DDCE - VTH – MCA/IIIRD – MCA – (LE) -
IIIS – M.Sc. – (CS/IT/ITM)

CS - 5.1 - (DM & DW) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

Group – A

1. Answer all questions. [2×5=10

(a) What is KDD ?

(b) Explain support and confidence.

(c) What is fact table ?

(d) Differentiate supervised learning and unsupervised learning.

[Cont...

(e) Given x1 = (1, 2) and x2 = (3, 5) represent two objects. Find the Euclidean and Manhattan distance between these objects.

Group – B

2. Answer any THREE questions. [8×3=24

(a) Assume that the minimum and maximum values for the attribute income are $12,000 and $98,000, respectively and new range to map income is [0:0; 1:0]. Normalize the value of $73,600 for income using min-max normalization and Z-Score Normalization.

(b) Explain Three - Tier Architecture of Data Warehouse.

(c) Differentiate OLTP and OLAP.

(d) Explain Back propagation Errors.

(e) Differentiate AGNES and DIANA.

[Cont...

Group – C

3. Answer any THREE questions. [12×3=36

(a) Explain all OLAP operations with suitable example.

(b) A database has five transactions as in the following. Let min sup = 60% and min con f = 80%.

TID	items bought
T100	{M, O, N, K, E, Y}
T200	{D, O, N, K, E, Y}
T300	{M, A, K, E}
T400	{M, U, C, K, Y}
T500	{C, O, O, K, I, E}

Find all frequent item sets using Apriori.

(c) Briefly outline the major steps of decision tree classsification.

(d) Explain K-Medoids Algorithm.

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(ii) Show that the decision problem HC is in NP class.

(e)(i) Show the polynomial reduction HC $<_p$ HP.

(ii) Write Prim's algorithm for construction of MST and find its running time.

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2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all the questions. [5×2

(a) Find the height of Binary Search Tree of List

L = <MON, TUE, WED, THU, FRI, SAT, SUN>

(b) Arrange the function in monotonically increasing order of complexity n^2, Lg (n!), 2^n, n^2Lgn, 2^{10}.

(c) Construct a MAX-HEAP on the list of Keys L = <3, 7, 2, 6, 9, 12, 1, 5, 8>.

(d) Write two characteristics of Dynamic Programming for the optimization problem.

[Cont...

(e) 2CNF - SAT is NP or NP COMPLETE ? YES or NO

2. Answer any THREE questions. [3×8

(a) Write randomize quick sort and find the expected running time.

(b) Find optimal parenthesis to find product of chain matrix whose dimension is $M_1 = 5 \times 10$, $M_2 = 10 \times 20$, $M_3 = 20 \times 5$ and $M_4 = 5 \times 5$.

(c) Find the longest common subsequence of the given list of string X and Y. Where X = <1,0,1,0,0,0,1,1> and Y = <0,0,1,1,1,0,0,1>.

(d) Construct the minimum spanning tree of graph given below whose edge and weights are :

(a,b,4), (a,f,10), (a,g,8), (b,g,9), (b,c,3), (f,g,6), (f,e,2), (e,g,4), (e,d,8), (d,g,6), (d,c,9), (c,g,7) by Kruskal's algorithm and find its running time.

(e) Prove that the decision problem CLIQUE is NP COMPLETE.

[Cont...

3. Answer any THREE questions : [3×12

(a)(i) Write the PARTITION procedure of quick sort algorithm and find its running time.

(ii) Build a max heap on the given list of keys and find its running time

L = <5,7,9,2,51,45,24,33,21,51>.

(b)(i) Solve the recurrence relation by recursion tree and prove by substitution method. T (n) = T(n/3) + T (2n/3) + cn.

(ii) Write the Counting sort algorithm and find its running time.

(c)(i) Construct a RED BLACK tree of the given list of keys and find its black height.

L = <3,7,9,2,6,23,12,20,15,18,34,56,70>.

(ii) Show the final RED BLACK tree of the above after deleting the keys 3,7,12,34,56.

(d)(i) Write random select to find the i^{th} smallest element in list L.

[Cont...

DDCE - VTH – MCA/IIIRD – MCA – (LE) - IIIS – M.Sc. – (CS/IT/ITM)

CS - 5.3 - (C.D.) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figures in the right hand margin indicate marks.

Answer ALL questions.

1. Answer All. [2×5

(a) Why is buffering used in lexical analysis ? Name and describe the commonly used buffering method. [2

(b) Compare the features of NFA with DFA. [2

(c) What is the dangling else problem ? [2

(d) Give the transition diagram for an identifier. [2

(e) Describe the role of a parser with a figure. [2

[Cont...

