SHANMUGHA ARTS, SCIENCE, TECHNOLOGY & RESEARCH ACADEMY

SASTRA University
TIRUMALAISAMUDRAM
THANJAVUR – 613402

SUBJECTS OF STUDY AND SYLLABI FOR

B.TECH (CSE) PROGRAMME

SHANMUGHA
ARTS, SCIENCE, TECHNOLOGY & RESEARCH ACADEMY (SASTRA)
TIRUMALAISAMUDRAM - 613 402.
School of Computing - B.Tech. (CSE) Scheme
(For Candidates Admitted From 2006 Onwards)

SEMESTER VI:

Subject Code	Subject Title	Periods of Instruction			Credit Points
		L	T	P	
BCSCCS601	Security in Computing	4	1	0	5
BCSCCS602	Software Engineering	3	1	0	4
BCSCCS 603	Computer Graphics	3	1	0	4
BCSCCS 604	Computer Networks	3	1	0	4
BCSDXX XXX	DE 6	3	1	0	4
BCSDXX XXX	DE 7	3	1	0	4
BCSCCS 605	System Software & Computer Graphics Lab	0	0	3	2
BCSCCS 606	Computer Networks Lab	0	0	3	2
BCSCTP609	HR Skill IV	1	0	0	1
	TOTAL	**20**	**6**	**6**	**30**

DEPARTMENTAL Electives:

BCSDCS601	System Modeling & Simulation	3	1	0	4
BCSCCS602	Data warehousing and data Mining	3	1	0	4
BCSDCS603	Digital Image processing	3	1	0	4
BCSOCS604	Robotics	3	1	0	4
BCSDCS605	Mobile Computing	3	1	0	4
BCSDCS 606	Resource Management Techniques	3	1	0	4

BCSCCS601 – SECURITY IN COMPUTING

L T P   CREDITS
4 1 0   5

UNIT I   19

Introduction: Security Threats, Security Attacks, Security Services, Mechanisms- Model for Network Security-Classical Encryption Techniques-Substitutions-Transpositions Techniques- Examples-Stegnography-Stream Cipher, Block Cipher-Block Cipher Modes-ECB-CBC-CFB-OFB.

UNIT II   19

Finite Field-Number Theory:-Algorithms in Z, Algorithms in Z_n, Groups, Rings, Fields – Modular arithmetic- Euclid's algorithm-Finite field of the form GF(p)- Polynomial Arithmetic- Finite field of the form $GF(2^n)$-Prime Numbers-Fermat's & Euler's Theorem- Discrete Logarithms - Pseudorandom Bit Generation.

UNIT III   18

Types & Algorithms: Symmetric – Public Key Cryptography- Traffic Confidentiality - Feistal Cipher Structure- Data Encryption Standard-Strength of DES- Security in DES- Differential and Linear Cryptanalysis- AES- Triple DES – RSA – BLOWFISH..

UNIT IV   19

Hash Algorithm, Key Management: Hash Function-Message Digest algorithm (MD 5) – Secure Hash Algorithm – Diffie-Hellman Key Exchange – Key Management Techniques – Key Distribution – Key Agreement - Elliptic Curve Cryptography - - Digital Signatures- Authentication Protocols.

Text Books:

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall Professional Technical Reference, Fourth Edition. 2004
2. Alfred J. Menezes, Paul C.Van OorSchot, Scott A.Van Stone, "Handbook Of Applied Cryptography", CRC Press, 1996.

References:

1. Bruce Schneier, "Applied Cryptography: Protocols, Algorithms, and Source Code in C", Second Edition, Wiley, John & Sons, Incorporated, October 1995.
2. Atul Kahate "Cryptography and Network Security". Tata McGraw-Hill.
3. Richard E. Smith, "Internet Cryptography", Addison – Wesley, 1997.

