M.E-I Sem - Comp. 7/12/09

Con. 5376-09. Parallel Computer Architecture. BB–6125

(3 Hours) (1) [Total Marks : 100

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.

1. (a). Discuss different parallel computer architectures. 10
   (b). Explain Virtual Memory using Segmentation Technique. 10

2. (a). Explain the principles of designing pipeline processor. 10
   (b).Write short notes on job sequencing and collision prevention. 10

3. (a).Explain various pipelined vector processing methods. 10
   (b). Discuss different vector optimization methods. 10

4. (a). Explain the different SIMD Computer organizations. 10
   (b). Write Short notes on Shuffle Exchange and omega networks. 10

5. (a). Discuss different Data Flow machine Architectures 10
   (b). Discuss Data flow Graphs with examples. 10

6. (a). Explain different bus arbitration algorithms used in multiprocessor. 10
   (b).Discuss the Multicache problems and dynamic coherence check. 10

7. Write short notes on 20
   (a). I/O processors and I/O channels.
   (b). Cache memory design aspects.
   (c). Classification of Multiprocessors operating systems.

M.E-I Sem - Comp. 11/12/09.

AGJ 99

Algorithms and Complexity

Con. 5259-09. (2) BB–6128

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** out of remaining questions.
(3) Assume **suitable** data if necessary and **justify** the assumptions.
(4) **Figures** to the **right** indicate **full** marks.

1. (a) Write a function for insertion sort and show computation of its space and time complexity. **10**
   (b) Generate variable length Huffman codes for the set of frequencies. **10**
   a = 15, b = 3, c = 0, d = 6, e = 1, z = 7, h = 10 and i = 12.

2. (a) Prove that vertex cover is NP-Complete. **10**
   (b) Compute Longest common subsequence for A = aaabbcada and B = acabbdbdbda. **10**

3. (a) Find a fesible soultion or determine that no feasible solution exists for the following systems of difference constraints. Write the algorithm for the same and give its complexity. **10** **10**

$$x_1 - x_2 \leq 4$$
$$x_1 - x_5 \leq 5$$
$$x_2 - x_4 \leq -6$$
$$x_3 - x_2 \leq 1$$
$$x_4 - x_1 \leq 3$$
$$x_4 - x_3 \leq 5$$
$$x_4 - x_5 \leq 10$$
$$x_5 - x_3 \leq -4$$
$$x_5 - x_4 \leq -8$$

   (b) Give RSA encryption algorithm. **10**
   Consider a RSA key set with p=13, q = 29, n=351 and e=7.
   What value of 'd' should be stored in secrete key ?
   What is the encryption of the message M = 150 ?

4. (a) Insert the following keys 5,6,10, –3, 28, 89, 55, 32, 96, 1 in a hash table of length m=13 using open addressing with primary hash function h(k) = k mod m. Show results of inserting keys using. **10**
   (i) Linear probing
   (ii) Quadratic probing with $C_1 = 1$ and $C_2 = 3$.
   (b) Discuss the various models of computation. **10**

[TURN OVER

5. (a) Consider the following assembly line processing problem of manufacturing automobiles. The factory consists of four stations j = 1,2,3,4 and two assembly lines i=1,2 jth station on assembly line i is denoted by $S_{i,j}$. Time required at station $S_{i,j}$ is A(i,j). The time to transfer a chassis away from assembly line i after having gone through station $S_{i,j}$ is T(i,j). Entry time for assembly line i is E(i) and exit time is X(i). 10

Compute the minimum processing time required for one auto.

