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

P1226

[3564] - 344
B.E. (Computer Engineering)
DISTRIBUTED SYSTEMS
(2003 Course) (410451)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Compare between multiprocessor operating system, multicomputer operating system, network operating system and middleware based distributed systems. **[10]**

b) Explain different levels in client server application with suitable example. **[8]**

OR

Q2) a) Explain different transparencies in distributed system with suitable examples. **[6]**

b) Explain in detail middleware models and services provided by middleware. **[6]**

c) Explain variations on the client-server model in distributed system. **[6]**

Q3) a) Explain how quality of service can be achieved in stream oriented communication. **[10]**

b) Explain different forms of communication in message oriented communication. **[6]**

OR

Q4) a) Explain general architecture of message queuing system for persistent communication. **[8]**

b) Explain different RPC models in detail. **[8]**

Q5) a) Explain fault tolerant issues in NFS. **[8]**

b) Explain principle of log based striping in xFS with diagram. **[4]**

c) How Coda solves read-write conflicts on a file that is shared between multiple readers and only a single writer? **[4]**

P.T.O.

OR

Q6) a) Compare the following distributed file systems: Coda, xFS, **[8]**

b) Explain the difference between name server and directory server with examples. **[4]**

c) How DNS can be used to implement a home based approach to locating mobile hosts? **[4]**

SECTION - II

Q7) a) Explain how the causality can be captured by means of vector timestamps. **[8]**

b) Explain how NTP (network time protocol) is useful to distribute time over the Internet, also state the features of NTP. **[6]**

c) Explain ring algorithm with suitable example. **[4]**

OR

Q8) a) Compare Centralized, Distributed and Token Ring algorithms of mutual exclusion. **[8]**

b) Explain how Lamport timestamp can be used in totally-ordered multicasting. **[6]**

c) Compare Cristian and Berkeley algorithms of clock synchronization. **[4]**

Q9) a) Explain different classes of failures that can occur in the RPC systems. **[8]**

b) Consider a Web browser that returns an outdated cached page instead of a more recent one that had been updated at the server. Is this a failure, and if so, what kind of failure? **[8]**

OR

Q10) a) Explain n-army problem with possible solution, **[8]**

b) In the two-phase commit protocol, why can blocking never be completely eliminated, even when the participants elect a new coordinator? **[4]**

c) Explain how the write-ahead log in distributed transactions can be used to recover from failures. **[4]**

Q11) a) Explain CORBA ORB Architecture. **[8]**

b) Explain the elements of Grid Computing systems. **[8]**

OR

Q12) a) Compare Grid Computing and Cluster computing. **[4]**

b) Explain different types of Clusters with examples. **[6]**

c) Explain the steps to build CORBA application in brief. **[6]**

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

P1225

[3564] - 342
B.E. (Computer)
ADVANCED COMPUTER ARCHITECTURE & COMPUTING
(2003 Course) (410249)

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

Instructions to the candidates:

1) ***Answer three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) How parallel computer Architectures are classified? Discuss in brief parallelism exploited in each architecture. **[8]**

b) With suitable example, explain software pipelining implemented in Itanium Architecture. **[8]**

OR

Q2) a) What is significance of "Scalability"? Derive the Amdahl's law for speedup performance. **[8]**

b) Discuss Feng's classification for parallel computer Architecture in detail. **[8]**

Q3) a) Explain the following terms with respect to pipeline processors. **[10]**

i) Hazards.
ii) Internal forwarding.
iii) Dynamic pipeline.
iv) Speed up.
v) Efficiency.

b) With suitable diagram / Flowchart,
Explain the branch prediction logic implemented in pentium Architecture. **[8]**

OR

Q4) a) Consider the following pipeline reservation table. **[10]**

s \ i	0	1	2	3	4	5	6	7	8
1	X								X
2		X	X					X	
3				X					
4					X	X			
5							X	X	

i) Define the term latency & MAL.

ii) Determine latencies in the forbidden list F and collision vector, C.

iii) Draw the state Transition diagram.

iv) List all simple cycles and greedy cycles.

v) Determine MAL.

b) Discuss the various features of UltraSPARC Architecture. Explain in brief, the concept of RSE. **[8]**

Q5) a) With suitable example, discuss the efficiency of vector processing over scalar processing. **[8]**

b) Define shuffle and exchange Routing functions draw and explain 3 stage omega network as multistage network. **[8]**

OR

Q6) a) With suitable example, explain the necessity of data Routing in Array Processors. **[8]**

b) Discuss a problem of 3 × 3 Matrix multiplication on a Mesh Network. Obtain it's time complexity. **[8]**

SECTION - II

Q7) a) What is a cache coherency problem? What are different techniques of cache updation? With state Transition diagram explain the working of any one write invalidate protocol. **[10]**

b) Explain the desirable features / Characteristics of processor Architectures used in Multiprocessor systems. **[8]**

OR

Q8) a) Explain the cross-bar switch as an interconnection Network used in Multiprocessor system. With suitable functional diagram, Explain the design of cross-point switch. **[10]**

b) What do you mean by interprocessor communication and synchronization? Discuss the various issues involved in brief. **[8]**

Q9) a) What is significance of consistency model? Compare between sequential consistency and processor consistency memory model. **[8]**

b) With suitable example, explain SPMD [Single program multiple data] programming with respect to message passing parallel programming. **[8]**

OR

Q10) a) Explain the following terms with respect to Multi threaded architecture. **[8]**

i) Inter leaved Multithreading.

ii) Latency.

iii) Simultaneous Multithreading.

iv) Context switching.

b) With suitable example, explain shared memory parallel programming. **[8]**

Q11) a) Explain the various features of PVM message passing library. How PVM is different than MPI? **[8]**

b) With one example explain the parallel algorithm for Multiprocessor system. **[8]**

OR

Q12) a) Explain the terms Cluster and Grid. With suitable diagram discuss the architecture of Grid computing. **[8]**

b) Explain the standard programming constructs used in any one parallel programming language. **[8]**

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

P1349

[3564]-340
B.E. (Computer Engineering)
MULTIMEDIA SYSTEMS
(2005 Course) (410445)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.***
2) ***Answers to the two sections must be written in separate answer books.***
3) ***Assume suitable data if necessary.***
4) ***Draw sketches wherever necessary.***
5) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain the characteristics of Multimedia database management system with applications. **[9]**

b) Explain the features of QT? **[9]**

OR

Q2) a) Explain the characteristics of Multimedia presentation. **[9]**

b) What is DirectX? Explain in brief the functions of the components of the DirectX. **[9]**

Q3) a) What is Fractal? Explain fractal image compression with example. **[8]**

b) What do you mean by image enhancement by point processing? Also explain the concept of Image negative and Contrast stretching. **[8]**

OR

Q4) a) Discuss the various factors that influence the brightness of a pixel in an image. **[8]**

b) Explain Arithmetic coding compression technique with suitable example. **[8]**

Q5) a) Define the following **[8]**

i) Amplitude of sound wave.
ii) Frequency of sound wave.

