embedded into the corporate communication strategy.
b. Explain intercultural negotiation with an example. What are the file inter-cultural negotiation skills?
c. What are the basic principles of ethical communication followed by corporate houses?
d. Discuss the AIDA model for advertising.
e. How are effective paragraphs developed? Explain.
f. What are the different referencing styles? Explain with examples.

Q.5 Attempt **any three** of the following. **15**

a. How is brainstorming done while planning the presentation? Explain.
b. What are the steps to be carried out during the "Plan" stage of the presentation? Explain.
c. Explain the "Execute" stage of presentation.
d. What are the different types of graphics used in presentation? Explain.
e. What should be done to make a presentation impressive? Explain.
f. Why should there be practice before presentation? Discuss.

Q.P. Code :00906

[Time: $2\frac{1}{2}$Hours] **[Marks:75]**

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. Make suitable assumptions wherever necessary and state the assumptions made.
3. Answer to the same question must be written together.
4. Numbers to the right indicate marks.
5. Draw neat labeled diagrams wherever necessary.
6. Use of Non-programmable calculators is allowed.

1. **Attempt*any three* of the following:** (15)

a. Write the difference between analog signal and digital signal.

b. Convert the following numbers
$(17E.F6)_{16} = (?)_2$
$(110010100011.10100101)_2 = (?)_2$

c. Convert the given
$(125.50)_{10} = (?)_2$
$(110001)_2 = (?)_{10}$

d. Find
i) The Gray code equivalent of Decimal (13)
ii) Binary equivalent of Gray code 1111.
iii) Hexadecimal equivalent of octal (765)
iv) Octal equivalent of binary(1100111110101)
v) Decimal equivalent of binary 1010101010.

e. Write a short note on Error correction and detection code.

f. i) Perform the addition of following Binary number
(1100010 + 1010001)
ii) Perform the Subtraction of following Binary numbers using 1's complement method.
(11011 – 10001).

2. **Attempt*any three* of the following:** (15)

a. For the logic expression Y=AB+A'B' Obtain the truth table, name the operation performed, realize the operation using AND, OR, NOT gate.
Also realize it using NAND gate only.

b. Draw the output wave form of AND gate and explain it's operation. Also, discuss about 4 input AND gate.

c. Prove the following using Boolean law
A+A'. B +A.B' = A+B

d. Reduce the given SOP equation using K-map method and draw the circuit using NAND network.
ABC + ABC'+AB'C' + A'BC.

e. Reduce the given POS function using K-map and draw the circuit diagram using NOR network
$F(A,B,C,D) = \prod(0,1,2,3,7,8,9,10,11)$

f. Using Don't care condition find reduced SOP equation and draw the circuit diagram using basic gates
$F(P,Q,R,S) = \sum(1,2,3,6,12,14) + d(0,11,13)$

[TURN OVER]

Q.P. Code :00906

3. **Attempt*any three* of the following:** (15)

a. Design the Half adder using K-map. Draw the circuit diagram for the same.
b. With the help of circuit diagram discuss four bit binary adder-subtractor.
c. Design two bit magnitude comparator.
d. Write a short note on BCD to EXCESS-3 code converter.
e. What is Multiplier? Draw diagram and explain 4x4 bit multiplier.
f. Explain Full Adder in detail.

4. **Attempt*any three* of the following:** (15)

a. Draw the logic diagram of 4 to 1 multipexer. Explain its working.
b. Write a short note on demultipexer.
c. Define cascading. Design 16 to 1 multipexer using 8 to 1 multipexer.
d. With the help of diagram explain Bistable Multivibrator.
e. What is meant by race around problem? Explain master slave flip-flop.
f. How J-K flip-flop can used to form a D flip-flop.

5. **Attempt*any three* of the following:** (15)

a. Write a short note on modulus of counter.
b. Explain the working of four bit UP/DOWN counter.
c. Determine the number of flip-flops in Mod 10 ring counter and Jonson counter. Write count sequence in both the cases.
d. Briefly describe the architecture of SISO shift register.
e. Explain the design procedure for MOD 8 binary counter.
f. The table gives below the excitation of flip-flop having inputs X1 and X2. Draw the circuit excitation table of Mod -5 synchronous conter using this flip-flop for the counter sequence 000,001,010,011,100,000. Design the counter using flip-flop whose excitation table is given below.