E =

i	1	2
	2	3

X =

i	1	2
	3	2

A =

i \ j	1	2	3	4
1	5	7	3	8
2	6	6	4	6

T =

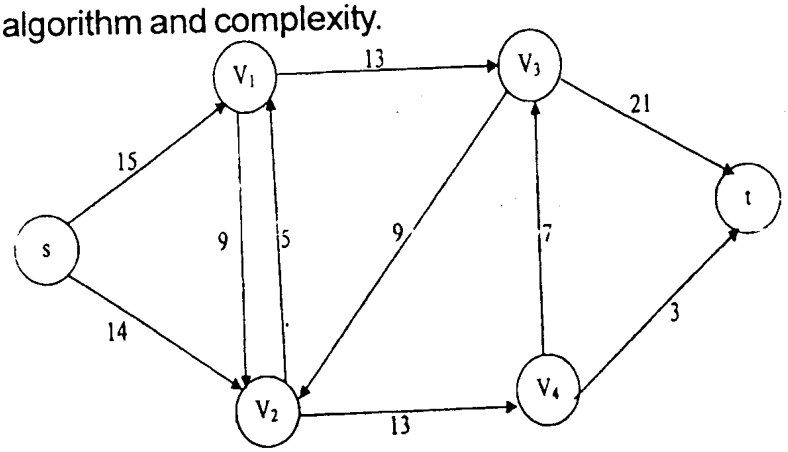
i \ j	1	2	3
1	3	2	2
2	2	2	3

(b) Given below is the weight matrix W for the graph consisting of five nodes {S,B,C,D,E}. Find the shortest path from node S to all other nodes. 10

Weight matrix W =

	S	B	C	D	E
S	0	10	∞	∞	5
B	∞	0	1	∞	2
C	∞	∞	0	4	∞
D	7	∞	6	0	∞
E	∞	3	9	2	0

6. (a) Find the maximum flow for the network given below. Give the algorithm and complexity.



(b) Define :– O, Ω θ.

7. Write short notes on any **four** of the following :–
   (a) Bitonic Sorting Technique
   (b) Versions of Problems
   (c) Master method for recurrences
   (d) B^+ Tree with operations insertion and deletion
   (e) RB Tree with operation insertion
   (f) Chinese Reminder Theorem.

M.E-I Sem - Comp.
Object Oriented Analysis & Design.

16/12/09.

125 : 2nd-AExm.09-Mina

Con. 5302-09.

(3)

BB-6132

(3 Hours)

[Total Marks :100

N.B.: (1) Question **1** is **compulsory.**
(2) Attempt in **four** questions out of remaining **six** questions.
(3) **Assumptions** made should be **clearly** stated.

1. (a) What are OOP, OOD and OOA ? Explain how they are related ? **8**
   (b) What are benefits and risks of Object Oriented Development ? **8**
   (c) What are five attributes of a complex system ? **4**

2. (a) A Ticket Vending Machine (TVM) dispenses tickets to passengers at a railway station. Passengers use the front panel to specify their boarding and destination place, details of passenger (number of adults and children) and date of travel. The machine displays the fare for the requested ticket. The passenger then deposits the cash in the bin provided and presses 'accept cash'. The machine checks the cash if it is more, the balance cash is paid out. And the ticket requested is printed. The system is also used by the operator who might want ot know the cash held in the machine, the break-up of small change available in the machine, withdraw or deposit cash when needed. And the report options also include the detailed report of transactions, summary report of the number of tickets sold for each destination, opening balance, cash collected, cash dispensed and current balance in the machine. Develop a use case diagram and state transition diagram for the same. **12**
   (b) Explain following with examples :— **8**
      (i) Conditional Transition, Nested States
      (ii) History state, Orthogonal state.

3. (a) What do you mean by abstraction ? Give appropriate examples. Also explain different types of abstraction. **10**
   (b) How does one properly identify the classes and their relationships that are relevant to a particular problem ? **10**

4. (a) Develop a class diagram for hospital management system. **10**
   (b) What is an object ? What is a class ? How do you distinguish between the two constructs ? **6**
   (c) What are the five levels of process maturity ? Explain. **4**

5. (a) Explain Macro Process of development in detail. **10**
   (b) Explain object identity and its role during its lifespan. What are passive and active objects ? Give appropriate examples of each. **10**

6. (a) Draw a functional model for library management system and give proper explanation for the same. **10**
   (b) Explain release management and walkthroughs with respect to object oriented development. **10**

7. Write short notes on :— **20**
   (a) Object oriented s/w testing
   (b) Typing
   (c) Reuse in s/w development
   (d) Role name and qualification.

Neural Networks & Fuzzy Systems

Con. 5378-09. **(REVISED COURSE)** **BE–6134**

(3 Hours) (4) **[Total Marks : 100**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of the **remaining**.