BCSCCS602 – SOFTWARE ENGINEERING

L T P   CREDITS
3 1 0   4

Unit I: Software engineering

Software and its characteristics - changing nature of software - legacy software – Software engineering: A layered technology - A process framework - CMMI - Process patterns - Process assessment - personal and team process models - Process models - Agile process - agile process models

Unit II: Requirements and analysis

System engineering hierarchy - Business process engineering - Product engineering - system modeling - Requirement engineering tasks - Initiating the requirements engineering process – Eliciting requirements – Developing use-cases – Building the analysis model – Negotiating requirements – Validating requirements

Requirements analysis – Approaches - Data modeling concepts – Object oriented analysis – Scene based modeling – Flow-oriented modeling – Class based modeling – creating a behavior al model

UNIT III: Design
Design concepts **-** Design model – Pattern-based software design Software architecture – Data design – Architectural styles and patterns – Architectural design – Assessing architectural designs – Mapping data flow into a software architecture

Component level design – Designing class-based components – Conducting component level design – Object constraint language – Designing conventional components - Golden rules for interface design – Interface analysis and design models – Interface analysis – Interface design steps – design evaluation

UNIT IV: Testing and metrics

A strategic approach to software testing – strategic issues – Test strategies for conventional software – Test-strategies for object-oriented software – Validation testing – system testing – The art of debugging

Software testing fundamentals – White box testing: Basis path testing – Control structure testing – Black box testing – Object-oriented testing methods applicable at class level - Testing methods - Inter-class test case design – testing for specialized environments, architectures and applications

Software quality – framework for product metrics – metrics for analysis model – metrics for design model – metrics for source code- metrics for testing – metrics for source code

Text book:

1. Roger S Pressman, "S/W Engineering A Practitioner's approach", McGraw Hill, 5th edition 2001.

References:

1. Ian Sommerville, "S/W Engineering", Pearson Education, 8th edition, Addison Wesley, 2006
2. Rajib Mall, "Fundamentals of software engineering", PHI, 1999

BCSCCS603 – COMPUTER GRAPHICS

	L	T	P	CREDIT
	3	1	0	4

UNIT I: (15)

Introduction to Computer Graphics - Display devices - hardcopy devices – interactive input devices – Display processors - Graphic Adapters – basic function – Monochrome adapters, video monitors - Graphic Software – output primitives - Line, Circle & Ellipse, Polygon drawing algorithms – Attributes of output primitives.

UNIT II: (15)

2D transformation-Clipping and Windowing-Line clipping algorithms (Cohen-Sutherland, Liang-Barsky, Nicholl–Lee – Nicoll)–Polygon Clipping (Sutherland-Hodgeman) – Text Clipping – Curve Clipping - Segmented display files – Display file compilation - Modeling and Modeling transformation

UNIT III: (15)

3D Concepts - Methods of 3D representation - 3D transformation – Viewing – 3D Clipping – Hidden surface and line elimination - Shading and coloring methods - Basic modeling concepts and Modeling methods

UNIT IV: (15)

Color table - Animation using Colour table - Anti aliasing methods - Representing curves, Surfaces and solids - B-splines - Bezier curves - Quadtree and octree - Geometric model – Fractals - Hierarchical model.

Text Books:

1. Hearn D and Baker M.P., "Computer Graphics, C Version", PHI, New Delhi 2006.

References:

1. Foley J.D., Van Dam A, Fiener S.K. and Hughes J.F., "Computer Graphics Principles and Practice ", 2nd Edition, Addison Wesley, 1995.
2. Newman W.M. and Sproull R.F., " Principles of Interactive Computer Graphics ", Second Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 1997.

BCSCCS604 – COMPUTER NETWORKS

L	T	P	CREDIT
3	1	0	4

UNIT I   15

Introduction: Network Hardware - Network Software - Reference Models - Example Networks Models. Physical Layer: The Theoretical Basis for data communication – guided transmission media - Wireless Transmission – Communication Satellites – Public switched Telephone Network.

UNIT II   15

Data Link Layer: Design issues – Error Detection and Correction – Elementary data link protocol – Sliding window protocol.
Medium Access Control: Channel Allocation Problem – Multiple Access protocol – Ethernet – Wireless LANs – Broadband wireless - Blue tooth – Data Link Layer Switching.

