UNIVERSITY OF PUNE

[4363]-251

T. E. (Computer & IT. Semester I) Examination - 2013

Database Management Systems

(2008 Pattern)

[Total No. of Questions:] **[Total No. of Printed Pages :2]**

[Time: 3 Hours] **[Max. Marks: 100]**

Instructions:

1) *Answers to the two sections should be written in separate books.*
2) *Black figures to the right indicate full marks.*
3) *Assume suitable data if necessary.*
4) *Solve Section 1: Q1 or Q2, Q3 or Q4, Q5 or Q6*
5) *Solve Section 2: Q7 or Q8, Q9 or Q10, Q11 or Q12*

SECTION - 1

Q1 A) How Following Problems are handled with DBMS. [6]

i. Data Isolation.

ii. Data Redundancy and Inconsistency.

iii. Data Integrity

B) Explain with Example how E-R diagrams are converted into tables [6]

C) Explain the need for the following. [6]

i. View

ii. Foreign Key.

OR

Q2 A) Explain various database Languages [8]

B) Explain various Data Models used in DBMS. [10]

Q3 A) Given relation schema: R(A,B,C), S(D,E,F). Let relation r(R) and s(S) be given. Convert following SQL Statements in relational algebra form. [8]

1. Select * from r where B = 17
2. Select A,F from r,s where r.C = s.D
3. Update r, set B = B*15 where A='aaa'
4. Select * from s where E < 20

B) Explain various operators in relational Algebra. [8]

OR

Q4 A) What is cursor? Explain various types of Cursor. [8]

B) Explain Stored Procedures and Triggers. [8]

Q5 A) Explain why 4 NF is more desirable than BCNF. Rewrite the definition of 4NF and BCNF using the notions of domain constrains and general constraints.

B) Specify Armstrong's axioms. Use Armstrong's axioms to prove the soundness of pseudo transitivity rule. [8]

OR

Q6 A) Let R=(A,B,C,D,E) and let M be the following set of multivalued dependencies. [8]

A→→BC, B→→CD, E→→AD.

List the non-trivial Dependencies in M+

B) Describe the concept of transitive dependency and explain how this concept is used to define 3 NF. [8]

SECTION – 2

Q7 A) What is ordered indices? Explain the types of Ordered indices with suitable example. [9]

B) Explain detail use of B Tree as an indexing technique. Compare B Tree and B+ Tree. [9]

OR

Q8 A) Explain Following: [9]

i. Dense Index.

ii. Sparse Index.

iii. Clustered Index.

B) Give the Transformation Rules for Relational Expressions. [9]

Q9 A) Explain the concept of 'transaction'. Describe ACID properties for transaction. [8]

B) Show that two phase locking protocol ensures conflict serializability [8]

OR

Q10 A) Explain Time Stamp Based Protocol. [8]

B) State and Explain Thomas Write rule [8]

Q11 A) How does the concept of an object in the object oriented model differ from the concept of an entity in the E-R model. [8]

B) Explain the need of Backup and Replication. [8]

OR

Q12 A) What is fragment of relation? What is main types of fragments? [8]
Why a fragmentation is useful concept in distributed database design?

B) Write short note on: [8]

i) Data Warehouse Manager

ii) Pointer Swizzling Techniques

UNIVERSITY OF PUNE

[4363]-261

T. E. (IT) Examination 2013

314441: OPERATING SYATEM

(2008 Pattern)

[Total No. of Questions:12] **[Total No. of Printed pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

(1) *Answers any 3 questions from each section*

(2) *Answers to the two Sections should be written in separate answer-books*

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

SECTION I

Q.1 a)Describe with the help of neat diagram the interaction of operating system with hardware. [8]

b)Write a shell script for following. [8]

i)Count number of directories in current directory

ii)Search a file in current directory

iii)Display all the users logged in and count them

iv)Simulate DOS copy command using command line arguments

OR

Q.2 a)What is OS? Write different functions of OS. [8]

b)Write an AWK script to generate a report of students having marks above 40% and count them. Input data file contains fields as roll no, name, percentage marks. fields are separated by space. [4]

c)What is thread? Give comparison between thread and process. [4]