Q.1 (a) A neuron with 4 inputs has the weight vector $w = [1, 2, 3, 4]^t$. The activation function is linear, that is, the activation function is given by f(net) = net. If the input vector is $X = [5, 6, 7, 8]^t$, then find the output of the neuron. 05

(b) Model the following as fuzzy set using suitable membership function - "numbers close to 5". 05

(c) Define with examples the terms Projection and Cylindrical Extension in a fuzzy relation. 05

(d) Differentiate between the membership functions T function and Zadeh's S function. 05

Q.2 Design a fuzzy controller to determine the wash time of a domestic washing machine. Assume that the inputs are dirt and grease on clothes. Use three descriptors for each input variable and five descriptors for the output variable. Device a set of rules for control action and defuzzification. The design should be supported by figures wherever possible. Clearly indicate that if the clothes are soiled to a smaller degree the wash time required will be less. 20

Q.3 (a) What is learning in neural networks? Compare different learning rules. 10

(b) Explain error back propagation training algorithm with the help of a flowchart. 10

Q.4 Determine the weights after three iterations for hebbian learning of a single neuron network starting with initial weights w = [1,-1], inputs as X1 = [1,-2], X2 = [2,3], X3 = [1,-1] and c = 1.
Use (i) Bipolar binary activation function
(ii) Bipolar continuous activation function 20

Q.5 (a) Describe the basic Hopfield model and give the theory of energy minimization in auto-associative Hopfield network. 10

(b) Explain the architecture of Bidirectional associative memory. How is storage and retrieval performed in BAM? 10

Q.6 (a) What is competitive learning? Explain winner take all learning rule and self-organizing map with the help of an example. 10

(b) Explain with suitable examples linearly and non-linearly separable pattern classification. 10

Q.7 Write notes on **any two** of the following 20
(i) Fuzzy Knowledge based Controller
(ii) Defuzzification Methods
(iii) Character recognition using neural networks
(iv) Medical diagnosis using neural networks

M.E-I Sem- Comp. 29/12/09.

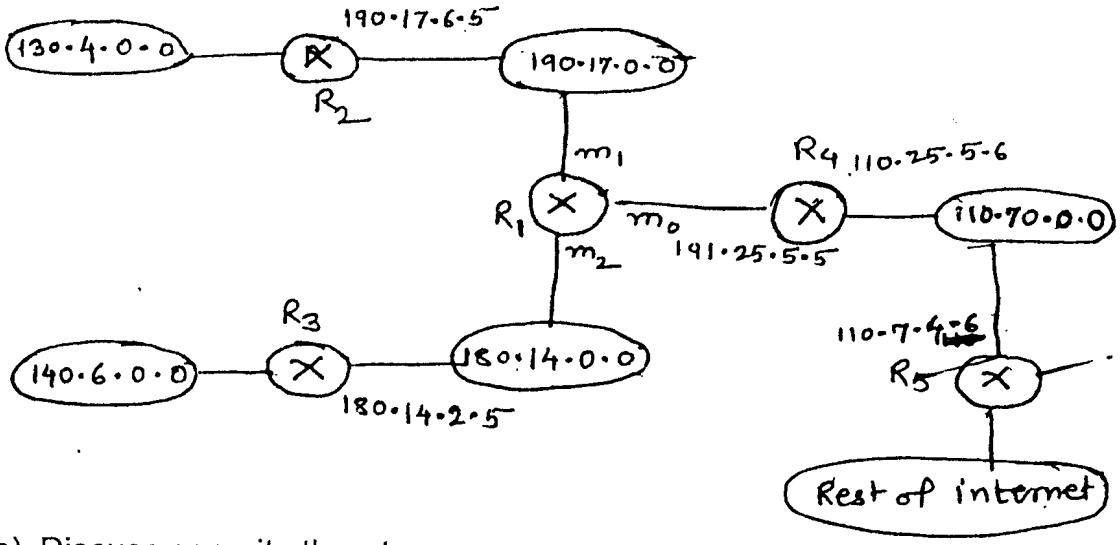
AGJ 2nd half (b) 57 Network Protocols & Networking

Con. 5658-09. (5) **BB-6140**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions out of remaining **six** questions.