P.T.O.

iii) Psychoacoustic.
iv) Bit depth.

b) Explain MPEG audio file with its frame buffer. **[8]**

OR

Q6) a) What is MIDI? Explain channel message and system message. **[8]**

b) Distinguish between two main types of synthesizers. **[8]**

SECTION - II

Q7) a) What do you mean by digital video? Explain the features of EDTV in detail. **[9]**

b) Explain LZW Compression/Decompression technique using suitable example. **[9]**

OR

Q8) a) Discuss about video file formats AVI, MOV, & Real Video. **[9]**

b) What is video editing? Explain how SMPTE time code is used in video editing. **[9]**

Q9) a) Explain with suitable example, the four class specifiers available in VRML 2.0. **[8]**

b) Explain perambulation, synthetic experience and realization in Virtual reality? **[8]**

OR

Q10) a) Explain the different forms of virtual reality? **[8]**

b) What do you mean by VR devices? Explain VR-Chair used in VR applications. **[8]**

Q11) a) Explain the role of shockwave format in web based animation. **[8]**

b) What are the different methods used to create animation? Explain any one of them. **[8]**

OR

Q12) Write short notes on : **[16]**

a) 3-D animation.

b) Key frames and tweening.

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

P1348

[3564] - 339
B.E. (Computer Engg.)
ARTIFICIAL INTELLIGENCE
(2003 Course)

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

Instructions to the candidates:

1) ***Answer three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What is an agent? Detail the architecture of an agent. **[8]**

b) Compare forward and backward reasoning with example. **[8]**

OR

Q2) a) Define Artificial Intellegence. Give typical applications of AI in detail. **[8]**

b) What is Production System? What are the characteristics and classification of it? Give example of each. **[8]**

Q3) a) Apply constraint satisfaction to solve following cryptarithmetic problem to assign unique single digit number from 0 to 9 each alphabet,

BASE + BALL = GAMES **[8]**

b) Explain waiting for Quiescence and Secondary search with proper example. **[8]**

OR

Q4) a) Explain Hill Climbing algorithm in detail **[8]**

b) Is it possible to avoid loops in A* algorithm? Justify with example. **[8]**

Q5) a) Assume the following facts, **[10]**

- Steve only likes easy courses.
- Science courses are hard.
- All the courses in basketweaving department are easy.
- BK301 is a basketweaving course.

Use resolution to answer the question, "What course would Steve like?"

P.T.O.

b) Explain JTMS with detail example. **[8]**

OR

Q6) a) Explain Dempster-Shafter theory with example. **[8]**

b) What is Conceptual Dependency? Give one example. **[6]**

c) Explain Frame representation briefly. **[4]**

SECTION - II

Q7) a) What is Learning? Explain Learning by Induction and Deduction in detail. **[8]**

b) What is Nonlinear planning? Write the complete algorithm. **[8]**

OR

Q8) a) Explain in detail the Hierarchical planning by an example. **[8]**

b) Solve any block problem by Goal Stack Planning. **[8]**

Q9) a) What is NLP? Explain all the five phases of NLP. **[10]**

b) What is Robot architecture? Give detail description. **[8]**

OR

Q10) a) Explain Perception confined to Vision and Speech Recognition. **[8]**

b) Draw the ATN parser to parse the statement, "John wanted to go the movie with Sally". Show the complete parse. **[10]**

Q11) a) Give complete Expert system architecture and explain. **[8]**

b) Give the applications of Artificial Neural Networks in detail. **[8]**

OR

Q12) a) Explain the process of designing an expert system to diagnose Childhood diseases. **[8]**

b) What is Perceptron? Give typical structures of it. **[8]**

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

P1293

[3564]-338
B.E. (Computer Engineering)
ADVANCED DATABASES
(2003 Course)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain in detail intraoperation and interoperation parallelism. **[8]**

b) What is skew in parallel databases? Explain handling of skew. **[8]**

OR

Q2) a) Explain how following operations can be parallelized using data partitioning. **[8]**

i) Scanning.
ii) Sorting.
iii) Join.

b) Describe and differentiate the following partitioning techniques. **[8]**

i) Hash partitioning.
ii) Range partitioning.

Q3) a) Explain the following with respect to distributed databases. **[10]**

i) Availability.
ii) Deadlock handling.

b) Write short notes on : **[8]**

i) LDAP.
ii) Location transparency.

OR

Q4) a) Explain with respect to distributed databases Locking protocols and Timestamping. **[10]**

P.T.O.

b) Write short notes on : **[8]**

i) Replication transparency.
ii) Distributed data storage.

Q5) a) Explain in detail XML document. **[8]**

b) Explain following terms **[8]**

i) Soap.
ii) XML DTD.
iii) XQuery.

OR

Q6) a) Explain in detail different tiers in 3-tier architecture. **[8]**

b) Explain following terms **[8]**

i) Thin client.
ii) Thick client.
iii) Xpath.

SECTION - II

Q7) a) Explain showflake schema for the multidimensional databases in detail. **[8]**

b) Explain the following in brief. **[8]**

i) OLAP.
ii) Data Smoothing techniques.

OR

Q8) a) Explain star schema for the multidimensional databases in detail. **[8]**

b) Explain the following in brief. **[8]**

i) Data Cube
ii) Materialized view.

Q9) a) Explain "Apriori Algorithm" for association rules in detail. **[8]**

b) Write short note: Text Mining. **[5]**

c) Explain Decision tree. **[5]**

OR

Q10) a) Explain "K-means Algorithm" for clustering in detail. **[8]**

b) Explain supervised and unsupervised clustering. **[5]**

c) Write short note : Outlier analysis. **[5]**

Q11) a) Explain Page ranking in detail. **[8]**

b) Explain the following terms **[8]**

i) Synonyms.
ii) Homonyms.
iii) Ontologies.
iv) Hyperlinks.