Q.3 a)What resources are used when a thread is created? How do they differ from those when a process in created? [6]

b)Draw Gantt chart and calculate turnaround time, wait time for following processes using FCFS, SJF nonpreemptive and Round Robin CPU scheduling algorithms. (Round robin time quantum=2) [12]

Process	Arrival Time	Burst time
P1	0	8
P2	1	5
P3	3	3
P4	4	1
P5	6	4

OR

Q.4 a)Explain real time scheduling with examples. [8]

b)Explain multilevel feedback queue scheduling. [8]

c)What is race condition? [2]

Q.5 a)What is deadlock? Explain necessary conditions for deadlock? How to prevent deadlock? [10]

b)Write pseudo C code of BAKERY algorithm for N process solution to the critical section problem. [6]

OR

Q.6 a)Write structure of producer processes using semaphore and explain synchronization. [8]

b)Explain different strategies for deadlock recovery. [8]

SECTION II

Q.7 a)For following addresses write page references and calculate number of page faults using FIFO, LRU and Optimal page replacement policies with number of page frame =3 page size 100 bytes Reference String 12,19,100,121,200,150, 360,300,309,312,122,53,59,415,212,515 [12]

b)What is Compaction? How it deals with external fragmentation? [6]

OR

Q.8 a) Consider the following table [6]

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?
i)0,430 ii)1,10 iii)2,500 iv)3,400 v)4,112 vi)2,60

b)Explain Fixed Partitioned memory management scheme. [6]

c)Why are segmentation and paging sometimes combined into one scheme? [6]

Q.9 a)Explain different blocking methods used by I/O subsystem. [6]

b)Write different methods used for space allocation for files on disk. [10]

OR

Q.10a)Define following terms [6]

i)Seek time

ii)Rotational Latency

iii)Transfer time

b)Explain different methods used for disk free space management. [10]

Q.11a)If virus must execute to replicate, how can a word processing document transmit a virus? [4]

b)Explain Unix Password scheme with neat diagram [6]

c)Explain Different methods used for authentication. [6]

OR

Q.12a)Describes system and network threats [6]

b)Write short note on [10]

i)Trusted System

ii)Virus & Trojan Horse

UNIVERSITY OF PUNE

[4363]-262

T. E. (IT) Examination 2013

THEORY OF COMPUTATION

(2003 Pattern)

[Total No. of Questions:12] **[Total No. of Printed pages :6]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

(1) *Answers any 3 questions from each section*

(2) *Answers to the two Sections should be written in separate answer-books*

(3) *Neat diagram must be drawn wherever necessary.*

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

SECTION-I

Q.1a) Define the following terms [6]

1) Symbol 2) Language 3) Kleen closure

b) Design a Finite Atomata FA which accepts odd number of 0'S and even number of 1's [6]

c) Find all possible regular expression ever L $\underline{C}$ {0,1}* [4]

i) The set & all possible string containing

ii) The set of all string that do not end with "01".

OR

Q.2a) Design NFA which accepts the string containing either "01" or "10" over Σ={0,1}. [6]

b) Construct an equivalent DFA fer given NFA [10]

m={q,p,r,s,t}, {0,1}, δ,p, {t}

where δ is defined in the following table.

δ	0	1
{p}	{t}	{q,r}
{t}	ϕ	ϕ
{q,r}	ϕ	{p,s}
ϕ	ϕ	ϕ
{p,s}	{p,t}	{q,r}
{p,t}	{t}	{q,r}

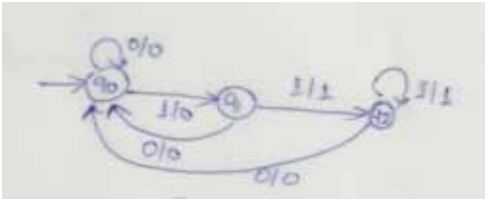
Q.3a) Construct a DFA for the regular expression (a+b)*(baaa) [6]

b) Design a mealy machine fer binary input sequence such that if [6]
sequence ends with 100, the output is 1 otherwise output is 0.

c) Explain the difference between DFA and NFA. [4]

OR

Q.4a) Convert the following mealy machine into equivalent Moore machine. [10]



b) consider the following productions [6]

$S \rightarrow A1B$

$A \rightarrow OA \mid \in$

$B \rightarrow OB \mid 1B \mid \in$

For the string 1001. Find

1) The leftmost derivation

2) The rightmost derivation

3) Parse tree

Q.5a) Convert the following grammar to CNF [8]

S→a A b B

A→aA

B→bB | b

b)Write a note on Applications of CFG [6]

c)If G is a grammar [4]

s→ sbs | a

show that G. is ambigous.