Preset state (Qn)	Next state (Qn+1)	Input (X1)	Input (X2)
0	0	0	0
0	1	0	1
1	0	1	X
1	1	X	

[Time: $2\frac{1}{2}$ Hours] [Marks:75]

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. Make suitable assumptions wherever necessary and state the assumptions made.
3. Answers to the same question must be written together.
4. Numbers to the right indicate marks.
5. Draw neat labeled diagrams wherever necessary.
6. Use of Non-programmable calculators is allowed.

Q 1 Attempt ***any three*** of the following: **15**

a) i. Which of the following sets are equal? Justify your answer:

$A = \{0, 1, 2\}$
$B = \{x \in \mathrm{R} \mid -1 \le x < 3\}$
$C = \{x \in \mathrm{R} \mid -1 < x < 3\}$
$D = \{x \in \mathrm{Z} \mid -1 < x < 3\}$
$E = \{x \in \mathrm{Z}^+ \mid -1 < x < 3\}$

ii. Let $A = \{w, x, y, z\}$ and $B = \{a, b\}$. Use the set-roster notation to write each of the following sets, and indicate the number of elements that are in each set:

$A \times B$, $T \times S$, $S \times S$, $T \times T$

b) A relation C from R to R is defined as follows: For any $(x, y) \in \mathrm{R} \times \mathrm{R}$.
$(x, y) \in C$ means that $x^2 + y^2 = 1$

i. Does $(1, 0) \in C$? Does $(0, 0) \in C$? Is $-2\ C\ 0$? Is $0\ C\ (-1)$? Is $1\ C\ 1$?
ii. What are the domain and co-domain of C?
iii. Draw a graph for C by plotting the points of C in the Cartesian plane.

c) Let p be the statement "DATAENDFLAG is off," q the statement "ERROR equals 0," and r the statement "SUM is less than 1,000." Express the following sentences in symbolic notation.

i. DATAENDFLAG is off, ERROR equals 0, and SUM is less than 1,000.
ii. DATAENDFLAG is off but ERROR is not equal to 0.
iii. DATAENDFLAG is off; however, ERROR is not 0 or SUM is greater than or equal to 1,000.
iv. DATAENDFLAG is on and ERROR equals 0 but SUM is greater than or equal to 1,000.
v. Either DATAENDFLAG is on or it is the case that both ERROR equals 0 and SUM is less than 1,000

d) The logician Raymond Smullyan describes an island containing two types of people: knights who always tell the truth and knaves who always lie. You visit the island and are approached by two natives who speak to you as follows:

A says: B is a knight.
B says: A and I are of opposite type.

What are A and B? Explain with logical reasoning.

e) Let sets R, S, and T be defined as follows:
$R = \{x \in \mathrm{Z} \mid x \text{ is divisible by } 2\}$
$S = \{y \in \mathrm{Z} \mid y \text{ is divisible by } 3\}$
$T = \{z \in \mathrm{Z} \mid z \text{ is divisible by } 6$

i. Is $R \subseteq T$? Explain.
ii. Is $T \subseteq R$? Explain.
iii. Is $T \subseteq S$? Explain.

P.T.O.

f. Given sets *A* and *B*, the symmetric difference of *A* and *B*, denoted $A \Delta B$, is

$$A \Delta B = (A - B) \cup (B - A).$$

Let *A* = {1, 2, 3, 4}, *B* = {3, 4, 5, 6}, and *C* = {5, 6, 7, 8}. Find each of the following sets:

i. $A \Delta B$
ii. $B \Delta C$
iii. $A \Delta C$
iv. $(A \Delta B) \Delta C$

Q 2 Attempt **any three** of the following: **15**

a. i. Give counter examples to prove that the following statements are false:
   a. $\forall x \in R, x > 1/x$.
   b. $\forall a \in Z, (a - 1)/a$ is not an integer.
   c. $\forall$ positive integers m and n, m X n ≥ m + n.

