CompilerDesign

Course code	PCC-CSE-302-G				
Category	Professional Core Course				
Course title	Compiler Design				
Scheme and Credits	L	T	P	Credits	Semester 6th
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note:For setting up the question paper, Question No. 1 will be set up from all the four sections which will becompulsory and of short answer type. Two questions will be set from each of the four sections. The studentshavetoattemptfirstcommonquestion,whichhavetoattempt5questionsoutof9questions.

Course Objectives :

- To understand and list the different stages in the process of compilation.
- Identify different methods of lexical analysis.
- Design top-down and bottom-up parsers.
- Identify synthesized and inherited attributes.
- Develop syntax directed translation schemes.

UNIT-I

IntroductionToCompilers: Compilersandtranslators,needoftranslators,structureofcompiler:itsdifferentphases,Compiler constructiontools.

Lexical Analysis: Role of lexical analyzer, design of lexical analyzer, regular expressions ,Specificationandrecognitionoftokens,input buffering,Alanguagespecifyinglexicalanalyzer.Finiteautomata,conversionfromregularexpressiontofiniteautomata,andviceversa,minimizingnumberofstatesof DFA,Implementationoflexical analyzer.

UNIT-II

SyntaxAnalysis: Roleofparsers,contextfreegrammars,definitionofparsing.

Parsing Technique: Shift- reduce parsing, operator precedence parsing, top down parsing, predictive parsing.

UNIT-III

LRparsers,SLR,LALRandCanonicalLRparser, Syntax Directed Translations: Syntax directed definition, construction of syntax trees, syntax directed translation scheme, implementation of syntax directed translation, three address code, quadruples and triples.

UNIT-IV

SymbolTable&ErrorDetectionandRecovery: Symboltables,itscontentsanddatastructurefors ymboltables;trees,arrays,linkedlists,hashtables.Errors,lexicalphaseerror,syntacticphaseerror,se manticerror.

CodeOptimization&CodeGeneration: Codegeneration,formsofobjectscode,machinedepende ntcode,optimization, registerallocationfortemporaryanduserdefinedvariables.

Suggested Text Books:

1. Compilers Principle, Techniques & Tools - Alfread V. AHO, Ravi Sethi& J.D. Ullman; 1998 Addison Wesley.

Suggested Reference Books:

1. Theory and practice of compiler writing, Tremblay & Sorenson, 1985, Mc. Graw Hill.
2. System software by Dhamdere, 1986, MGH.
3. Principles of compiler Design, Narosa Publication
4. Elements compiler Design, Dr. M. Joseph, University Science Press

Course Outcomes:

1. To develop the lexical analyser for a given grammar specification.
2. For a given parser specification design top-down and bottom-up parsers.
3. To Develop syntax directed translation schemes.

Theory of Deep Learning

Course code	PCC-ADS-302G				
Category	Professional Core Course				
Course title	Theory of Deep Learning				
Scheme and Credits	L	T	P	Credits	Semester 6th
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Outcomes:

1. Recognize the characteristics of deep learning models that are useful to solve real-world problems.
2. Understand different methodologies to create application using deep nets.
3. Identify and apply appropriate deep learning algorithms for analyzing the data for variety of problems.
4. Implement different deep learning algorithms
5. Design the test procedures to assess the efficacy of the developed model.
6. Combine several models in to gain better result

UNIT-I

Introduction to theoretical aspects in Deep Learining (DL), Ingredients of DL, Expressivity theorems in DL, Data classes and curse of dimentionality, DL through lens of Matrix Factorization (MF), Review of MF techniques, Supervised and Unsupervised learning via MF

UNIT-II

Deep MF and approximation guarentees, Geometric perspective of expressivity, Input domain partitions and random paths,DL through lense of Random Matrix Theory (RTM) , Evolution for signal variances and covariances in infinite depth DNN , Random DNN - Input/output Jacobian, DNN gaussian vs orthogonal initialization

UNIT-III

DL through lense of Information Theory, Mutalinfomation estimation in DNN, Optimization algorithms

UNIT-IV

Advanced optimizers and second-order algorithms, Loss landscape of DNNs, Saliency map Visualization, Spectral Visualization: Generalization error in DNNs

Suggested Readings:

1. Deep Learning by Ian Goodfellow, YoshuaBengio, Aaron Courville

Data Science Essentials

Course code	PCC-ADS-304G				
Category	Professional Core Course				
Course title	Data Science Essentials				
Scheme and Credits	L	T	P	Credits	Semester 6th
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Outcomes:

1. Students will be able to perform exploratory analysis of multivariate data and scientific data Visualization.
2. Student will be able to conduct statistical hypothesis testing
3. Student will be able to use regression techniques for predictive data analytics and time series modeling.
4. Students will build capability of real life problem solving and dealing with large data.