OR

Q.6a) Explain the following terms in CFG with suitable examples [6]

1) Useless symbols.

2) Nullable variables.

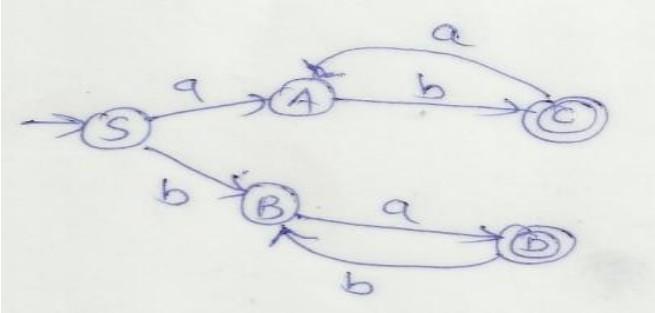
b) Find context free grammar for given language. [8]

$\{a^i b^i c^k \mid$ i= j+k$\}$

c) Write short note on inherent ambiguity [4]

SECTION II

Q.7a) Find the right linear grammar fer the following DFA [4]



b) Check whether the given language is CFL or not [8]

L={$0^N 1^N 2^N$ | n ≥}

c) Convert the following left linear grammar [4]

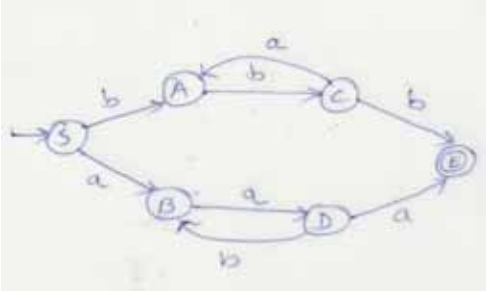
S→ ABa

A→ a ab

B→ AC

OR

Q.8a) Find left linear grammar for the given DFA [4]



b) Obtain NFA fer the following Right linear grammar [6]

S→ Aaa | Bbb

A→ Caa | aa

B→ Dbb | bb

C→ Aaa

D→ Bbb

c) Show that L={WW | W∈ {a,b}*} is not CFL [6]

Q.9a) Construct a PDA that accepts the language [10]

L={$a^n b^{2n}$ | n ≥ 1}

b) Define PDA Discuss the various applications of PDA. [4]

c) Write and Explain closure properties of CFL. [4]

OR

Q.10a) Convert the PDA to CFG. PDA is given by [10]

P=({p,q}, {0,1}, {x,z},δ ,q,z)

Transition function δ is defined as

δ(q,1,z)= {(q,xz)}

δ(q,1,x)={(q,xx)}

δ(q, ∈,x)={(q, ∈)}

δ(q,o,z)={(q,x)}

δ(p,1,x)={(p, ∈)}

δ(p,o,z)={(q,z)}

b)Construct PDA equivalent to CFG, which defines language containing all string only with equal number of a's & b's. simulate working of this PDA fer the input is ''aabb" [8]

Q.11a) Design Tm to accept the set L of all strings fermed with 0&1 and having substring 000. [8]

b) Explain the following [8]

i) Universal TM

ii) Halting problem in TM.

OR

Q.12a) Design a TM to recognize palindreme string over {a,b} [8]

b) Explain the following terms in relation to TM [8]

1) Solvability

2) Semi – Solvability

3) Unsolvability

UNIVERSITY OF PUNE

[4363]-263

T. E.(IT Semester-I)Examination - 2013

COMPUTER NETWORK TECHNOLOGY

(2008 Pattern)

[Total No. of Questions:] **[Total No. of Printed Pages :2]**

[Time : 3 Hours] **[Max. Marks : 100]**

*(1)Answers to the **two sections** should be written in **separate answer-books**.*

(2) Neat diagrams must be drawn wherever necessary.