ii. Consider the following statement:
$\exists x \in R$ such that $x^2 = 2$.
Which of the following are equivalent ways of expressing this statement?
   a. The square of each real number is 2.
   b. Some real numbers have square 2.
   c. The number x has square 2, for some real number x.
   d. If x is a real number, then $x^2 = 2$.
   e. There is at least one real number whose square is 2.

b. Write negation for each of the following statements:
   i. $\forall$ real numbers x, if $x^2 \geq 1$ then $x > 0$.
   ii. $\forall$ integers d, if 6/d is an integer then d = 3.
   iii. $\forall x \in R$, if $x(x + 1) > 0$ then $x > 0$ or $x < -1$.
   iv. $\forall n \in Z$, if n is prime then n is odd or n = 2.
   v. $\forall$ integers a, b and c, if a − b is even and b − c is even, then a − c is even.

c. i. Rewrite the following argument using quantifiers, variables, and predicate symbols. Is this argument valid? Why? Explain.
If an integer is even, then its square is even.
k is a particular integer that is even.
$\therefore k^2$ is even.

ii. Prove the following by using universal modus ponens:
Suppose m and n are particular but arbitrarily chosen even integers. Then
m = 2r for some integer r and n = 2s for some integer s. Hence
m + n = 2r + 2s by substitution
= 2(r + s) by factoring out the 2.
Now r + s is an integer, and so 2(r + s) is even. Thus m + n is even.

d. i. Is 1 prime? Why?
ii. Is every integer greater than 1 either prime or composite? Prove.
iii. Prove the following: ∃ an even integer n that can be written in two ways as a sum of two prime numbers.
iv. Suppose that r and s are integers. Prove the following: ∃ an integer k such that 22r + 18s = 2k.
v. Disprove the following statement by finding a counterexample:
$\forall$ real numbers a and b, if $a^2 = b^2$ then a = b. **P.T.O.**

e. Prove that for all real numbers x and for all integers m, $\lfloor x + m \rfloor = \lfloor x \rfloor + m$.

f. By using negation, prove that $\sqrt{2}$ is irrational.

Q 3 Attempt ***any three*** of the following: **15**

a. Transform the following summation by making the specified change of variable.

$$\sum_{k=1}^{n+1} \frac{k}{n+k} \quad change\ of\ variable: j = k - 1$$

Transform the summation so obtained by changing all j's to k's.

b. For all integers $n \geq 0$, $2^{2n} - 1$ is divisible by 3.

c. Suppose a sequence $b_0, b_1, b_2, \ldots$ satisfies the recurrence relation

$$b_k = 4b_{k-1} - 4b_{k-2} \text{ for all integers } k \geq 2,$$

with initial conditions $b_0 = 1$ and $b_1 = 3$. Find an explicit formula for $b_0, b_1, b_2, \ldots$

d. Define logarithm and logarithmic functions. Use the definition of logarithm to prove that for any positive real number b with $b \neq 1$, $\log_b b = 1$ and $\log_b 1 = 0$.

e. A function F is defined as F: $\mathbf{R} \times \mathbf{R} \rightarrow \mathbf{R} \times \mathbf{R}$ as follows: For all $(x, y) \in \mathbf{R} \times \mathbf{R}$,

$$F(x, y) = (x + y, x - y).$$

Is F a one-to-one correspondence from $\mathbf{R} \times \mathbf{R}$ to itself?

f. Define countably infinite, countable and uncountable sets. Show that the set $\mathbf{Z}$ of all integers is countable.