OR

Q12) a) Explain the following terms. **[8]**

i) Signature files.
ii) Web crawlers.
iii) Information Extraction.
iv) Inverted index.

b) Explain in detail popularity ranking. **[8]**

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

P1270

[3564] - 337
B.E. (Computer)
IMAGE PROCESSING
(Elective - I) (2003 Course)

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

Instructions to the candidates:-

1) ***Answer three questions from section I and three questions from section II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain the main components of typical image processing system with block diagrams. **[8]**

b) Describe some mathematical preliminaries required in any image processing application. **[8]**

OR

Q2) a) Describe image fidelity criteria and comment on their usefulness in evaluating different image processing techniques. **[8]**

b) Explain any two of the following : **[8]**

i) Vector Algebra.
ii) Fuzzy sets.
iii) Orthogonal transform,

usage in image processing.

Q3) a) How the images are represented digitally. Describe any one model in detail. **[8]**

b) Explain the following terms : **[8]**

i) Light ii) Luminance.
iii) Brightness. iv) Contrast.

OR

Q4) a) Describe any two formats for storing image information as computer file. **[8]**

b) Explain two dimensional sampling and Nyquist rate, aliasing effect and foldover frequencies in case of two dimensional sampling. **[8]**

P.T.O.

Q5) a) Explain the methods used for lossless image compression. **[8]**

b) Explain the method of contrast streching using histogram equalisation. **[10]**

OR

Q6) Explain following methods for Image Enhancement : **[18]**

a) Median filtering.

b) Linear filtering.

c) Pseudo colouring.

SECTION - II

Q7) a) State different methods of edge detection and explain one in detail. **[8]**

b) With suitable example, explain feature extraction in an image. **[8]**

OR

Q8) a) What is image segmentation. Discuss various approaches for image segmentation. **[8]**

b) Write a short note on image recognition. **[8]**

Q9) a) What is meant by image Morphology. **[8]**

b) Describe the color vision model in detail. **[8]**

OR

Q10)a) Explain Gray level morphology. **[8]**

b) Briefly describe thickening & pruning. **[8]**

Q11)a) What is geometric correction? Why it is necessary for satellite image processing. **[10]**

b) Explain medical image processing. **[8]**

OR

Q12)Explain following application of image processing : **[18]**

a) Multimedia domain.

b) Stereography.

c) Water marking.

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

P1228

[3564] - 347
B.E. (Computer)
HIGH PERFORMANCE NETWORKS
(2003 Course)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Discuss the need of Carrier extension and frame bursting in Half Duplex operation of Gigabit Ethernet. **[8]**

b) Calculate the worst case channel efficiency for a stream of minimum length frame of 512 bits for 10,100 & 1000 Mbps Network. Which network performs badly? How to improve the situation. **[8]**

OR

Q2) a) Differentiate between 10, 100 and 1000 Mbps networks based on their MAC characteristics. **[8]**

b) Discuss the various Gigabit Ethernet Cabling options available with their Suitable applications. **[8]**

Q3) a) Discuss the significance of DLCI in frame relay with suitable example. **[6]**

b) Comment on the significance and relationship between CIR, Bc, Be with respect to frame relay congestion control. **[6]**

c) Comment on the ISDN transmission structure along with the data rates supported. **[6]**

OR

P.T.O.

Q4) a) A company has decided to use ISDN for its Internet connection. The internet facility should be simultaneously provided to all the users. Draw and explain the topological diagram along with the suitable components to fulfill the requirement. **[6]**

b) Draw and Discuss the LAPF Protocol Frame Format. **[6]**

c) Differentiate between ISDN and PSTN. **[6]**

Q5) a) Comment on the various B_ISDN physical layer characteristics at the User-network interface. **[8]**

b) Explain the significance of VPI and VCI in cell switching. Why VP switch is better than a VC switch? **[8]**

OR

Q6) a) What is AAL? Explain AAL 5 with suitable application support. **[8]**

b) Draw and explain the cell delineation state diagram. **[8]**

SECTION - II

Q7) a) List and explain in short any 4 xDSL types. **[4]**

b) What is DMT? **[4]**

c) Discuss a typical ADSL network architecture. **[8]**

OR

Q8) a) Draw and explain the general block diagram of DMT Transmitter. **[8]**

b) How does ADSL compare to cable modems? **[4]**

c) What is a POTS Splitter? **[4]**

Q9) a) Explain the need and working of RSVP protocol. **[8]**

b) Describe in short Expedited forwarding and Assured forwarding concepts. **[8]**

OR

Q10) a) What is the role of LDP in MPLS? Also explain the various LDP message Exchanges. **[8]**

b) Explain the working of MPLS with suitable diagram. **[8]**

Q11) a) What are the various methods that can be use to secure wireless network? **[4]**

b) Discuss in short typically which parameters are configured during Access point installation. **[6]**

c) Differentiate between 802.11a and 802.11 g standards. **[8]**

OR

Q12) a) Describe in short OFDM and its significance in WiMax. **[6]**

b) Explain the following QOS classes with their application support. **[6]**

i) Unsolicited Grant service (UGS)

ii) real time polling service (rt PS)

iii) non real time polling service (nrt PS)

c) Explain the following terms along with their advantages and disadvantages. **[6]**

i) Time Division Duplexing (TDD).

ii) Frequency Division Duplexing (FDD).

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

P1227

[3564] - 346
B.E. (Computer Engineering & I.T.)
EMBEDDED SYSTEMS
(2003 Course) (410451)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***In section I attempt : Q.No. 1 or Q.No. 2, Q.No 3 or Q.No 4, Q.No. 5 or Q.No. 6. In section II attempt : Q.No. 7 or Q.No. 8, Q.No 9 or Q.No 10, Q.No. 11 or Q.No. 12.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What are the different categories of Embedded Systems depending on the area of applications? **[8]**

b) Which are the different processors used as GPP in the Embedded Systems? Mention applications for each. **[8]**

OR

Q2) a) List different features of ARM7 family. Also mention the features which enhance the speed of operation of ARM7. **[8]**

b) What are the characteristics of Embedded Systems? **[8]**

Q3) a) With the help of neat diagram, explain the different stages of conversion of assembly language into ROM image. **[8]**

b) Describe special structural units of processor that helps to improve its performance when used in Embedded System. **[8]**

OR

Q4) a) What is the role of clock oscillator circuit in an Embedded System? **[6]**

P.T.O.

b) Mention the required processor and memory (size and type) for the following devices. Also justify the selection of processor and memory for the same. **[10]**

i) Mobile phone.
ii) Automatic Robotics system.