(3) Assume suitable data, if necessary.

SECTION-I

Q1 a) Explain Multi Protocol Label Switching architecture. [8]

b) Compare between distance vector routing and link state routing protocol [8]

OR

Q2 a) Explain leaky bucket and token bucket algorithm [8]

b) Discuss the design issues of the network layer. [8]

Q3 a) For a Given class B network 150.160.0.0 with default subnet mask, How can you divide it into 8 equal subnets? How many hosts can be Accommodated in each sub-network? [8]

b) Explain Border gateway protocol with message format. [8]

OR

Q4 a) What is supernet. Explain it with suitable example. [8]

b) Explain packet format of both ARP and RARP. [8]

Q5 a) Explain TCP with its header format [9]

b) What is a Socket? Explain various socket primitives used in client-server interaction [9]

OR

Q6 a) How will you differentiate a stream socket from a raw socket? How data transmissions happen in a datagram mode? [9]

b) Explain TCP congestion control in detail. [9]

SECTION-II

Q7	a) Explain SNMP model with its components	[8]
	b) List and describe all the messages types used in SNMP.	[8]
	OR	
Q8	a) Explain what is static, dynamic and active pages. Give one real Example of each one.	[8]
	b) Explain POP3 with its features and limitations.	[8]
Q9	a) What do you mean by the integrated services? Explain with suitable Example.	[8]
	b) Explain H.323 architectural model	[8]
	OR	
Q10	a) Explain the RTSP protocol. Why this protocol is needed.	[8]
	b) Explain Session Initiation Protocol with respect to following points: i) SIP addresses ii) SIP message	[8]
Q11	a) Explain 802.11 architecture.	[9]
	b) Explain Bluetooth features and architecture with suitable diagram.	[9]
	OR	
Q12	a) Explain ATM cell format in detail.	[9]
	b) Write a detailed note on WLAN.	[9]

UNIVERSITY OF PUNE

[4363]-264

T.E Software engineering Examination - 2013

INFORMATION TECHNOLOGY

(2008 COURSE)

[Total No. of Questions :12] **[Total No. of Printed Pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **Q1 or Q2, Q3 or Q4 or Q6 and answer Q7 or Q8, Q9 or Q10, Q 11 or Q12** question from section I.*

*(2) Answers to the **two sections** should be written in **separate answer-books**.*

(3) Black figures to the right indicate full marks.

(4) Neat diagrams must be drawn wherever necessary.

SECTION – I

Q1 A) What are the characteristics of software? Explain in detail following software myths. 10

i) Practioner's myths ii) Management myths

B) Define software engineering. Explain the failure curve of software. 8

OR

Q2 A) What is software process? Explain iterative software process model and Spiral model in detail. 10

B) Explain in detail extreme programming 8

Q3 A) Explain requirement elicitation and elaboration tasks in brief. 8

B) What are the rules of thumb. Explain in detail following UML diagrams stating purpose and applicability. 8

i) Use-case diagram ii) State diagram

OR

Q4 A) Draw level 0, level 1, and level 2 data flow diagram for library book returning system for a student. System also maintains book information. 8

B) Explain (Class-Responsibility-Collaborator CRC) Modeling. 8

Q5 A) Explain in Detail following Design concepts: 12
1. Information Hiding 2. Modularity 3. Function Independence
B) Explain Layered architecture style in brief. 4

OR

Q6 A) Explain the Golden rules used for user interface design. 12
B) Explain Web application interface design principles and guidelines. 4

SECTION – II

Q7 A) Explain the Debugging Process with the help of a diagram. 6
B) Explain the following system testing strategies in brief. 6
i) Stress Testing ii) Security Testing
C) Define Cyclomatic Complexity? What are the 3 ways to calculate it? 4

OR

Q8 A) Explain the following Integration Testing Strategies: 8
i) Top-down integration ii) Bottom-up integration
B) Distinguish between: 8
i) White Box and Black Box Testing ii) Alpha and Beta Testing

Q9 A) Explain the FP based Estimation Decomposition Technique. 6
B) Explain the term people and process of management Spectrum. 6
C) State the direct measures of the Software process and product. Also state the indirect measures of product? 4