Q 4 Attempt ***any three*** of the following: **15**

a. A relation R from $\mathbf{R}$ to $\mathbf{R}$ as follows: For all $(x, y) \in \mathbf{R} \times \mathbf{R}$,

$$x\ R\ y \Leftrightarrow y = 2|x|.$$

Draw the graphs of R and R^{-1} in the Cartesian plane. Is R^{-1} a function?

b. A relation T on $\mathbf{Z}$ (the set of all integers) is defined as follows: For all integers m and n,

$$m\ T\ n \Leftrightarrow 3 \mid (m - n).$$

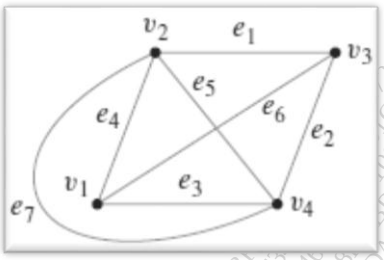
Is T reflexive? Is T symmetric? Is T transitive? Prove.

c. If A is a set, R is an equivalence relation on A, and a and b are elements of A, then either $[a] \cap [b] = \emptyset$ or $[a] = [b]$.

d. State and prove the handshake theorem.

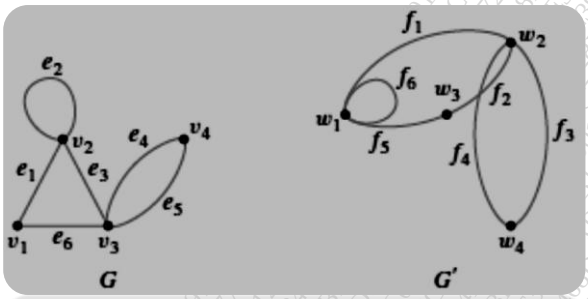
e. Show that the graph below does not have an Euler circuit.

P.T.O.

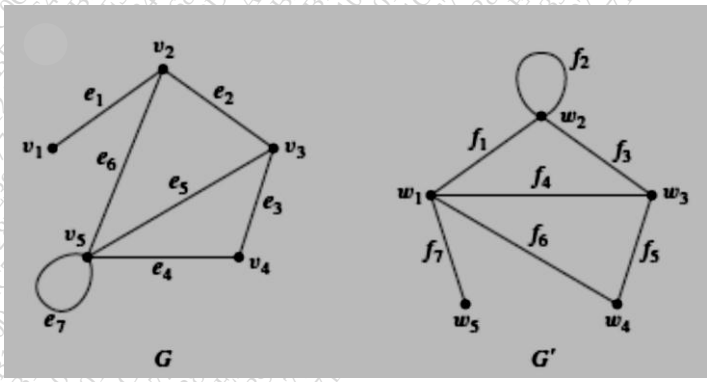


f. For each pair of graphs G and G' in, determine whether G and G' are isomorphic. If they are, give functions g: $V(G) \rightarrow V(G')$ and h: $E(G) \rightarrow E(G')$ that define the isomorphism. If they are not, give an invariant for graph isomorphism that they do not share.

i.



ii.



Q. 5 Attempt ***any three*** of the following: **15**

a. Teams *A* and *B* are to play each other repeatedly until one wins two games in a row or a total of three games. One way in which this tournament can be played is for *A* to win the first game, *B* to win the second, and *A* to win the third and fourth games. Denote this by writing *A–B–A–A*.

P.T.O.

i. How many ways can the tournament be played?
ii. Assuming that all the ways of playing the tournament are equally likely, what is the probability that five games are needed to determine the tournament winner?

b. i. How many ways can the letters of the word *QUICK* be arranged in a row?
ii. How many ways can the letters of the word *QUICK* be arranged in a row if the *Q* and the *U* must remain next to each other in the order *QU*?
iii. How many ways can the letters of the word *QUICK* be arranged in a row if the letters *QU* must remain together but may be in either the order *QU* or the order *UQ*?

c. Let $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$.

i. If five integers are selected from *A*, must at least one pair of the integers have a sum of 9? Explain.
ii. If four integers are selected from *A*, must at least one pair of the integers have a sum of 9? Explain.

d. Suppose five members of a group of twelve are to be chosen to work as a team on a special project.

i. How many distinct five-person teams can be selected?
ii. Suppose two members of the group of twelve insist on working as a pair—any team must contain either both or neither. How many five-person teams can be formed?
iii. Suppose the group consists of five men and seven women. How many teams of five contain at least one man?

e. A lottery game offers □2 million to the grand prize winner, □20 to each of 10,000 second prize winners, and □4 to each of 50,000 third prize winners. The cost of the lottery is □2 per ticket. Suppose that 1.5 million tickets are sold. What is the expected gain or loss of a ticket?

f. A coin is loaded so that the probability of heads is 0.6. Suppose the coin is tossed ten times.

i. What is the probability of obtaining eight heads?
ii. What is the probability of obtaining at least eight heads?