UNIT-I

Random variable, distribution, Maximum Likelihood Estimation usingmaxLik, basic multivariate stats - matrix summarisation, Simpson's paradox, variance- covariance, correlation, canonical correlation; Data preprocessing, exploratory data analysis and high quality visualisation. Advanced scientific plots - stacked histograms for multivariate data, bi-variate scatter plots, parallel coordinate plot, table plot, mosaic plot etc**.**

UNIT-II

Goodness of fit - likelihood ratio test, Lagrange multiplier test, Q-Q plot, performing varity of hypothesis testings. Dimension reduction using PCA, SVD, tSNE. Generalised linear models (GLM) with various link functions (eg logit). Specific focus on gamma regression

UNIT-III

Time series modeling using autoregressive errors (AR), moving average (MA), ARIMA - stationary and non-stationary time series data, mean stationarity, trend stationarity, statistical test for stationarity. Survival Analysis using survfit - Kaplan Meier survival density

estimation, Cox proportional hazards model, Gaussian mixture model and Naive Bayes, assessment of model performance

UNIT-IV

Bootstrapping and Monte Carlo methods, randomisation test. Introduction to handling large data - locality sensitive hashing, sizing sketches, corset, Applications - gene expression, EHR data, demand forecasting, price optimisation in retal, probability of default in banking

Reference Books

[1] Han, Jiawei, Jian Pei, and MichelineKamber. Data mining: concepts and techniques. Elsevier, 2011.
[2] Tan, Pang-Ning. Introduction to data mining. Pearson Education India, 2007.b
[3] Friedman, Jerome, Trevor Hastie, and Robert Tibshirani. The elements of statistical learning. Vol. 1. No. 10. New York, NY, USA:: Springer series in statistics, 2001
[4] Shalev-Shwartz, Shai, and Shai Ben-David. Understanding machine learning: From theory to algorithms. Cambridge university press, 2014.
[5] R for Data Science, by Garrett Grolemund and Hadley Wickham (2016)
[6] Exploratory Data Analysis with R, by Roger D. Peng (2016)
[7] An Introduction to Statistical Learning with Application in R, First Edition, by Gareth James et al. (2013)
[8] Introduction to linear algebra, by Gilbert Strang

Network Security

Course code	PCC-ADS-306G				
Category	Professional Core Course				
Course title	Network Security				
Scheme and Credits	L	T	P	Credits	Semester 6th
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consistof total 8 parts (short-answer type questions) covering the entire syllabus and will carry 20marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV.Examiner will set two questions from each Unit of the syllabus and each question will carry20 marks. Student will be required to attempt FIVE questions in all. Question Number 1 willbe compulsory. In addition to compulsory question, student will have to attempt four morequestions selecting one quest ion from each Unit.

Course Outcomes:

1. Develop Concept of Security needed in Communication of data through computers and networks along with Various Possible Attacks
2. Understand Various Encryption mechanisms for secure transmission of data and management of key required for required for encryption
3. Understand authentication requirements and study various authentication mechanisms
4. Understand network security concepts and study different Web security mechanisms.

UNIT-I

Introduction: Need for Security, Security Attacks , Services and Mechanisms, Network Security, Model

Unit II

Ciphers: Symmetric Ciphers, Substitution &Transposition Techniques , Block Cipher, DES, Triple DES, Stream Ciphers, RC4

Unit III

Public Key Cryptography: Need and Principles of Public Key Cryptosystems, RSA Algorithm, Key Distribution and Management, Diffie-Hellman Key Exchange, Digital Signatures

Unit IV

Authentication: Authentication Requirements, Message Authentication Codes, Hashes, MD5 & SHA, User Authentication: Password, Certificate based & Biometric Authentication, Kerberos

Network Security: Firewalls, IP Security, VPN, Intrusion Detection, Web Security, SSL,TLS

Suggested readings:

1. “Cryptography & Network Security”, PHI William Stalling
2. “Cryptography & Network Security”, Mc Graw Hill AtulKahate
3. “Cryptography & Network Security”, PHI Forouzan
4. "Modern Cryptography, Theory & Practice", Pearson Education. Wenbo Mao
5. "An Introduction to Mathematical Cryptography", Springer. Hoffstein, Pipher, Silvermman.
6. "The Design of Rijndael", Springer. J. Daemen, V. Rijmen.
7. "Algorithmic Cryptanalysis", CRC Press. A. Joux
8. "Number Theory", Tata Mc Graw Hill. S. G. Telang
9. "Protocols for Authentication and Key Establishment", Springer. C. Boyd, A. Mathuria.
10. "Computer Security", Pearson Education. Matt Bishop
11. “Understanding Cryptography”, Springer-Verlag Berlin Heidelberg ChristofPaar, Jan Pelzl