OR

Q10 A) Explain decision tree to support make-buy decision with an example. 8
B) What do you mean by DRE? What is the ideal value for DRE? What is the significance of DRE in maintaining Software Quality? 4
C) Describe the Lorenz and Kidd approach of estimation for Object-Oriented Projects. 4

Q11 A) Compare Reactive Verses Proactive Software Risks. Explain Software Risk Management. 10
B) What is a task network in project scheduling? Explain with an example. 8

OR

Q12 Write a Short note on: (Any 3) 18
1) Software Configuration Management 2) Software Quality
3) Earned Value Analysis 4) Product Metrics

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UNIVERSITY OF PUNE
[4363]-265
T. E.(IT)Examination - 2013
SYSTEM SOFTWARE PROGRAMMING
(2008 Pattern)

[Total No. of Questions:12] **[Total No. of Printed Pages :2]**
[Time: 3 Hours] **[Max. Marks: 100]**

Instructions :

*(1) Answer **Q1 or Q2, Q3 or Q4, Q5 or Q6** from section I and **Q7 or Q8, Q9 or Q10, Q11 or Q12** from section II.*
*(2) Answers to the **two sections** should be written in **separate answer-books**.*
(3) Black figures to the right indicate full marks.
(4) Neat diagrams must be drawn wherever necessary.
(5) Assume suitable data, if necessary.

SECTION-I

Q1 a) What feature of Assembly makes to design pass II of two pass Assembler? Explain with suitable example. [6]

b) Describe different types of errors that are handled by Pass I & Pass II of two pass Assembler. [6]

c) Enlist different Data Structures created during Pass I of two pass Assembler. Explain with suitable example. [6]

OR

Q2 a) Write an algorithm for Pass-II of two pass Assembler and explain with suitable example. [10]

b) What do you mean assembler directives? Explain how assembler directives LTORG, ORIGIN and EQU are processed in pass-I of two pass assembler. [8]

Q3 a) Describe Macro definition within Macro definition with suitable Examples. [8]

b) What are the different ways in which we can specify the arguments to a Macro call? Explain with suitable examples. [8]

OR

Q4 a) Write an algorithm for Pass-II of two pass Macro Processor with suitable example. [8]

b) Differentiate between Macro and Subroutine with respect to execution speed and memory space. [4]

c) Write a short note on C-Preprocessor. [4]

Q5 a) Explain Shift Reduce Parser with example also enlist what are major problems with Shift Reduce Parser. [8]

b) Differentiate between top down and bottom up parser. [6]

c) What are the basic tasks of scanner? [2]

OR

Q6 a) Explain the problem of left factoring in Top down Parser. [6]

b) Write short note on Lexical Analysis. [6]

c) What is ambiguous grammar? Explain with example. [4]

SECTION-II

Q7 a) Explain Machine dependent code optimization technique with suitable example. [8]

b) For the statement given below, generate intermediate code in the format. i) Quadruple, ii) Triple, iii) Parse tree, iv) Postfix notation, A=-P*(-Q+R) [8]

OR

Q8 a) What are the issues in code generation [8]

b) Explain the importance of intermediate code generation in compiler. [4]

c) Write a short note on activation record. [4]

Q9 a) Explain Binary Symbolic subroutines (BSS) loading scheme with Example. Also discuss how allocation, relocation, linking & loading is done. [10]

b) Explain with the help of Flow chart the design of an absolute loader. [8]

OR

Q10 a) Explain the following [6]

i) Overlay Structure ii) Linkage editor.

b) What is loader? Enlist basic functions of a loader? [6]

c) Compare: i) Dynamic loading Vs Dynamic linking [6]

Q11 a) Describe various types of editors? Explain with the help of the block diagram of Typical Editor structure. [12]

b) Differentiate between Line and Screen editor. [4]

OR

Q12 a) Write a short note on Debug Monitor. [4]

b) With the help of diagram, Explain user interface & its use in software application. [6]

c) Explain following language processing tools. [6]

i) LEX ii) YACC

[Total No. of Questions: *12*] **[Total No. of Printed Pages:** *2*]

UNIVERSITY OF PUNE

[4363]-266

T. E. (*I.T.*) Examination - 2013

Management Information Systems (2008 Course)