UNIT III   15

Network Layer: Design Issues – Routing Algorithms: Optimality principle, shortest path routing, flooding, distance vector routing, link state routing, hierarchical routing, broadcast routing, multicast routing –routing for mobile hosts –routing in adhoc networks- Congestion Control Algorithms – QOS – Internetworking - Network Layer in Internet.

UNIT IV   15
Transport layer: Transport Service – Elements of Transport Protocol - Simple transport Protocol – Internet transport Protocols: TCP and UDP – Performance Issues. Application Layer: DNS – Electronic Mail – WWW – Multimedia. Security: Digital Signature – Mail Security – Web Security.

Text book:

1. Andrew S Tanenbaum , " Computer Networks ", Fourth Edition, Pearson Education , 2003.

. **References:**

1. Behrouz A Forouzan , "Data Communication and Networking " , Fourth Edition,   TMH,2006.
2. William Stallings , " Data and Computer Communications " , Seventh Edition, PHI, 2004.

BCSCCS605 – SYSTEM SOFTWARE & COMPUTER GRAPHICS LAB

	L	T	P	CREDITS
	0	0	3	2

System Software

1. Inter process communication
2. Implementation of a text editor
3. Removal of loop invariants in a 'C' program
4. Lexical Analyzer Compiler Tool Study – simple examples, Yacc Study –simple examples
5. Write a lex specification for decimal numbers.
6. Write a lex program which changes any numbers in its input into hexadecimal representation.
7. Write a lex program to change all characters in its input from uppercase to lowercase, unless they're enclosed inside a C comment.
8. Develop a Lex program that generates a symbol table
9. Write a lex program that reads HTML data containing markups written in lowercase (eg: <p>) or mixed case (eg <Code>, and converts some subset of the HTML markups to uppercase (eg <P>). All other text should be written to the output
10. Design of Calculator grammar with variables and real values (using lex and yacc)
11. Simulation of a loader
12. Put the following grammar into the form required by YACC and add error tokens to specify error recovery. Note that the terminals of this grammar are all in bold font. You will need to write a simple lexer as well yacc.

```
program       -> statement_list

statement_list -> statement_list statement
        | statement
        | statement -> ID := expression ;
        | if expression then statement_list fi ;
        | null ;
expression            -> expression + ID
        | ID
```

Computer Graphics

1. Drawing through graphic primitives in graphics.h
2. Bresenhams line drawing algorithm
3. Circle generation algorithm.
4. 2D Transformation, Translation and Rotation, Scaling, Shear and Reflection.
5. 3D Transformation Translation, Rotation, Scaling.

BCSCCS606 – COMPUTER NETWORKS LAB

	L	T	P	CREDIT
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1. Ping a computer using Java API and Detect system information such as retrieval of computer names and their IP Addresses,obtaining Node Address

2. File Transfer-using TCP.

3. File Transfer-using UDP

4. Using networking communication functions – like sending POP-UP messages via NetMessage functions

5. Simulation of HDLC and X.25 protocols

6. Remote procedure call under client server environment(RMI).

7. Information transfer using different routing protocols

8. Program to find shortest path in a network.

9. Simple firewall Implementation

10. Serial Communication between PCs (Character Transfer)- Communication via RS 232/ Modems

11. Case Study on web server

12. Study of Network Performance and Management using an SNMP, FTP, HTTP, SMTP and other protocols.

13. Study of Wireless LAN Architecture and devices

14. Case study on entire SASTRA intranet (infrastructured network)

Note:

1.Eclipse editor is suggested for java programs
2.NS2 simulator for routing algorithms