1. (a) ISP is granted a block of addresses. Starting with 190·100·0·0/16. The ISP needs to distribute these addresses to the group of customer as follows – **10**
   (i) The first group has 128 customers, each need 256 addresses
   (ii) The second group has 64 customers, each needs 128 addresses
   (iii) The third group has 128 customers, each need 64 addresses.
   Design the sub blocks and find out how many addresses still are available after this allocation.
   (b) Design the routing table router R_1 for following network. **10**



2. (a) Discuss security threats. **10**
   (b) Explain in detail connection establishment and connection termination process in TCP. **10**

3. (a) Disucss various network monitoring configurations. How information required for network monitoring is collected ? **10**
   (b) Explain error reporting messages in ICMP. **10**

4. (a) How error detection and correction is achieved in TCP ? **10**
   (b) Explain RMON goals and RMON MIB. **10**

5. (a) IP datagram has arrived with following information in the header (in hexadecimal) **10**
   45 00 00 54 00 03 00 00 20 06 00 00 7C 4E 03 02 B4 0E 0F 02.
   (i) are there any options
   (ii) is the packet fragmented
   (iii) what is the size of the data
   (iv) is a checksum is used
   (v) what is the type of service
   (vi) what is the identification number of the packet ?
   (b) Explain ARP process and state different cases in which ARP services are used. **10**

6. (a) Explain fragmentation of IP datagram. **10**
   (b) Explain technique used for forwarding IP packet when host has a packet to send or when a router has received packet to be forwarded. **10**

7. Write notes on any **four** of the following :– **20**
   (a) DNS
   (b) Layer 3 switching
   (c) Telnet
   (d) IP V_6
   (e) FTP.

B.E. - II Sem. - Comp. 5/12/09.

Software Engineering

Con. 5377-09.

BB–6173

(4 Hours) (6) [Total Marks : 100

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from the remaining **six** questions.
(3) Assumptions must be **justified**.

1. (a) Explain Incremental and RAD model.
   (b) Explain RMMM in detail. What is RIS ? Give it's format.

2. (a) What is process, project and product ? Explain different ways of organizing a software team .
   (b) Explain different activities of Software Configuration Management .

3. (a) Define SQA and explain SQA activities.
   (b) Explain different types of Cohesion and Coupling with examples.

4. (a) What is analysis modeling? Explain different aspects of analysis modeling.
   (b) Explain different debugging approaches.

5. (a) Define Reliability and Availability and explain their measures.
   (b) How does SEI determine an organization's current state of process maturity? Explain in detail.

6. (a) Explain boundary value analysis and equivalence partitioning.
   (b) What is the difference between testing strategy and testing technique? Explain different types of System testing.

7. Write short notes on any two :
   1. Formal Technical review.
   2. Project Scheduling and Tracking.
   3. Object Oriented Testing.

ATKT

AIKT

M.E - II sem - Comp

14/12/09.

Distributed Operating System

124 2nd-AExm.09-Mina

(7)

Con. 5301-09. **BB-6176**

(4 Hours) **[Total Marks :100**

N.B.: (1) Question **1** is **compulsory.**
(2) Attempt in **four** questions out of remaining **six** questions.
(3) **Assumptions** made should be **clearly** stated.

1. (a) Define Distributed Operating System (DOS). What are different issues in the design of a DOS ? **10**
   (b) Discuss in detail the Unix i-node structure. Evaluate its Maximum capacity and convert virtual address 13,000 to (block no, offset) pair. Assume block size of 1K. **10**

2. (a) Explain what are RPC Semantics in presence of failure. **10**
   (b) Discuss types of deadlocks, solutions for deadlocks and any one de-centralized deadlock detection algorithm. **10**

3. (a) Explain physical, logical and vector clocks. Compare and contrast their advantages, disadvantages and other details if any. **10**
   (b) (i) Discuss bully election algrorithm. **5**
   (ii) What happens if two processes detect failure of co-ordinator simultaneously and both decide to hold an election ? Explain. **5**

4. (a) (i) Discuss structure of buffer header in Unix. **4**
   (ii) Discuss following scenarios for retrieval of a buffer :- **6**
      (1) Block is in hash queue and buffer is free.
      (2) Block not in hash queue and buffer on free list is marked "delayed write".
   (b) Explain following :— **10**
      (i) Filters and pipes in Unix
      (ii) Relationship between file table, File Descriptor table and i-node.