[Time: *3* **Hours]** **[Max. Marks: 100]**

Instructions:

1 *Answer any three question from each section*

2 *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*

3 *Neat diagrams must be drawn wherever necessary.*

4 *Figures to the right indicate full marks.*

5 *Assume suitable data, if necessary.*

6 *Point wise answers indicate full marks.*

SECTION -I

Q.1	A	State and explain role of each component of the information system with suitable diagram.	8
	B	Define information system activities for the online admission process.	8
		OR	
Q.2	A	State and justify with suitable diagram "MIS supports to management process".	8
	B	Apply four of strategies for establishing sweet mart business.	8
Q. 3	A	Suppose you want to set up business of milk shop, how different types of analytical modeling are applicable your business. Justify with example.	8
	B	What is Artificial Intelligence? What are the major application areas of AI.	8
		OR	
Q. 4	A	Justify with example, "Data mining is the key for decision support system".	8
	B	State and explain benefits and limitations of Expert system.	8
Q. 5	A	Explain with example: B2B, B2C, C2C, C2G, G2G.	9

	B	Justify whether Adhar Card is a E-Governance system. If yes what are the benefits of E-Governance system.	9

OR

Q. 6	A	"Customer relationship management is the key any successful business", Justify with benefits and challenges of CRM.	9
	B	What is the role of Supply chain Management in any business. State with suitable example.	9

SECTION II

Q. 7	A	Design a complete MIS for Insurance sector. Draw blocks semantics for same.	8
	B	Justify with example, "MIS system is called as a cross functional enterprise system".	8

OR

Q. 8	A	Justify with example, "Banking system is a transaction processing system".	8
	B	Design a complete MIS for hotel business. Draw blocks semantics for same.	8
Q. 9	A	What are different ITES? Why document processing is an ITES.	8
	B	What is Inbound and Outbound BPO? Explain with example.	8

OR

Q. 10	A	What is BPO? What is the motive for BPO set up? Explain with advantages of BPO.	8
	B	What are the different key features are considered for designing a complete ERP system for an organization.	8
Q. 11	A	What are the different security measures to be taken while developing E-business application.	9
	B	What is disaster management? How information system is useful for disaster management	9

OR

Q. 12	A	What is contingency management? Why it is needed?	9
	B	Write short note with appropriate example on i) Patents ii) Hacking iii) Cyber crime	9

University of Pune
T.E. (Information Technology)
4363-267
Examination - 2013
Programming Pardigms
(2008 Pattern)

Total No. of Questions : 12 **[Total No. of Printed Pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answers to the **two sections** should be written in **separate answer-books**.*
(2) Figures to the right indicate full marks.
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Section I

Q1. A) State the key features of following programming paradigms.
i) Procedural ii) Object oriented iii) Logic iv) Functional [8]
B) Explain properties of following data types. [8]
i) Structured ii) Derived
iii) Scalar iv) Composite

OR

Q2. A) Enlist and explain characteristics of good programming language. [8]
B) Define term 'Binding'. Explain following classes of binding times. [8]
i) Language implementation time.
ii) Translation Time
iii) Run Time

Q3. A) Explain the concept of sequence control in recursive subprograms. [8]
B) What do you mean by exception? Explain its use with example. [8]

OR

Q4. A) Explain following terms related to variables. [8]

1. Lifetime
2. Scope
3. Static scope
4. Dynamic Scope

B) Compare the programming language 'C' and PASCAL with respect to [8]

1. Subprogram declaration 2. Subprogram invocation
3. Variable declaration 4. Control loops

Q5. A) Explain the concept of Multithreading? Explain the same with respect to JAVA with suitable example. [8]

B) Compare JAVA Application with Java Applets. Draw and explain typical applet life cycle. [10]

OR

Q6. A) Write the features not supported by JAVA but supported by C++. [8]

B) Explain concept of abstract class and interface with respect to Java. [4]

C) State and explain steps required to execute Applet. [6]

Section II

Q7. A) What is Unification and Resolution? Why these are important in Logic Programming? [8]

B) Define function in LISP to find the roots of a quadratic equation. [6]

C) Write output of following primitive functions primitive functions in Lisp. [4]