Q5) a) Describe the topology used in a USB protocol. How many maximum devices can be connected? **[6]**

b) Describe any one IPC mechanism in detail. **[6]**

c) What is the use of optical devices in Embedded Systems? **[6]**

OR

Q6) a) Differentiate between I^2C and CAN protocol. Mention the applications where these protocols are preferred. **[6]**

b) What is the necessity of different hardware devices in Embedded Systems? **[6]**

c) What are the different Embedded OS models? Give examples. **[6]**

SECTION - II

Q7) a) What are the advantages of using higher level language for the development of complex Embedded System? **[6]**

b) Name the appropriate data structures in C language to implement the following for an Embedded System. Also substantiate your answer. **[6]**

i) Printer Buffer.
ii) Series of active tasks to be maintained by scheduler.
iii) Maintaining a file directory.

c) Differentiate between complier and cross complier. **[4]**

OR

Q8) a) What are the advantages of assembly language programming when used for the development of an Embedded System? **[4]**

b) How Queuescan be used to implement a network protocol? Discuss with the help of a neat diagram. **[7]**

c) What are the disadvantages of using Java programming for the development of embedded applications? **[5]**

Q9) a) State and explain different criteria, based on which RTOS is selected for an embedded application. **[6]**

b) How time taken for an ISR execution in RTOS can be made shorter? Discuss the techniques for the same. **[6]**

c) What are fixed or static real time scheduling methods? How fixed schedules are defined? **[6]**

OR

Q10) a) With the help of neat diagram, name and explain the most preferred scheduling technique used in RTOS. Also state the worst case latency period for the same. **[10]**

b) Differentiate between Desktop OS and an Embedded OS. **[4]**

c) Name four Operating Systems used in mobile devices. **[4]**

Q11) a) Is MicroC/OS-II a hard RTOS or a soft RTOS? Is this OS scalable? Why is it popular? **[6]**

b) Assume an embedded system in which RTOS tasks communicate to the TCP/IP stack from an application. The application layer byte streams are formatted and sent on the TCP/IP network.
For the above said system, draw and discuss the scheduling sequence of the different tasks during TCP/IP transmission. Also discuss IPCs used. **[10]**

OR

Q12) a) Name the scheduling algorithms used in VxWorks. Also discuss area of applications of VxWorks. **[6]**

b) What are the different inter process communication (IPC) techniques implemented in VxWorks? Give details. **[6]**

c) What are the limitations of MicroC/OS- II? Also mention two area of applications. **[4]**

Total No. of Questions : 12] **[Total No. of Pages :4**

P1223

[3564] - 336
B.E. (Computer Engg.)
PRINCIPLES OF COMPILER DESIGN
(2003 Course)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answers will be valued as a whole.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) List various phases of a compiler. For the following program statement in C, Show the output of each phase of compiler.

P = I + R * 80

Assume that the type of variables P and R is float and I is an integer. The underline machine has only two registers say R_a and R_b and the machine provides instructions 'ADD' and 'SUB' for addition and multiplication of two operands respectively. Show the contents of symbol table also. **[10]**

b) Discuss the various compiler construction tools. **[6]**

OR

Q2) a) What is the difference between an interpreter and a compiler? **[8]**

b) Write LEX specifications and necessary C code that reads English words from a text file and calculates the count of words that starts with a vowel. The program appends the current value of the counter to every occurrences of such word. The program should also compute total number of words read. **[8]**

Q3) a) List the three conditions (rules) that should be satisfied by a grammar that is LL(1)? Using these rules, check if grammar given below is LL(1).

P.T.O.

$E \rightarrow E + T / T$
$T \rightarrow TF / F$
$F \rightarrow F * T / a / b$
If it is not LL (1) grammar, convert the grammar into an equivalent LL (1) grammar and justify. **[8]**

b) Discuss the problems associated with top-down parsing. How these problems can be overcome? **[8]**

OR

Q4) a) Construct LALR (1) parser table for the grammar
$S \rightarrow iCtS \mid CtSeS \mid a$
$C \rightarrow b$
Are there any conflicting entries? If so, how these conflicts are resolved? Also discuss the techniques used to resolve the conflicts in YACC. **[10]**

b) What is the need of semantic analysis? Explain the significance of the type checker with suitable example. **[6]**

Q5) a) Write a complete YACC specifications to convert a given infix expression to an equivalent postfix expression. **[8]**

b) Explain the technique of "Back patching" for translation of flow of control statement: if-then, if-then-else and while do. **[10]**

OR

Q6) a) Generate three address code for the following code fragment:

```
while (A < C & B > D) do
    if (A = = 3) then C = C + 1
    else
        while (A < = D) do
            A = A + 3.
```

[7]

b) What is a marker non-terminal symbol? Explain their significance with suitable examples. **[5]**

c) If declarations are generated by the following grammar:
$D \rightarrow id\ L$
$L \rightarrow id\ L$
$L \rightarrow T$
$L \rightarrow integer$
$T \rightarrow real$
Construct a translation scheme to enter the type of each identifier into the symbol table. **[6]**

SECTION - II

Q7) a) What is an activation record? Explain each of its field. **[8]**

b) What is the output of following C programs, if the compiler uses dynamic scope?
Briefly justify your answer

```
int r;
void write(void)
{
    printf("%d", r);
}
void Display(void){
    int r= 37.24;
    write();
}
void main(void)
{
    r = 11.34;
    write();
    Display();
}
```

[6]

c) Explain the difference between static, stack and Heap allocation. **[4]**

OR

Q8) a) Explain with suitable example the concept of "nesting depth" to set up and use the "access links" to access non-local names for languages that make use of lexical scope with "nested functions" and make use of "stack allocation" for run time storage management. Write the expressions that may be used to set up and access the link. Is it possible to compute some part of these expressions at compile time? Comment. **[10]**

b) Explain the term run time support and storage organization. **[8]**

Q9) a) What is a basic block? With suitable example's discuss various transformations that may be carried out on a basic block. **[8]**

b) Write an algorithm for constructing a DAG for the following block statements.

1) t1 = 4 * i
2) t2 = a[t1]
3) t3 = 4 * i
4) t4 = b[t3]

5) t5 = t2 * t4
6) t6 = P + t5
7) P = t6
8) t7 = i + 1
9) i = t7
10) if i < 20 goto (1). **[8]**

OR

Q10) a) Explain the code generation algorithm. **[8]**

b) Explain peephole optimization with suitable examples. **[8]**

Q11) a) Explain the principal sources of code optimization with suitable examples. **[8]**

b) What do you mean by 'Next-Use' information? How it is computed? **[8]**

OR

Q12) Consider the following three address code statements.