5. (a) What are Hard job and Soft jobs ? Give Examples. 4

(b) Define :– 4

(i) Release Time (iii) Absolute Deadline

(ii) Response Time (iv) Relative Deadline.

(c) "RTOS" implementation is not feasible using Monolithic Kernel". Comment. 4

(d) Compare and contrast EDF and LST scheduling algorithms. 4

(e) Explain Event triggered versus time triggered systems. 4

6. (a) (i) Suppose process P2 needs resource R1 which is held by process P1. P2 has transaction timestamp of 20 and P1 has a transaction timestamp of 70. What happens in :— 5

(1) Wait-die (2) Wound-wait.

(ii) Differentiate between stateless and stateful servers. 5

(b) Discuss sender initiated and receiver initiated heuristic algorithms for processor allocation in distributed systems. Which of these is more optimal for heavy loads and why ? 10

7. Write short notes on any **three** :— 20

(a) Distributed Shared Memory

(b) Consistent Global State

(c) Transparency

(d) Monolithic Kernal

(e) Fault Tolerance and it's significance.

ME II Sem - Comp.

18/12/10

Advance Database Management System

Con. 5258-09.

(8) BB-6179

(4 Hours) [Total Marks : 100

N.B. (1) Question No.1 is **compulsory.**
(2) Attempt any **Four** out of **remaining.**
(3) Assume **suitable** data if **necessary** and **justify** the **assumptions** .
(4) **Figures** to the **right** indicate **full** marks.

1. We have to keep track of BANK database. Each bank can have multiple branches. It is necessary to keep track of different types of accounts (savings-accounts, cheque accounts) and loans(car loans, home loans) of the customers. Suppose that it is desirable to keep track of each accounts transaction (deposits, withdrawals, cheques) and each loan payments.
   (a) Draw the ER Diagram.
   (b) Answer the following queries in SQL
      (i) Find all customers who have both an account and a loan at the Matunga branch.
      (ii) Find the branch that has the highest average balance.
   (c) Give the rules for converting EER schema to OODB schema . 10

2. (a) Consider the relation REFRIG(MODEL#, YEAR, PRICE, MANUF_PLANT, COLOR), which is abbreviated as REFRIG(M, Y, P, MP, C) and the following set F of functional dependencies F={M → MP, {M, Y} → P, MP → C} 9
      (i) Evaluate each of the following as a candidate key for REFRIG, giving reasons why it can or cannot be a key: {M}, {M, Y}, {M, C}
      (ii) Based on the above key determination, state whether the relation REFRIG is in 3NF and in BCNF giving proper reasons.
      (iii) Consider the decomposition of REFRIG into D = {Rl(M, Y, P), R2(M, MP, C)}. Is this decomposition loss less? Show why.
   (b) Explain 4NF and 5NF with example. 6
   (c) Define 3NF and BCNF. 5

3. (a) Explain with example ARIES recovery technique 10
   (b) Write a note on Validation Concurrency Control Techniques. 10

4. (a) Write Basic Timestamp Ordering Algorithm. 5
   (b) Explain in brief Shadow Paging 5
   (c) Draw the serializable graphs for the schedules S_1 and S_2, and state whether each schedule is conflict serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s). 5

      S_1 : $r_1(X)$; $r_2(Z)$; $r_1(Z)$; $r_3(X)$; $r_3(Y)$; $w_1(X)$; $w_3(Y)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$;
      S_2 : $r_1(X)$; $r_2(Z)$; $r_3(X)$; $r_1(Z)$; $r_2(Y)$; $r_3(Y)$; $w_1(X)$; $w_2(Z)$; $w_3(Y)$; $w_2(Y)$

   (d) For the schedules given in Q2(b) determine whether each schedule is view serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s). 5

[TURN OVER

5. Consider university database that keeps track of students and their majors, transcripts and registration and university's courses. Several sections of each course are offered and each section is related to the instructor. who is teaching. It also keeps track of the sponsored research projects of faculty and graduate student, of the academic departments of the particular college. The database also keeps track of research grants and contracts awarded to the university. A grant related to one principle investigator and to all researchers it supports.
   (a) Design Object Oriented Database Schema **15**
   (b) Answer the following queries in Object Query Language— **5**
      (i) Retrieve the names of all students who completed the course called "Systems Programming I".
      (ii) Retrieve the top three computer science majors based on GPa.