2. Answer any THREE : [8×3

(a) Differentiate between : [8

(iii) Compiler and Interpreter

(iv) Top down parsing and Bottom up parsing

(b) Explain the need for grouping of compiler phases. [8

(c) Describe the following with respect to a string with examples for each : [8

Prefix, suffix, proper prefix, substring, subsequence

(d) How are left recursion and left factoring different ? Illustrate with examples. [8

(e) Describe the following types of errors with examples : [8

Lexical errors, Syntactic errors, Semantic error, Logical errors.

3. Answer any THREE : [12×3

(a) Explain how regular expression can be converted to a DFA with an example. [12

[Cont...

(b) Show the moves made by a predictive parser on the input id + id*id on the grammar : [12

$E \rightarrow E + T \mid T$

$T \rightarrow T * F \mid F$

$F \rightarrow (E) \mid id$

(c) What is meant by three address code ? How can they be implemented on an actual compiler ? Present a comparison of the representations. [12

(d) Explain the phases of a compiler with a neat diagram. [12

(e) Write short notes on (ALL) : [4×3

(v) Language Processors

(vi) Handle Pruning

(vii) Panic mode error recovery

(viii) Compiler construction tools

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DDCE - III - S - M.Sc. - (CS) -
C.S. - 5.4 - (RTS) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5

(a) Define RPC ?

(b) What do you mean by fault tolerance ?

(c) Defined and differentiate between dynamic and static systems ?

(d) What is a distributed system ?

(e) What is RTOS ?

2. Answer any THREE : [8×3

(a) Define distributed OS along with its different goals ? Also write down its Hardware and Software.

(b) Discuss different types of clock synchronization issues in detail ?

[Cont...

(c) State and explain the round robin and weighted round robin scheduling algorithms with suitable examples ?

(d) Discuss the features PIP and PCP by taking suitable examples ?

(e) What are the basic concepts of real time OS ? Discuss basic kernel services ?

3. Answer any THREE : [12×3

(a) Define and discuss ATM network with a suitable diagram ? Mention its advantages and disadvantages ?

(b) Discuss different types of scheduling in distributed systems with suitable examples ?

(c) Explain scheduling of sporadic jobs and algorithms for constructing schedule for static jobs ?

(d) Discuss task scheduling with precedence constraints with an example and scheduling algorithms in multiprocessor systems ?

(e) Define and differentiate between real time POSIX, RT-Linux and Windows NT with individual applications ?

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DDCE - VTH – MCA/IIIRD – MCA – (LE) -
IIIS – M.Sc. – (IT/ITM)

CS - 5.4 - (DS) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5

(a) Differentiate between network and DS.

(b) What is a MULTILEVEL FEEDBACK queue ?

(c) What are the conditions for deadlock characterisation ?

(d) Differentiate between multiprogramming and time-sharing os ?

(e) Why does thrashing occur ?

2. Answer any THREE. [8×3

(a) Consider the following snapshot and calculate A.W.T. and T.W.T for FCFS, SJF, nonpreemptive PRIORITY and R-R (T.Q. = 2 m.s.).

[Cont...

PROCESS	B.T.	PRIORITY
P1	10	3
P2	1	1
P3	2	4
P4	1	5
P5	5	2

(b) State and explain Banker's algorithm. Give an example for the same.

(c) What is critical section ? Why do we use semaphore ? Explain Dining - philosopher problem of process synchronisation.

(d) What is fragmentation ? What are its types. What are the solutions to this ?

(e) What is a page fault ? Show a diagram to establish its occurrence ?

(f) Compare FIFO, LRU and optimal algorithm for page replacement by taking an example of your choice ?

(g) Explain how election algorithms are helpful in synchronization of D.S.

3. Answer any THREE. [12×3

(a) What are the goals and design issues of a distributed os ? Explain each issue in detail.

[Cont...

(b) Why do we need a logical clock ? Comment on Lamport's vector clock by defining logical clock and analyse its limitation.

(c) Why do we make RPC ? Write the steps to do it. Differentiate the same with asynchronous RPC.

(d) What is virtual address ? Distinguish between internal and external fragmentation ? Compare paging with segmentation.

(e) Why do we need process synchronisation ? Give Dijkstra's algorithm for critical section problem. What is a monitor ?

(f) What are the approaches available for making a DS fault tolerant ? Cite all of them in detail.

(g) Write notes on the following : [4×3

(a) Solution to thrashing

(b) Types of schedulers

(c) ATM

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DDCE - VTH – MCA/IIIRD – MCA – (LE) - IIIS – M.Sc. – (IT/ITM)

CS - 5.5 - (CNS) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5

(a) What is substitution and transposition in Cryptography ?

(b) What do you mean by Public Key cryptography ?

(c) Discuss the functions of MIME protocol.

(d) Which are the key participants in SET.

(e) What is stealth virus ?

[Cont...

2. Answer any THREE : [8×3

(a) What is private key encryption system ? Discuss IDEA in detail.