1) PROD = 0
2) I = 1
3) T2 = addr(A) – 4
4) T4 = addr(B) – 4
5) T1 = 4 * I
6) T3 = T2[T1]
7) T5 = 4[T1]
8) T6 = T3 * T5
9) PROD = PROD + T6
10) I = I + 1
11) If I <= 20 GOTO (5)

Compute basic blocks and draw the flow graph. Eliminate induction variables and draw the modified flow graph. **[16]**

Total No. of Questions : 10] **[Total No. of Pages : 2**

P1195

[3564]-88
B.E. (Computer)
OBJECT ORIENTED COMPONENTS & SYSTEMS
(1997 Course) (Elective - II)

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

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What are middleware technologies? Explain any two technologies in details. **[8]**

b) What is distributed computing? Explain in details with an example. **[8]**

Q2) a) How flow of control takes place in component creation process? Explain with graphical diagram. **[8]**

b) What are Generics in Java? Explain different forms of generics classes. **[8]**

Q3) a) What do you mean by surrogate process? Explain DLL surrogate & executable components. **[8]**

b) What do you mean by Marshalling? Explain standard & custom marshalling. **[8]**

Q4) a) How object implimentation takes place in CORBA? Explain client invocation process with suitable diagram. **[8]**

b) Explain Interface & Implimentation repositories in CORBA. **[8]**

Q5) Write short notes on any three : **[18]**

a) XML & Web applications.

b) The class factory in COM.

c) Connection points in DCOM.

d) CORBA facilities.

P.T.O.

SECTION - II

Q6) a) Explain Containment and Aggregation concepts in COM/DCOM. **[8]**

b) What is super component? Explain the super component creation process with suitable example. **[8]**

Q7) a) What is J2EE? Explain the architecture of J2EE and compare it with J2ME. **[8]**

b) What are servlets? Explain life cycle of servlets with methods & examples. **[8]**

Q8) a) What is RPC? Explain the architectural difference between RPC and LPC. **[8]**

b) Explain Microsoft Transaction server with the help of 3 tier architectural diagram. **[8]**

Q9) a) Explain the architecture of CORBA with suitable block diagram. **[8]**

b) How location transperency is achieved in CORBA? Explain with suitable block diagram. **[8]**

Q10) Write short notes on any three : **[18]**

a) IDL tutorial.

b) Moniker's and structured storage.

c) Java Beans.

d) Apartment threading in COM/DCOM.

Total No. of Questions : 10] **[Total No. of Pages : 2**

P1194

[3564]-87
B.E. (Computer Engineering)
ADVANCED UNIX PROGRAMMING
(1997 Course) (Elective - II) (410251)

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

Instructions to the candidates:

1) ***Attempt three questions from Section-I and Section-II each.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Make suitable assumptions wherever necessary.***

SECTION - I

Q1) a) Why process group requires the process leader? What will happen if process leader is not assigned? **[8]**

b) Compare between foreground and background processes. **[8]**

Q2) a) Explain the important macros used to check the status of the process. **[8]**

b) Describe the Process Accounting in Unix. **[8]**

Q3) a) Explain the Unix File System with suitable diagram. **[8]**

b) How child process is created in Unix? Which properties are inherited by the child from the parent? **[8]**

Q4) a) What do you mean by the slow system call? What action is expected to overcome the effect of system call? **[8]**

b) How shell script is useful form system administration point of view? **[8]**

Q5) Write short notes (Any Three) : **[18]**

a) AWK.

b) Unbuffered I/O.

c) Sleep Function Call.

d) Unreliable Signals.

P.T.O.

SECTION - II

Q6) a) What is need of two types of semaphores? Explain the difference between binary semaphore and general semaphore. **[8]**

b) How messages are stored in a queue? How are they processed? **[8]**

Q7) a) Explain the key socket functions in client server communication. **[8]**

b) Compare between the simple piles and FIFO. **[8]**

Q8) a) List the advantages and disadvantages of stream pipes and sockets. **[8]**

b) Write a program for echo server using socket. **[8]**

Q9) a) Why threads are called light weight process? Explain with example. **[8]**

b) What is the role of shared memory in group communication? Explain with suitable example. **[8]**

Q10) Write short notes on (Any Three) : **[18]**

a) Job control Signals.

b) Terminal driver.

c) System Tuning.

d) IPC structures.

Total No. of Questions : 10] **[Total No. of Pages : 2**

P1193

[3564]-84
B.E. (Computer Engineering)
PROJECT PLANNING AND MANAGEMENT
(1997 Course) (410250)

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

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What is role of Organization Structure in Project Development? What are the merits and demerits of Matrix Project organization? **[8]**

b) What are the responsibilities of Project Managers? What is Feature Creep? How it can be controlled? **[8]**

Q2) a) What is the role of Requirement Engineering as a Life Cycle phase? What are the elements of Requirement Engineering? Which category of requirements is difficult to address? **[8]**

b) What is the relationship between needs and requirements? What is the impact of Feasibility Study on Project? What are the ideal characteristics of System Requirement Specification? **[8]**

Q3) a) Why Risk analysis is performed? What are primary sources of risks? How risk assessment is performed? List elements of RMMP. **[8]**

b) What are the mechanisms to control the risks? How an undermined risk can lead to Project failure? What is Proactive Risk Management? **[8]**

Q4) a) Why classic mistakes need to be addressed? Explain People related classic mistakes and its impact on product development. **[8]**

b) Why Software Project Plan is essential? What are the steps for Project Plan Verification? **[8]**

P.T.O.

Q5) Write short notes on (ANY THREE) : **[18]**

a) Requirement Traceability.

b) SQA plan.

c) High Risk and Gambling.

d) Functional Project Organization.

SECTION - II

Q6) a) What is Size Oriented estimation? What are the reasons of unrealistic estimate and what is its impact? **[8]**

b) Explain in detail COCOMO II estimation technique. What are the factors considered in this estimation technique? **[8]**

Q7) a) What is Gantt chart? What is PERT? What are the applications of PERT? **[8]**

b) How Team Structure is decided? What are the factors affecting Team Structure? What is the role of Technical Lead? **[8]**

Q8) a) What is Rapid Development? What are the characteristics of High Performance team? How Team Models are established and used? **[8]**

b) What is meant by Formal Verification? What is the role of Inspection? What is meant by auditing? **[8]**

Q9) a) What is Functional Testing? What are the methods available for performing functional testing? **[8]**

b) What is the difference between Forward Engineering and Reverse Engineering? When Re-engineering is required? What is restructuring? **[8]**

Q10) Write short notes on (ANY THREE) : **[18]**

a) Capability Maturity Model.

b) Importance of Test Oracle.

c) Integrated CASE Environment.

d) Personal Software Process.

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Total No. of Questions : 8] **[Total No. of Pages :3**

P1192

[3564] - 83

B.E. (Comp. Engg.)