Q.P. Code : 00896

[Time: $2\frac{1}{2}$ Hours] **[Total Marks:75]**

Please check whether you have got the right question paper.

N.B:
1. **All** questions are **compulsory**.
2. Make **suitable assumptions** wherever necessary and **state the assumptions** made.
3. Answers to the same **question** must be **written together**.
4. Numbers to the **right** indicate **marks**.
5. Draw **neat labeled diagrams** wherever necessary.
6. Use of **Non**-**programmable** calculators is **allowed**.

Q.1 Attempt <u>any three</u> of the following: **(15)**

a. List various techniques for the development of a program? Explain any one with suitable example.

b. What is program development life cycle? Explain its various stages.

c. Discuss desirable program characteristics.

d. Define keywords and identifiers in C language? Also differentiate between keywords and identifiers.

e. What is constant? List various constants in C. Explain any two in detail with suitable examples.

f. Assume that your version of C can recognize only first eight characters of an identifier name, though identifier names may be arbitrarily long. Which of the following pairs of identifier names are considered to be identical and which are distinct?
(i) Address , address (ii) name, names (iii) list1, list2 (iv) answer, ANSWER (v) identifier_1, identifier_2

Q.2 Attempt <u>any three</u> of the following: **(15)**

a. What do you understand from hierarchy/precedence of operators?
What is the hierarchy of operators in c?

b. Explain the purpose and use of following operators with suitable examples
(i) == and =
(ii) Conditional operator (? :)

c. C program contains the following declarations and initial assignments
int i=8, j=5;
float x=0.005, y=-0.001;
Determine the value of each of the following expressions
(i) 2*(i/5)+(4*(j-3))%(i+j-2)
(ii) (x>y)&&(i>0)II(J<5)

d. Summarize the meaning of commonly used conversion characters within the control string of a scanf() function.

e. C program contains the following variable declarations
float a=2.5, b=0.0005, c=3000.;
Show the output from following printf statements
(i) printf("%f %f %f",a,b,c);
(ii) printf("%3f %3f %3f", a,b,c);
(iii) printf("%8f %8f %8f",a,b,c);
(iv) printf(8.4f f %8.4f %8.4f",a,b,c);
(iv) printf("%e %e %e", a,b,c);

[TURN OVER]

Q.P. Code : 00896

f. Write an interactive C program to find roots of a quadratic equation $ax^2+bx+c=0$ and roots are given by $-b\pm\sqrt{(b^2-4c)}/2a$.

Q.3 Attempt <u>any three</u> of the following: (15)

a. What are control statements? Explain any two of them.

b. Differentiate between while and do while loop with suitable examples. When to use which Loop?

c. How many times following loops will be executed in the following code

(i) for(i=10;i<25;i++)
{…….
…….
}

(ii) int i=0,n=10,sum=0;
while (i<=n)
{
sum+=i;
}

(iii) for(i=0,j=10;i<10;i++j--)
{…….
……}

(iv) for(i=100;i>70;i=i-2)
{…….
……}

(v) int i=1,n=5
while(i<=10)
{…….
if(i==n)
break;
i++;
}

d. Predict the output of following C codes

(i)int i;
for(i=0;i<=2;i++)
{
switch(i)
{
case 1 : printf("%d",i);
case 2 : printf("%d",i);
default : printf("%d",i);
}
}

[TURN OVER]

Q.P. Code : 00896

(ii)Void exchange (int,int);

```
      void main( )
 {
   int x=20,y=10;
            exchange(x,y);
            printf("%d, %d",y,x);
 }
 Void exchange(int x, int y)
 {
 int temp;
 temp=x;
          x=y;
 y=temp;
}
```

e. What is a function? Explain the purpose of function prototype, function call and function definition in a C program.

f. What is recursion? Write a recursive function to calculate factorial of a number.