BCSCTP609 – HR Skill IV

L	T	P	CREDITS
1	0	0	1

WEEK 01   EMPLOYERS' PERSPECTIVE

WEEK 02   BIO DATA / RESUME / CV

WEEK 03   APPLICATION WRITING

WEEK 04   PROFILE PRESENTATION

WEEK 05   APTITUDE TEST VI

WEEK 06   GROUP DISCUSSION PRACTICE

WEEK 07   GROUP DISCUSSION PRACTICE

WEEK 08   INTERVIEW ESSENTIALS

WEEK 09   MOCK INTERVIEW

WEEK 10   TEAM SKILLS IV

WEEK 11   MARKETING SKILLS

WEEK 12   ASSERTIVENESS

WEEK 13   VERBAL ABILITY TEST

WEEK 14   TECHNICAL TEST

WEEK 15   SELF – ACTUALISATION

BCSOCS601 – SYSTEM MODELING & SIMULATION

	L	T	P	CREDITS
	3	1	0	4

Unit – I: Introduction, Examples & Primitives   15

Introduction to simulation – advantages and disadvantages – areas of applications – components of systems – types of models
Simulation examples – simulation of Queuing and inventory – principles – discrete event simulation – continuous system simulation

Unit II: System Dynamics, Probability concepts in simulation, Arrival patterns & Service times and Discrete System Simulation   15

System Dynamics – Exponential growth and DK models – dynamic diagrams
Probability – Discrete, Continuous Probability functions – numerical evaluation of continuous probability – uniformly distributed random numbers
Arrival patterns – Poisson Arrival – Exponential distribution – coefficient of variation – Erlang – Hyper exponential distribution – normal distribution- queuing disciplines – measures of queues
Discrete System Simulation – Discrete events – Delay calls – Counters & Summary statistics – Measuring utilization & Occupency – Recording distributions & Transit times

Unit – III: Analysis of simulation data   15

Analysis of simulation data – Input modeling – Identifying the distribution with data – parameter estimation – Goodness of fit test – selecting input models without data – multivariate & time series – input models
Verification, calibration and validation of models – output modeling – stochastic nature – measures of performance & estimation – output analysis for terminating and steady state simulations

Unit – IV: Comparision & Evaluation of Alternative system designs   15

Comparision of two systems – several system designs – statistical models – meta model – variance reduction techniques – simulation of manufacturing systems

Text Books :

1. Jerry Banks, John S. Carson II, Barry L. Nelson, "Discrete Event System Simulation", 2 Ed, PHI 1998
2. Narasingh Deo, Simulation and its applications, PHI, 2006.
3. Geoffray Gordon, "System Simulation", 2 Ed, PHI 2005

References:
1. Averill M. Law, W. David Kelton, "System Modeling & Analysis", 2 Ed, MGH 1991.

BCSDCS602 – DATA WAREHOUSING AND DATA MINING

	L	T	P	CREDITS
	3	1	0	4

Unit 1: Introduction to Data Warehousing   15

Data Warehouse, Data Marts, Operational Data Stores, Business Intelligence – Data Warehouse Vs Online transaction processing systems – typical DW/BI operations and OLTP operations – base architectures for data warehouse – Specialized databases - Extraction, Transformation, Cleansing and Loading – ETL Tools – OLAP Tools

Unit 2: Dimensional Modeling & ETL   15
Normalization Vs De-Normalization – level of normalization for Data Warehouses, Data Marts – Facts – Measures – additive, non-additive and semi-additive, factless facts – Dimensions – keys, attributes, level, hierarchies – snowflakes, outboards – SCD Type 1, 2, 3 and other variants – aggregates – Metadata – Metadata Management – Source Systems, ETL & BI Metadata

Considerations for extractions – extraction mechanisms – different sources systems – handling ASCII and EBCDIC data – extraction from ERP and CRM – transformation mechanisms – staging area – lookups, key generation – cleansing concepts – Loading concepts – Full Refresh – Incremental Loads - scheduling

Unit 3: Reporting & Business Intelligence   15
Reporting – Standard/Canned Reports – Ad-hoc Reporting – drill up, drill down and drill across – ROLAP, MOLAP and HOLAP – Cubes – building cubes, refreshing cubes - Building of Reports – Prompted Reports – scheduled reports - report caching – distribution mechanisms - dashboards, scorecarding – Case Study: The Retail Data Warehouse