(b) What is digital envelope ? Discuss the process of digital envelope.

(c) What is email security. Discuss Authentication Header and Encapsulating Security Payload.

(d) What is VIRUS ? Discuss the types and phase of Virus.

(e) How does SET secures electronic payment system, explain ?

3. Answer any THREE : [12×3

(a) What is Symmetric key cryptography ? Outline som Symmetric algorithms along with their applications and advantages.

(b) Discuss RSA algorithm with a suitable solved example.

[Cont...

(c) What is internet security ? Discuss the working principles of PGP and PEM in detail.

(d) What is SSL ? Discuss the working principles of SSL.

(e) What is Firewall ? Discuss how circuit gateway differ from application gateway. Outline the limitations of firewall.

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(e) Write short notes on (ALL) : [4×3

(i) Membership function

(ii) Characteristic of neural network

(iii) Hybrid systems

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DDCE - III - S - M.Sc. - (CS) - CS - 5.5 - (SC) - R & B

DDCE - III - S - M.Sc. - (CS) - CS - 5.5 - (SC) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figures in the right hand margin indicate marks.

Answer ALL questions.

1. Answer All. [2×5

(a) Differentiate between supervised and unsupervised learning. [2

(b) Define an artificial neural network [2

(c) Compare crisp and fuzzy sets. [2

(d) What is meant by associative memory ? [2

(e) Describe the model of an artificial neuron. [2

2. Answer any THREE : [8×3

(a) List the various properties of crisp set and the corresponding ones of fuzzy set. [8

[Cont...

(b) The task is to recognize English alphabetical characters (F, E, X, Y, I, T) in an image processing system. The fuzzy sets I~ and F~ represent identification of characters I and F.[8

I~ = {(F,0.4), (E,0.3), (X,0.1), (Y,0.1), (I,0.9), (T,0.8)} and

F~ = {(F,0.99), (E, 0.8), (X,0.1), (Y,0.2), (I,0.5), (T,0.5)}

Find the following :

(i) $I^{\sim} \cup F^{\sim}$

(ii) $I^{\sim} - F^{\sim}$

(iii) $F^{\sim} \cup F^{\sim c}$

(iv) Verify De Morgan's Law $(I^{\sim} \cup F^{\sim}) = I^{\sim c} \cap F^{\sim c}$

(c) Show that $(P \rightarrow Q) = (\sim PVQ)$ using propositional logic. [8

Given

(i) CVD

(ii) $\sim H \rightarrow (A \wedge \sim B)$

[Cont...

(iii) $(CVD) \rightarrow \sim H$

(iv) $(A \wedge \sim B) \rightarrow (RVS)$

Can (RVS) be inferred from above ?

(d) What is crossover ? Describe its variants. [8

(e) Differentiate between single layer feed forward network, Multilayer feed forward network, recurrent network. [8

3. Answer any THREE : [12×3

(a) What are the types of Fuzzy inference systems ? Explain each with appropriate diagrams. [12

(b) Explain the various methods for selecting chromosomes for parents to crossover in genetic algorithm. [12

(c) List the features of various types of learning methods. [12

(d) Describe the various types of encoding for representing individual genes in genetic algorithm. [12

[Cont...

III - S - M.Sc. - (IT / ITM) -
C.S. - 5.6 - (C. Compting.) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5

(a) Define elastic computing ?

(b) What is hypervisor ?

(c) Write down two reasons of load imbalance in cloud ?

(d) Differentiate between GFS and HDFS ?

(e) What do you mean by cloud security ?

[Cont...

2. Answer any THREE : [8×3

(a) What is cloud computing ? Explain the different characteristics and components of cloud computing ?

(b) Discuss different types of virtualization technology along with its challenges ?

(c) Define load balancing in cloud ? Discuss min-min, min-max, PSO and GA schemes for load balancing in cloud ?

(d) Discuss different types of cloud file systems in detail along with suitable applications.

(e) Elaborate different types of vulnerability assessment tools for cloud ?

3. Answer any THREE : [12×3

(a) Explain how cloud services are monitored and administered along with benefits and limitations ? Also write down different issues and challenges in cloud environment ?

[Cont...

(b) What is a virtual machine ? Discuss different types of virtualization applications in enterprises along with associated issues and challenges ?

(c) Explain the mathematical model for load structure along with six load balancing schemes of cloud computing ?

(d) Define parallel computing in cloud ? Discuss map-reduce model with its efficiency and operations ?

(e) Elaborate access control, autonomic security, dependability, data migration and streaming in cloud ?

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III - S - M.Sc. - (CS) - CS - 5.6 - (CSC) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5

(a) Write down two benefits of client server computing ?

(b) Mention two open system standards ?

(c) Define windowing ?

(d) What is server hardware ?