Q.4 Attempt <u>any three</u> of the following: **(15)**

a. What do you understand from storage classes? List various storage classes? Explain any two.

b. What is the purpose of a static function in a multifile program? Explain with suitable example.

c. What are preprocessors in C language? Explain #if-#else-#endif preprocessor directive with suitable example.

d. What is macro? Summarize the similarities and differences between macros and functions.

e. What is an array? What are advantages of using arrays? Discuss one dimensional array.

f. Write a C program to find largest number out of given n numbers stored in an array using a function.

Q.5 Attempt any three of the following: **(15)**

a. C program contains following statements

```
int i,j=25;
int *pi,*pj=&j;
*pj=j+5;
i=*pj+5;
pi=pj;
*pi=i+j;
```

Suppose each integer quantity occupies 2 bytes of memory. If the value assigned to i begins at address 1456 and value assigned to j begins at 1458 then

(i) What value is represented by &i and &j?
(ii) What value is represented by pj and *pj?
(iii) What value is assigned to i?
(iv) What is the value represented by pi?
(v) What value is represented by (pi+2)?

b. What is dynamic memory allocation? Explain the use of malloc function with example.

c. Write a C program to perform addition and subtraction of two pointer variable.

[TURN OVER]

Q.P. Code : 00896

d. What is a structure? How does a structure differ from an array?

e. What is a union? Differentiate between structure and union.

f. (a) Define a structure of type hms containing
Three integer members, called hours, minutes and second, respectively.
Then define a union containing two members, each a structure of type hms.
Call the union members local and home respectively.
Declare a pointer variable called time that points to this union.

(b) Define a union of type ans which contains
an integer quantity called ians,
a floating point quantity called fans,
a double precision quantity called dans.
Then define a structure with members
a union of type ans called answer,
a single character called flag,
iIntegar quantites called A and B.
Finally declare two structure variables called x and Y.

Q.P. Code :00892

[Time: 2½ Hours] **[Marks: 75]**

Please check whether you have got the right question paper.

N.B:
1. **All** questions are **compulsory**.
2. **Make suitable assumptions** wherever necessary and **state the assumptions** made.
3. Answers to the **same question** must be **written together**.
4. Numbers to the **right** indicate **marks**.
5. Draw **neat labeled diagrams** wherever **necessary**.
6. Use of **Non-programmable** calculators is **allowed**.

1. Attempt **any three** of the following: **15**

a. Define Operating System. Explain the role of OS as extended machine.
b. Write a short note on fifth generation Operating System.
c. Explain the micro kernel approach of Operating System design.
d. List and explain any five system calls used in process management.
e. Explain process states and possible transitions among these states using diagram.
f. List the three categories and goals of scheduling algorithms.

2. Attempt **any three** of the following: **15**

a. Explain the concept of running multiple programs without memory abstraction.
b. Write a note on swapping.
c. Explain page table and Structure of a Page Table Entry using suitable diagram.
d. Write a short note on Single-Level & Hierarchical Directory Systems.
e. Define file. Explain any four operations associated with file.
f. Explain disk quotas.

3. Attempt **any three** of the following: **15**

a. Write a note on device controller.
b. Explain RAID in details with its different levels (any four).
c. Write a short note on Touch Screen.
d. What are Preemptable and Non-preemptable Resources? Explain.
e. Define Deadlock. List the four conditions that must hold for there to be a deadlock.
f. Explain recovery from deadlock through preemption and rollback.

4. Attempt **any three** of the following: **15**

a. Explain type- 1 and type -2 hypervisor using suitable diagram.
b. Write a note on clouds.
c. What are the requirements of virtualization?
d. Write a note on I/O virtualization.
e. Explain using suitable diagram multicomputer hardware interconnection technology.
f. Write any five comparisons between multiprocessor and distributed system.

TURN OVER

5. Attempt **any three** of the following: **15**

a. Explain using suitable diagram the kernel structure of Linux operating system.

b. Explain the booting of Linux operating system.

c. List and explain the design goals of android operating system.

d. List Win 32 calls for managing processes and threads.

e. Explain using suitable diagram NTFS master file table and its attribute.

f. Briefly explain windows power management.

_____