Unit 4: Data Mining   15
Introduction to Data Mining – Mining Methodologies– classification, clustering, prediction, affinity grouping, association rules – Mining Techniques – decision trees, cluster detection and neural networks – Data Mining Life Cycle – Source Data for Mining – Derived variables & Dirty/Missing Data – Case Study: Super Market, Churn Analysis for a telecom company - Tools

Text Books:

1. Data Warehousing in the Real World – Sam Anahory, Pearson Education Asia, 2000
2. Mastering Data Mining: The Art and Science of Customer Relationship Management – Michael J. A. Berry, Gordon S. Linoff

References:

1. The Data Warehouse Toolkit – The complete Guide to Dimensional Modeling, 22nd Edition, Wiley, 2002
2. The Data Warehouse Lifecycle Toolkit – Expert Methods for Designing, Developing & Deploying Data Warehouses – Ralph Kimball, Laura Reeves, Margy Ross and Warren Thornthwaite, 1999.
3. Building the Data Warehouse – W.H. Inmon, 2001.

BCSDCS603 – DIGITAL IMAGE PROCESSING

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3	1	0	4

UNIT I (15)

Digital Image Fundamentals: Digital image – applications of digital image processing – elements of digital image processing systems – vidicon camera – line scan CCD sensor – area sensor – flash A/D converter – display – elements of visual perception – structure of the human eye – luminance – brightness – contrast – mach band effect – image fidelity criteria – colour models – RGB, CMY, HIS mathematical preliminaries of 2D systems – convolution – Fourier transform – Z transform – toeplitz and circulant matrices – orthogonal and unitary matrices.

UNIT II (15)

Image Transform: Properties of unitary transform – 2D DFT- DCT- DST- Discrete wavelet transform – Discrete Hadamard – Walsh – Hotelling transform – SVD transform – Slant, Haar transforms.

UNIT III (15)

Image Enhancement And Restoration: Contrast stretching – intensity level slicing – Histogram equalization – spatial averaging – directional smoothing – Median filtering – non linear filters – maximum, minimum, geometric mean, Harmonic mean contra-harmonic mean, Lp mean filters – edge detection – Roberts, Sobel, Isotropic, Kinsch, Campass gradient, Laplacian operators- Degradation model – unconstrained and constrained restoration – inverse filtering – removal of blur caused by uniform linear motion – Wiener filtering – geometric transformations for image restoration.

UNIT IV (15)

Image Compression: Huffman coding – truncated Huffman coding – B2, binary codes, arithmetic coding – bit plane coding – contrast area coding – Run length encoding – transform coding JPEG and MPEG coding schemes.

Text Book:

1. Gonzalez,R.C and Woods,R.E, Digital image processing Addition – Wesley, 2000

2. Anil.K.Jain Fundamentals of digital image processing, PHI, 1997.

References:

1. Umbaugh,S.E Computer vision and image processing, Prentice Hall International, Inc,1998.
2. William. K. Pratt, Digital image processing. Wiley Interscience, 2000.

BCSDCS604 – ROBOTICS

L   T   P   CREDITS
3   1   0   4

UNIT I   **(15)**
Introduction: Introduction to Robotics - What is a Robot - Components of an Industrial Robot - Classification, Drives and Control, Performance, End effectors and Grippers.

UNIT II   **(15)**
Sensor And Vision System: Sensor and vision system - Transducers and sensors - Tactile - Proximity and Range sensors - Acoustic - Capacitance, Inductance sensors, Robot vision system - Image acquisition, processing and analysis.

UNIT III   **(15)**
Robot Programming and layout: Robot Programming - Methods, lead through, Motion interpolation. Capabilities and limitations of lead through program. Textual robot languages and its types - Artificial intelligence in Robot programming LISP programming. Speech / voice programming. Robot cell design and layout, workcell design and control, Interlocks.