(e) What do you mean by middleware ?

2. Answer any THREE : [8×3

(a) Explain client server computing ? Also discuss its evolution and applications ?

(b) Elaborate obstacles upfront and hidden in client server computing along with factors needed for its success ?

[Cont...

(c) Explain different types of client hardware and software with some specific examples ?

(d) Discuss the features of network OS along with its advantages and disadvantages ?

(e) What do you mean by groupware server ? Elaborate different components of groupware server ?

3. Answer any THREE : [12×3

(a) Define and discuss different classes of client server computing along with their advantages ?

(b) What is open system ? Discuss different organizations that set standards for open system ?

(c) Explain several client software products in detail along with client requirements ?

(d) Explain different categories and features of server machine ? Also discuss network management tools ?

(e) Write short notes on :

(i) CGI

(ii) 3 tire Client Server

(iii) Web Client Server

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DDCE - Vth – MCA / III – MCA – (LE) - CS - 5.6 - (PC) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5

(a) Differentiate between static and dynamic mapping.

(b) Describe granularity and its impact on parallel computing.

(c) There are 2000 jobs and to do a single job 20 ns is required. If each job can be done in 5 stages and 5 processors are employed. What is the speedup and efficiency ?

[Cont...

(d) How fast can two sorted lists of size *n* each be merged into one using p processors ?

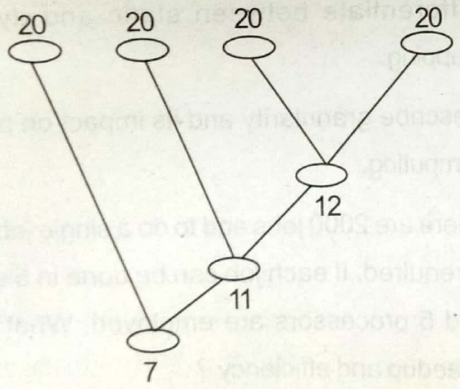
(e) What is a bitonic sequence ?

2. Answer any THREE. [8×3

(a)(i) Explain the difference between superscalar processing and pipelining ? Explain briefly.

(ii) How a mesh can be embedded into a hypercube ?

(b)(i) For the following task graph determine the following :



[Cont....

(a) Maximum degree of concurrency.

(b) Average degree of concurrency.

(c) Critical path length.

(d) Maximum achievable speedup over one process assuming that an arbitratily a large number of processes is available.

(ii) What are different decomposition techniques ? Describe any two with example.

(c)(i) Describe and formulate the algorithm for all to one reduction on a p-node ring and find its time complexity.

(ii) Explain different mapping technique used in parallel algorithms.

(d)(i) Write a short notes on VLIW processors.

(ii) Write an algorithm to find the prefix sum operation on a d-dimensional hypercube and find its time complexity.

[Cont...

(e)(i) Describe the parallel formulation of odd-even transposition sort on a n processors ring for a list of n numbers and show whether it is cost optimal or not cost optimal.

(ii) Design a parallel algorithm for multiplying a $n \times n$ matrix with a $n \times 1$ vector with p processors such that $< n$. Show that it is cost optimal.

3. Answer any THREE. [12×3

(a)(i) Consider a memory system with cache of 64 KB and DRAM of 1GB with the processor speed operating at 1 GHz. The latency to DRAM is 50ns and in each memory cycle the processor fetches four words. What is the peak achievable perfomance of multiplyaing two matrices of order 32×32.

[Cont...

(ii) Draw a diagram of 8 nodes hypercube. Number the nodes using systematic binary codes and give the answer to the following questions.

(a) What is the bisection bandwidth for this hypercube ?

(b) How many links are there in this hypercube ?

(c) What is the maximum number of hops in this networks ?

(d) How many alterrate paths are there between any two nodes ?

(e) What is the diameter of this hypercube ?

(f) What is the arc connectivity of this hypercube ?

(b)(i) What are the different parallel algorithm models ? Explain briefly.

[Cont...

(ii) What are different network topologies used in interconnection networks for parallel computers ? Explain them briefly.

(c)(i) Give a detailed description of an algorithm for $t_s \log p + t_w m(p-1)$ on a p-node hypercube.

(ii) What are the different data decomposition technique ? Explain "Recursive Decomposition" with a suitable example.

(d)(i) Describe and formulate the algorithm for all to all broadcast on a p-node mesh and find its time complexity.

(ii) What are the different performance metrics for the Parallel system ? Explain all of them.

[Cont...

(e)(i) Design a parallel algorithm for multiplying two $n \times n$ matrices using 2D block partition method with fewer than n^2 processors. Show that it is cost optimal.

(ii) Sort the following list of elements using shell sort technique. Derive an expression for its time complexity.

32, 54, 18, 50, 15, 6, 2, 78.

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