DIGITAL SYSTEM DESIGN

(1997 Course)

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

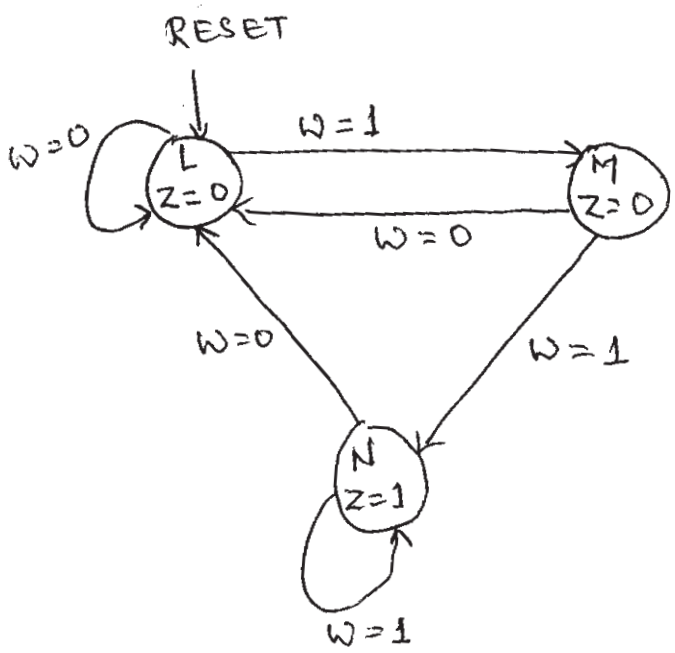
Instructions to the candidates:-

1) ***Answer three questions from Section I and three questions from Section II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Draw a structural diagram of internal architecture of FPGA and explain in brief. **[8]**

b) Write VHDL code for FSM shown in the following figure. **[10]**



P.T.O.

Q2) a) Consider following VHDL code **[8]**

Architecture No-ENTITY of DUMMY is begin
y < = '1' after 4 ns, '0' after 10 ns, '1' after 20 ns;
y < = '0' after 8 ns, '1' after 10 ns, '0' after 40 ns;
y < = '1' after 20 ns, '0' after 40 ns;
END NO-ENTITY;
How is the value of 'Y' determined? Explain.

b) Write VHDL code for FULL ADDER? **[8]**

Q3) a) Differentiate between FPGA ICs and CPLD ICs. **[8]**

b) Compare Inertial Delay and Transport Delay. **[8]**

Q4) a) Write a VHDL code for 8 : 1 MUX using CASE statement? **[10]**

b) Explain in brief 'Signal' and 'Variable' data objects? **[6]**

SECTION - II

Q5) a) Write a VHDL code for 8-bit counter with an asynchronous reset input (R).

The counter also has an disable input (D). On positive edge of the clock, if D = 0, the counter is incremented. If D = 1, the counter holds its current value. **[10]**

b) What is the purpose of a Test Bench? Write a stimulus only test bench for D flip-flop. **[8]**

Q6) a) With the help of suitable examples explain the difference between structural, Data flow and Behavioral style of modelling. **[10]**

b) Explain the following VHDL code. **[6]**

```
PACKAGE keg 24-Package IS
    COMPONENT Key 12
    PORT (
        d : IN BIT-VECTOR (12 DOWN TO 0);
        c/k : IN BIT;
        g : OUT BIT-VECTOR (12 DOWN TO 0);
END COMPONENT;
END keg 24-Package;
```

Q7) a) Compare between configuration specification and configuration declaration. **[8]**

b) Explain the following attributes with example: **[8]**

i) S' DELAYED (T).

ii) S' EVENT.

iii) S' QUIET (T).

iv) S' LAST VALUE.

Q8) Write a short note on : **[16]**

a) S' TRANSACTION attributes.

b) JTAG.

c) VHDL data types.

d) VHDL Synthesis.

■■■■

Total No. of Questions : 10] **[Total No. of Pages :2**

P1191

[3564] - 82
B.E. (Computer Engineering)
COMPUTER NETWORKS
(410241) (1997 Course)

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

Instructions to the candidates:-

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What is difference between connection-oriented & connectionless networks? **[4]**

b) What is difference between hub & switch? How does it affect performance in Network? **[4]**

c) A channel has a bit rate of 4 kbps & propagation delay of 20 msec, for what range of frame sizes does stop & wait protocol give an efficiency of at least 50%. **[8]**

Q2) a) Explain various classes in IPv4 networks? **[8]**

b) What is jitter. Explain a technique used to control jitter in network? **[8]**

Q3) a) Explain difference between datagram subnet & virtual circuit subnet. **[8]**

b) Explain various framing technique used in data link layer. **[8]**

Q4) a) How many host can be connected in a network 192.168.4.0 having subnet mask 255.255.254.0? **[5]**

b) What is difference between congestion control & flow control? **[5]**

c) Explain symmetric key system with example? **[8]**

P.T.O.

Q5) Write Short Notes on (Any Three): **[16]**

a) Network Management.
b) Email Security.
c) Network design issues.
d) Remote procedure call.

SECTION - II

Q6) a) Explain difference between OSI reference model & TCP/IP reference model? **[6]**

b) Which are various types of addresses used in computer networks at various Layers? Explain, why all are required? **[8]**

c) Give an argument why the leaky bucket algorithm should allow just one packet per tick, independent of how large the packet is? **[4]**

Q7) a) Explain how DNS resolves name into IP address with example? **[8]**

b) Describe a way to reassemble IP fragments at the destination? **[8]**

Q8) a) Explain how NAT works with suitable example. **[10]**

b) Describe two major differences between warning bit method & RED bit method? **[6]**

Q9) a) Divide a network 192.168.4.0/24 into 2 sub networks having host size of 50. Find sub network address, subnet mask & IP-address range for the sub network? **[10]**

b) What is difference between non-persistent CSMA & P-persistent CSMA? **[6]**

Q10) Write Short Notes on (Any Three) : **[16]**

a) Wireless Security.
b) Routing Information protocol.
c) SIP.
d) Blue- tooth architecture.