UNIT IV   **(15)**
Safety And Application: Safety- Robot safety, sensor for safety, training and maintenance. Application-Material transfer, machine loading/unloading, processing operations-welding and painting. Assembly and inspection. Introduction to Social Issues and future applications.

Text Book:

1. Mikel P. Groover, Mitchell Weiss, Roger N.Nagel and Nicholas G.Odrey, Industrial Robotics Technology Programming and Applications, Mc Graw Hill International Edition, 1986.

References:

1) Richard D.Klafter,Thomas A.Chmielewski and Michael Negin, Robotic
2) Engineering: An Integrated Approach, Prentice Hall of India, 2002
3) Fu, Gonzalez and Lee: Robotics: Control, Sensing, Vision and Intelligence Mc Graw Hill International edition. 1986
4) John J. Craig, Introduction to Robotics: Mechanics and Control, Addison Wesley Longman Inc., 1999.
5) James L. Fuller, Robotics Introduction, Programming and Projects, Mc Millan Publishing Company, 1991.

BCSDCS605 – MOBILE COMPUTING

L T P   CREDITS
3 1 0   4

UNIT I

(15)

Introduction – Frequencies – signals – antennas – signal propagation – multiplexing modulation – spread spectrum – cellular systems – Medium access control.

UNIT II   (15)

Telecommunication systems-GSM,DECT-Satellite systems-Broadcast systems. Wireless LAN-Infrared vs radio transmission, Infrastructure and ad hoc networks, Blue tooth.

UNIT III   (15)

Mobile Network layer-Mobile IP, DHCP, Ad hoc networks.-Mobile transport layer-Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP.

UNIT IV   (15)

WAP-architecture, wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, wireless application environment, Introduction to WML, Writing a WAP in WML

Text Book:

1. Jochen Sciller, Mobile communications, Addison –Wesley publishers 2001.
2. Ben Forta, Paul Fonte, Ronan Mandel, Dylan Bromby, WAP development with WML and WMLScript, Techmedia 2001.

References:

1. W.C.Y.Lee, Mobile communication Engineering: Theory and Applications, TMH 1998.

BCSDCS606– Resource Management Techniques

L T P   CREDITS
3 1 0   4

Unit-I   15

Linear Programming-Introduction-Mathematical formulation of LPP-Graphical solution-General LPP-Canonical form-Standard form-Simplex method-Charnes Penalty method-Duality-Dual simplex method-Transportation problem-IBFS-NWCR-LCM-VAM-Optimum solution-MODI algorithm-Assignment problem-Hungarian algorithm.

Unit-II   15

Network Analysis-Introduction-Activities-Events-Network-Constraints in Network-Construction of the network-Time calculations in networks-Earliest times-Latest times-Float or slack values –Types of floats-Critical path calculations-Critical path method (CPM)-Project evaluation and Review technique (PERT) – Evaluation of the probability of completing the project within the scheduled time.

Unit-III   15

Inventory Control: Introduction-Definition of costs involved in inventory – Stock-Economic Order Quantity(EOQ) problem-Fundamental problems of EOQ-Problem of EOQ with finite rate of replenishment-Problem of EOQ with shortage and instantaneous production-Problem of EOQ with shortage, instantaneous production and fixed time-Inventory control techniques- uncertain demand –Buffer stock-ROL-Stochastic problem with uniform demand(discrete units)-The problem of purchase-Inventory-Price Breaks

Unit-IV   15

Replacement problems-Introduction-Replacement of items-Deteriorate with time-Replacement of items whose maintenance costs increase with time and the value of money remains the same during the period-Replacement of items whose maintenance costs increases with time and the value of money also changes with time-Replacement of items that fail completely-Individual replacement policy-Problems and solutions.

Text Book

1) 'Operations Research' by Kanti swarup, P.K.Gupta and Man Mohan, Sultan Chand & Sons Publishers

References

1) 'Operations Research' by Hira and Gupta , S.Chand Publications, New Delhi, 1999
2) ' Operations Research' by H.A.Taha ,7th Edition, Prentice Hall 2002