1. (let ((A 3)) (cons A(let((A 4))A)))
2. (cdr (cdr'(A B C)))

OR

Q8. A) Explain backtracking in Prolog with suitable example. [8]

B) Define following terms with respect to functional programming [6]

1. Ambiguity
2. Free and bound identifier
3. Reduction

C) Explain rules, fact and queries in Prolog with example. [4]

Q9. A) Explain the Flynn's classification of computer architectures. [8]

B) Explain different synchronization mechanisms of parallel programming language. [8]

OR

Q10. A) What do you mean by Granularity? Explain different types of module granularity for parallel execution. [8]

B) Explain the following terms: [8]

1. Data Parallelism
2. Control Parallelism
3. Shared-memory Parallelism
4. Message-passing parallelism

Q11. A) Explain design principles of network system and types of sockets used in network programming. [8]

B) Explain design principles Data flow programming and note firing schemes used in data flow computation. [8]

OR

Q12. Write short notes on following (Any four) [16]

1. Internet Programming.
2. Design principles of Database Programming
3. Socket Programming in Java
4. Parallel compiler
5. Windows Programming.

[Total No. of Questions: *12*] **[Total No. of Printed Pages:** *3*]

UNIVERSITY OF PUNE

[4364]-268

T. E. (*Information Technology*) Examination - 2013

Design and Analysis of Algorithms (2008 Course)

[Time: *3* **Hours]** **[Max. Marks: 100]**

Instructions:

1 ***Answer any 3 each from Section.***

2 *Answers to the* ***two sections*** *should be written in* ***separate answer-books***.

3 *Black figures to the right indicate full marks.*

4 *All questions compulsory.*

5 *Neat diagrams must be drawn wherever necessary.*

SECTION -I

Q.1 A Prove by contradiction that "square root of 2 is irrational" 04

B Explain the meaning of following asymptotic notations. 08
- i. Big "oh" O
- ii. Omega Ω
- iii. Theta Θ

C Show that 06
- i. $3n+2 = \Theta(n)$
- ii. $6*2^n+n^2 = \Theta(2^n)$

OR

Q.2 A Prove by mathematical induction that the sum of the cubes of the first n positive integers is equal to the square of the sum of these integers. 08

B Solve the following recurrence relations: 10

i. $T(n) = 1$ if $n=1$

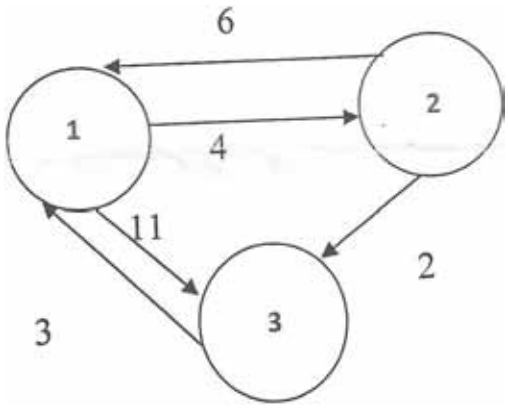
$= 2(n/2)+C$ otherwise

ii. $T(n)= \begin{cases} 0 & if\ n=0 \\ 7 & if\ n=1 \\ 3T(n-1)+4\,T(n-2) & otherwise \end{cases}$

Q. 3	A	Write an algorithm for sorting ‚n' numbers using merge sort. Determine it's time complexity.	08
	B	Explain the following terms with reference to Greedy Technique. i. Feasible solution and Optimal solution ii. Subset paradigm and ordering paradigm	08

OR

Q. 4	A	Write the control abstractions for divide and conquer.	06
	B	Write Kruskal's algorithm for finding minimum spanning tree. Compute the time complexity of the same.	10
Q. 5	A	State "Principle of Optimality"? Explain the significance of the same in dynamic programming with an example.	08
	B	Solve the all pairs shortest path problem for the given graph.	08



OR

Q. 6	A	What are the characteristics of Dynamic Programming? Distinguish between dynamic programming and divide and conquer technique.	08
	B	Explain optimal binary search tree problem. How dynamic programming technique can be applied to solve this problem.	08