■■■■

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

P1274

[3564]-345

B.E. (Computer/Information Technology) (Common)

SOFTWARE ARCHITECTURE

(2003 Course) (Elective - II) (414451)

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

Instructions :

1) ***Solve 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) ***Figures to the right indicate full marks.***
4) ***Make suitable assumptions wherever appropriate and relevant.***

SECTION - I

Q1) a) With appropriate examples illustrate and explain how the following decisions an Architect takes affect a system's development/deployment/ quality. **[6]**

i) Choosing the right technology (environment) for development of software.

ii) Choosing if an application is web based or desktop application.

b) Discuss how given rules of thumb contribute to a good architecture. **[6]**

i) Well defined interfaces for each module that hide changeable aspects.

ii) Well defined modules that follow information hiding and separation of concerns.

c) What do you understand by common architectural pattern 'Client Server' and what are its pros and cons as an architecture? **[6]**

OR

Q2) a) Write in brief and give examples about the following software architectural structures. **[6]**

i) Concurrency structure

ii) Deployment structure.

b) Explain clearly the advantages of software architecture . **[6]**

c) Write short notes on 4+1 view of software architecture with a neat diagram to illustrate too. (Hint : Kruchten views) **[6]**

P.T.O.

Q3) a) Draw a neat diagram to depict any one 'SECURITY' scenario. In brief write about the security terms Integrity of data, Access control. Also write about security tactics Intrusion detection and Authentication. **[8]**

b) In brief write about tactics (i) Defer binding time (ii) Checkpoint/Rollback. **[8]**

OR

Q4) Explain and illustrate the following concepts (in context of quality attributes) with examples, in brief. **[16]**

a) Following Concern in context of modifiability : "When is a change made and who makes it".

b) Any one Quality attribute scenario for performance.

c) Measuring and specifying performance for a website.

d) Usability aspects observed by you in any typical MS WINDOWS desktop software. (Hint : example softwares MS WORD/IE7)

Q5) a) For the design pattern SINGLETON give the following. **[8]**

i) Motivation/problem.

ii) Solution that is the actual pattern

iii) example

iv) implementation issues in multithreaded environment.

b) Give a scenario for application of observer pattern in detail. **[4]**

c) In brief state what are roles played by model, view, controller in MVC, illustrate with an example. **[4]**

OR

Q6) a) Compare FACTORY and Abstract Factory patterns. **[4]**

b) What are the advantages of an ITERATOR pattern? Show a class structure diagram and explain how Iterator pattern works with help of the diagram. **[6]**

c) Write short notes on Design patterns. **[6]**

SECTION - II

Q7) a) Why is Java said to be platform independent and portable, explain. **[6]**

b) In context of EJBs what do you understand by (i) Session beans (ii) message beans. **[6]**

c) In context of JAVA what do you understand by terms RMI registry, remote object and seriliasability. **[6]**

OR

Q8) In brief explain: **[18]**

a) XML and Types of XML parsers.

b) Application scenario to illustrate need for messaging middleware like JMS.

c) JDBC statements.

d) JNDI technology.

e) Advantages of JSP over servlets.

f) Http request response.

Q9) a) What kind of responsibilities does a Server side have in a web application? **[4]**

b) Explain following web concepts through simple examples (i) DOM tree ii) authentication (iii) http (iv) load balancing. **[12]**

OR

Q10)a) What is the importance of security, performance in today's websites. **[6]**

b) Write short notes on XML, AJAX. **[6]**

c) Discuss the features of Java applets on client side. **[4]**

Q11)Explain the following terms: **[16]**

a) Protocols used in Web Services.

b) Components (Hint : for example in COM)

c) C#

d) Interfaces.

OR

Q12)a) Explain in brief the following COM concepts. **[10]**

i) Stubs and proxies.

ii) I Unknown Interface.

b) Write short note on .NET platform. **[6]**

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

P1316 **[3564] - 343**

B.E. (Computer Engineering)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2003 Course)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Figures to the right indicate full marks.***
3) ***Your answers will be valued as a whole.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Define following term & give suitable examples : **[10]**

i) Empirical Relations.

ii) Mapping.

iii) Measurement.

iv) Models.

v) Predictions.

b) Explain measurement scales & scale types. **[8]**

OR

Q2) a) Explain in detail GQM method. Explain basic phases with example. **[10]**

b) Comment on following : **[8]**

i) Cost & effort estimation.

ii) Data collection.

iii) Quality models & measures.

Q3) a) The software program spell checker accepts as input a document file & an optional personal dictionary file. The checker lists all words not contained in either of these files. The user can query the number of words processed and the number of spelling errors found at any stage during processing.

For this problem find out UFC & TCF by Albercht's approach. (Do the necessary assumptions & explain those). **[10]**

b) Explain importance of Reusability with example. **[6]**

OR

P.T.O.

Q4) a) Differentiate between Albrecht's effort estimation method & COCOMO approach for effort prediction. **[4]**

b) Explain with Binary search algorithm example how to calculate or measure algorithmic efficiency. **[6]**

c) Explain following terms - **[6]**

i) Modularity.

ii) Morphology.

iii) Information flow.

Q5) a) Consider a program code **[8]**

```
if (c1) {
        f1 ( ); }
  else  { f2 ( ); }
if (c2) {
        f3 ( );}
  else  {f4 ( );}
```

Find out

i) No. of test cases for branch coverage.

ii) No. of test cases for path coverage.

iii) Cyclomatic no.

Justify your answer.

b) Explain positive & negative testing concepts. **[6]**

c) Explain use of checklist in developer manuals. **[2]**

OR

Q6) a) Write down minimum 4 mutants for following program code :- **[8]**

```
r : = 1;
for i : = 2 to 3 do.
if a[i] > a[r] then r : = i;
```

By assuming suitable data explain for above code atleast one secondary mutant.

b) Explain the life cycle for integrated testing. **[6]**

c) Define & explain concept of boundary values. **[2]**

SECTION - II

Q7) In a Enterprise security system to improve the performance of secure web server (SSL deployed) a web server is modified. The modified webserver is caching the sessioned. So, the HTTP response for a client would be fast enough. Results are bench marked by using appropriate bench marking tools.

Write down minimum 4 test cases for testing of above project. **[18]**

(Write down scope statement in detail to support your answer. Scope statement carries 2 marks.)

OR

Q8) A project is developed which uses wireless sensor networks. Main objective of project is to track the moving object in the network & inform that to base station. To demonstrate & to analyze the performances of different architectures (Centralized & distributed) Network simulator NS2 is used. A topology generator GENSEN is used which is giving input to the NS2 files. Find out minimum 4 test cases & document those.