Distributed System

Course code	PCC-ADS-308G				
Category	Professional Core Course				
Course title	Distributed System				
Scheme and Credits	L	T	P	Credits	Semester 6th
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consistof total 8 parts (short-answer type questions) covering the entire syllabus and will carry 20marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV.Examiner will set two questions from each Unit of the syllabus and each question will carry20 marks. Student will be required to attempt FIVE questions in all. Question Number 1 willbe compulsory. In addition to compulsory question, student will have to attempt four morequestions selecting one quest ion from each Unit.

Course Outcomes:

1. To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.
2. To know about Shared Memory Techniques.
3. Have Sufficient knowledge about file access.
4. Have knowledge of Synchronization and Deadlock.

UNIT-I

Introduction : Introduction to Distributed System, Goals of Distributed system, Hardware and Software concepts , Design issues. Communication in distributed system: Layered protocols, ATM networks, Client – Server model, Remote Procedure Calls and Group Communication. Middleware and Distributed Operating Systems.

UNIT-II

Synchronization in Distributed System: Clock synchronization, Mutual Exclusion, Election algorithm, the Bully algorithm, a Ring algorithm, Atomic Transactions, Deadlock in Distributed Systems, Distributed Deadlock Prevention, Distributed Deadlock Detection .

UNIT-III

Processes and Processors in distributed systems: Threads, System models, Processors Allocation, Scheduling in Distributed System, Real Time Distributed Systems.

Distributed file systems: Distributed file system Design, Distributed file system Implementation, Trends in Distributed file systems.

UNIT-IV

Distributed Shared Memory: What is shared memory, Consistency models, Page based distributed shared memory, shared variables distributed shared memory.

Case study MACH: Introduction to MACH, process management in MACH, communication in MACH, UNIX emulation in MACH.

Text Book:

1 Distributed Operating System – Andrew S. Tanenbaum, PHI.
2 Operating System Concepts ,P.S.Gill, Firewall Media

Mobile Application Development

Course code	PCC-CSD-310-G				
Category	Professional Core Course				
Course title	Mobile Application Development				
Scheme and Credits	L	T	P	Credits	Semester 6th
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each.

Course Outcomes:

1. Explain the principles and theories of mobile computing technologies.
2. Describe infrastructures and technologies of mobile computing technologies.
3. List applications in different domains that mobile computing offers to the public, employees, and businesses.
4. Describe the possible future of mobile computing technologies and applications.
5. Effectively communicate course work through written and oral presentations

UNIT I

Introduction: Mobile operating system, Operating system structure, Constraints and Restrictions, Hardware configuration with mobile operating system, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features

UNIT II

Introduction to Mobile development IDE's, Introduction to Worklight basics, Optimization, pages and fragments , Writing a basic program- in Worklight Studio, Client technologies, Client side debugging, Creating adapters, Invoking adapters from Worklight Client application, Common Controls, Using Java in adapters, Programming exercise with Skins, Understanding Apache Cordova.

UNIT III

Understanding Apple iOS development, Android development, Shell Development, Creating Java ME application, Exploring the Worklight Server, Working with UI frameworks, Authentication, Push notification, SMS Notifications, Globalization.

UNIT IV

Android: Introduction to Android, Architecture, memory management, communication protocols, application development methods, deployment. iOS: Introduction to iOS, Architecture, memory management, communication protocols, application development methods, deployment

Suggested text books:

1. Anubhav Pradhan, Anil V Deshpande, " Mobile Apps Development" Edition:
2. Jeff McWherter, Scott Gowell "Professional Mobile Application Development", John Wiley & Sons, 2012.
3. Barry Burd, "Android Application Development All in one for Dummies", Edition: I 4. Teach Yourself Android Application Development In 24 Hours, Edition: I, Publication: SAMS

Suggested reference books:

1. Neal Goldstein, Tony Bove, "iPhone Application Development All-In-One For Dummies", John Wiley & Sons
2. Henry Lee, Eugene Chuvyrov, "Beginning Windows Phone App Development", Apress, 2012.
3. JochenSchiller,"Mobile Communications", Addison-Wesley, 2nd edition, 2004.
4. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.