6. A university database contains information about professors and the courses they teach. The university has decided to publish this information on the web and you are incharge of the execution. You are given the following information about the contents of the database.
In the fall semester 2009, the course 'Introduction to Database Management Systems' was taught by Professor Loannidis. The course took place Tuesday and Wednesdays from 9-10 a.m. in room 101 the discussion was held on Fridays from 9-10 a.m. Also inthe fall semester 2009, the course 'Advance Database Management' was taught by Professor Carey. 25 students took that course which was held in room 110 Tuesdays and Thursdays from 1-2 p.m. In the spring semester 1999, the course 'Introduction to Database Management Systems' was taught by U. N. Owen on Tuesdays and Thursdays from 3-4 p.m. in room 110. 60 students were enrolled; the discussion section was on Thursdays from 4-5 p.m. The other course taught in the spring semester was 'Advanced Database Management Systems' by Professor Loannidis, Monday, Wednesday and Friday from 8-9 a.m.
   (i) Create a well-formed XML document that contains the university database. **5**
   (ii) Create a DTD for your XML document. Make sure that the XML document is valid with respect to this DTD. **5**
   (iii) Design a relational schema to publish this data. **5**
   (iv) Create an XML schema from the relational schema. **5**

7. Consider the following relations—
   Customer (Cus_id#, Cust_Name, street, City, Zip, Phone)
   Account (AccNo#, Acctype, BankBranchNo, Balance)
   CustAccount (Cust_id#, AccNo#, interest)
   (a) Give example of two simple queries that would be meaningful for the Account relation for horizontal partitioning. **6**
   (b) Show the derived horizontal partitioning of CustAccount based on the partitioning of the Account. **7**
   (c) Show the query by which Customer may be horizontally partitioned. **7**

Image Processing

Con. 5632–09.

(9)

BB–6185

(4 Hours)

[Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume **suitable** data wherever **necessary** and **state** it clearly.

1. (a) Write 8 x 8 Discrete Walsh Transform apply 4 x 4 Walsh Transform on a 4 x 4 digital image. **10**
   (b) Write a note on applications of Image Processing. **5**
   (c) What is Image Subtraction ? Is it related with Image segmentation ? **5**

2. (a) Describe the General Compression System Model for digital images. **10**
   (b) Write a note on White Block Skipping. **5**
   (c) Explain Homomorphic filter. **5**

3. (a) Histogram of a digital image with 8 quantization levels is given below. Perform Histogram Equalization. Derive the transformation function and the new histogram – **10**

(Gray Level) r	0	1	2	3	4	5	6	7
(No. of pixels with gray level r) n_r	75	100	350	50	25	25	150	225

   (b) What is Brightness adaptation and discrimination ? **5**
   (c) What is chessboard distance and city block distance ? **5**

4. (a) Illustrate Arithmetic Coding and Decoding. **10**
   (b) Show that a high pass image can be obtained as High pass = Original – Low pass. **5**
   (c) Explain median filter. **5**

5. (a) Write a note on Wavelet transform. **10**
   (b) Give masks of 3 x 3 size for the following and explain its usefulness in image processing – **10**
      (i) Sobel operator
      (ii) Prewitt operator.

6. (a) Explain the Medial Axis Transformation for finding the skeleton of a region. **10**
   (b) Name and explain different boundary descriptors. **10**

7. (a) Can Graph theoretic techniques be used in Image Segmentation ? If so, how ? **10**
   (b) Prove the validity of the duality equation – **5**

$$(A \bullet B)^c = (A^c \circ \hat{B})$$

   (c) State and prove periodicity and symmetry property of DFT. **5**