SECTION II

Q. 7	A	Write a formulation of recursive backing algorithm.	08
	B	Write an algorithm to solve n queens problem using backtracking method.	08
		OR	
Q. 8	A	What is m-colorability optimization problem? Explain with an example.	08
	B	State the principle of backtracking. Explain the constraints used in backtracking with an example.	08
Q. 9	A	Explain the following with respect to branch & bound technique. a. Significance of Bounding functions. b. State space tree	08
	B	Write an algorithm for upper bound function for 0/1 Knapsack problem.	08
		OR	
Q. 10		Explain the following terms with respect to branch & bound technique. With suitable example. a. Least cost search b. FIFO branch & bound c. LIFO branch & bound	16
Q. 11	A	Explain what is a non deterministic algorithm with an example	08
	B	Prove that 3SAT problem is NP- Complete.	04
	C	What is Reduction in NP completeness proofs? What are types of reductions?	06
		OR	
Q. 12	A	Explain relationship between P, NP, NP Complete and NP hard problems with an example of each class.	08
	B	How do you prove that a problem is NP hard?	04
	C	What is satisfiability problem? Explain with an example.	06

[Total No. of Questions: *12*] **[Total No. of Printed Pages:** *3*]

UNIVERSITY OF PUNE
[4363]-269
T. E. (Information technology) Examination – 2013
HUMAN COMPUTER INTERACTION AND USABILITY (2008 Course)
[Time: *3* **Hours]** **[Max. Marks: 100]**

Instructions:

1 ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II***

2 *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*

3 *Black figures to the right indicate full marks.*

4 *Neat diagrams must be drawn wherever necessary.*

5 *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6 *Assume suitable data, if necessary.*

SECTION -I

Q.1	A	Explain significance of sensory memory in interface design.	8
	B	List and explain five human senses and identify those that are most important to HCI.	8

OR

Q.2	A	Define Ergonomics. Explain with example	8
	B	What is reasoning? Discuss with example inductive versus Deductive Reasoning.	8
Q. 3	A	Describe how HCI affects use of Fully Automatic Washing Machine with respect to: i) the aim of the program (what is used for) ii) describe its interface (picture of the screen iii) describe its interaction (how it is used)	10
	B	Describe the interaction framework introduced in Human-Computer Interaction. Explain how it can be used to explain problems in the dialogue between a user and a computer.	8

OR

Q. 4	A	Discuss how social environment influences the interactions with the computer? What effect does the organization (commercial or academic) to which you belong have on the interaction?	10
	B	Describe briefly four different interaction styles used to accommodate the dialog between user and computer. Specify advantages and disadvantages of each interaction style.	8
Q. 5	A	How do "golden rules" and heuristics help interface designers take account of cognitive psychology? illustrate your answer with examples.	8
	B	Compare and contrast expert reviews with usability testing	8

OR

Q. 6	A	Why is context important in selecting and applying guidelines and principles for interface design? illustrate your answer with examples.	8
	B	A practical usability engineering process that can be incorporated into the software product development process to ensure the usability of interactive computer product is presented. Explain your view regarding usability engineering life cycle for online hotel booking management system.	8

SECTION II

Q. 7	A	What is DECIDE? List and explain unique phase DECIDE framework.	10
	B	Compare : Formative Evaluation versus Summative Evaluation.	8

OR

Q. 8	A	Discuss the following in respect of designing a web site. i) Browsing ii) Search facilities.	10
	B	What are design efforts and problems faced by developers for HutchWorld application of framework	8
Q. 9	A	Hierarchical Task Analysis (HTA) is used to describe	8

		the interactions between a user and a software system. Draw and explain HTA to online bus reservation system.	
	B	Give any two diagrammatic or textual notations used to design dialogs in effective user interface. Justify your notations with respective examples.	8
		OR	
Q. 10	A	What is Cognitive Model? Discuss interface for a train ticket vending machine.	8
	B	Draw and describe HTA to cook food (e.g. rice) using micro oven	8
Q. 11	A	Compare – Augmented Reality versus Virtual Reality.	8
	B	Discuss Augmented reality use for Aircraft.	8
		OR	
Q. 12	A	Ubiquitous Computing is a post-desktop model of human-computer interaction in which information processing has been thoroughly integrated into everyday objects and activities. Justify	8
	B	Discuss design issues of groupware applications.	8