(Write down scope statement in detail to support your answer. Scope statement carries 2 marks). **[18]**

Q9) a) Explain seven basic quality tools of Ishikawa. **[10]**

b) Write short note on ISO9001. **[6]**

OR

Q10)a) Explain how six sigma helps to improve total quality in a organization. **[10]**

b) Write short note on OPD (Organization Process Definition). **[6]**

Q11)a) What do you understand by means of 'problem reporting'. Which are various problems & Best practices context to this. **[10]**

b) Write short note on 'Testing the shipment unit'. **[6]**

OR

Q12)a) What is meant by 'Problem Resolution' which are various problems & Best practices context to this. **[10]**

b) Write short note on 'Test Frequency'. **[6]**

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

P1278

[3564]-334

B.E. (Computer Engineering)

OPERATING SYSTEM

(410442) (2003 Course)

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

Instructions :

1) ***Answer all questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***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) Explain the necessity for mutual exclusion. Describe various ways to achieve mutual exclusion. **[8]**

b) What is dining philosopher problem? Write a solution using monitors. **[8]**

OR

Q2) a) What is Semaphore? Explain Semaphore operations with example. Also explain various types of semaphores. **[10]**

b) What is critical region? Explain in detail. **[6]**

Q3) a) Explain deadlock detection algorithm with suitable example. **[8]**

b) State and explain different methods for user authentication and security. **[8]**

OR

Q4) a) What are the difficulties that may arise when a process is rolled back as a result of deadlock? **[6]**

b) How access matrix is used in protection domain? Explain various methods to implement access matrix. **[10]**

Q5) a) Enlist and explain various system calls and its functionalities for file management and Process management subsystem. **[8]**

b) Write and explain the algorithm for buffer allocation. **[10]**

P.T.O.

OR

Q6) a) Explain in brief following Unix concepts – **[12]**

i) Execution modes of user level process.

ii) Features of Unix OS.

iii) Unix building block primitives.

b) Explain with neat diagram structure of buffer pool. **[6]**

SECTION - II

Q7) a) Explain with example inode assignment to new file and freeing an inode. **[10]**

b) Explain the following concepts with example using shell commands. **[8]**

i) Hard link and soft link.

ii) File types and access permissions.

OR

Q8) a) Why filesystem mounting is required? Explain the process of mounting, also enlist the fields of mount table. **[8]**

b) Explain with neat diagram following – **[10]**

i) Structure of Unix filesystem.

ii) Structure of Regular file.

Q9) a) Draw and explain detailed process state transition diagram. **[8]**

b) Explain system boot and in it process. **[8]**

OR

Q10) a) Discuss various kernel level data structures and their inter relationship for process management subsystem. **[8]**

b) Write a note on following – **[8]**

i) Signals.

ii) Awaiting process termination.

Q11) a) Explain in detail driver entry points and role of device switch table for accessing the device. **[10]**

b) What is swapping? Explain how space is allocated in swapping. **[6]**

OR

Q12) a) Write a note on terminal drivers. **[8]**

b) Explain with example demand paging in Unix. **[8]**

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

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B.E. (Computer)

DESIGN AND ANALYSIS OF ALGORITHMS

(2003 Course)

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

Instructions to the candidates :

1) ***Answer THREE 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

Q1) a) Interpret the following equations: **[4]**

i) $2n^2 + \Theta(n) = \Theta(n^2)$.

ii) $2n^2 + 3n + 1 = 2n^2 + \Theta(n)$.

b) Define the asymptotic notations: **[6]**

i) Ω ii) ω iii) Θ.

c) Solve the recurrence: **[8]**

$$t(n) = \begin{cases} 0 & \text{if } n = 0 \\ 1 & \text{if } n = 1 \\ 3t_{n-1} + 4t_{n-2} & \text{otherwise} \end{cases}$$

OR

Q2) a) What are the basic components that contribute to the space complexity? **[4]**

b) What is the use of recurrence relations? Give a recurrence relation for sequential search. **[6]**

c) Prove by contradiction: There exist two irrational numbers x and y such that x^y is rational. **[8]**

Q3) a) Write an algorithm for sorting n numbers using quick sort method. Determine its time complexity. **[8]**

b) Write Kruskal's algorithm. Comment on its time complexity. **[8]**

OR

P.T.O.

Q4) a) Enlist the general characteristics of greedy algorithm. Explain these characteristics in detail. **[8]**

b) Let the number of jobs be 4, and the associated profits with these jobs be p1 = 100, p2 = 10, p3 = 15 and p4 = 27 respectively. The deadline for completion of these jobs are d1 = 2, d2 = 1, d3 = 2 and d4 = 1 respectively for the four jobs. Find the feasible solutions and an optimal solution for these job sequencing using Greedy approach. **[8]**

Q5) a) Define multistage graph. What is a multi-stage graph problem? **[4]**

b) Write an algorithm for finding minimum cost binary search tree using dynamic programming strategy. Show that the computing time of this algorithm is $O(n^2)$. **[12]**

OR

Q6) a) What is the essential difference between dynamic programming and recursion? Explain. **[4]**

b) Explain how dynamic programming strategy can be used to find optimal binary search tree? **[8]**

c) Can we make use of dynamic programming for graph coloring problem? Explain. **[4]**

SECTION - II

Q7) a) If(u, v) is any edge in graph G, then prove relative to the depth first spanning tree t, either u is an ancestor of v or v is an ancestor of u. So there are no cross edges relative to a depth first spanning tree. (u, v) is a cross edge relative to t if and only if u is not an ancestor of v and v is not an ancestor of u. **[8]**

b) Write an algorithm for recursive formulation of in-order traversal. **[8]**

c) State TRUE or FALSE. **[2]**

i) Backtracking implementation needs queue.

ii) Branch and bound technique needs priority queue.

OR

Q8) a) Let T(n) and S(n) respectively represent time and space needed by any of the tree traversal algorithms for the tree t having ≥ 0 nodes. If the time and space needed to visit a node is $\Theta(1)$, then prove T(n) = $\Theta(n)$ and S(n) = $\Theta(n)$. **[8]**

b) Write an upper bound function for 0/1 Knapsack problem. **[6]**

c) Write a short note on: Branch and Bound method. **[4]**

Q9) a) State pointer doubling problem. **[2]**

b) If a comparison network with n inputs sorts all 2^n possible sequences of 0' s and 1' s correctly then prove that it sorts all sequences of arbitrary numbers correctly. **[6]**

c) Write an algorithm for prefix computation. Determine its time complexity. **[8]**

OR

Q10)a) Explain parallel sort strategy. **[8]**

b) Write an algorithm for pointer doubling problem. What is the time complexity of this algorithm? **[8]**

Q11)a) Explain Cooks theorem. **[8]**

b) Prove that vertex cover problem is NP complete. **[8]**

OR

Q12)a) Prove, if L1, L2 $\subseteq$ {0, 1}* are languages L1 $\leq$ p L2, then L2 $\in$ p implies L1 $\in$ p. **[8]**

b) State and explain AND / OR graph problem. **[8]**