# B. TECH INFORMATION TECHNOLOGY DEGREE PROGRAMME

**SCHEDULING OF COURSES**

**&**

**CURRICULUM AND DETAILED SYLLABI**

**FOR**

# FIFTH SEMESTER

**FOR THE STUDENTS ADMITTED IN THE**

**ACADEMIC YEAR 2022-23 ONWARDS**


## THIAGARAJAR COLLEGE OF ENGINEERING

(A Government Aided Autonomous Institution affiliated to Anna University)

**MADURAI – 625 015, TAMILNADU**

Phone: 0452 – 2482240, 41

Fax: 0452 2483427

Web: www.tce.edu



Passed in Board of Studies Meeting on 27.4.2023 Approved in 65th Academic Council meeting on 27.05.2023

## CREDIT DISTRIBUTION FOR STUDENTS ADMITTED IN THE YEAR 2022 ONWARDS

| S.No | Category | Credits |
|---|---|---|
| A | Foundation Courses (FC) | 54-62 |
| | Humanities and Social Sciences including Management Courses (HSMC) | 9-11 |
| | Basic Science Courses (BSC) | 24- 27 |
| | Engineering Science Courses (ESC) | 21 -27 |
| B | Professional Core Courses (PCC) | 55 |
| C | Professional Elective Courses (PEC) | 24 - 39 |
| | Programme Specific Elective (PSE) | 15 - 24 |
| | Programme Elective for Expanded Scope (PEES) | 9-15 |
| D | Open Elective Courses (OEC) | 6-12 |
| | Interdisciplinary Elective (IE) | 3-6 |
| | Basic Science Elective (BSE) | 3-6 |
| E | Project work | 12 |
| F | Internship and Mandatory Audit Courses as per Regulatory authorities | Non-Credit (Not included for CGPA) |
| | Minimum Credits to be earned for the award of the Degree | 160 (from A to E) and the successful completion of Mandatory Courses |

**THIAGARAJAR COLLEGE OF ENGINEERING: MADURAI – 625 015**
**B.E. / B.Tech. Degree Programmes**

**COURSES OF STUDY**
(For the candidates admitted from 2022-23 onwards)

**FIFTH SEMESTER**

| Course Code | Name of the Course | Category | No. of Hours / Week | | | credits |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| **THEORY** | | | | | | |
| 22IT510 | Information security | PCC | 3 | - | - | 3 |
| 22IT520 | Machine Learning | PCC | 3 | - | - | 3 |
| 22IT530 | Cloud Computing | PCC | 3 | - | - | 3 |
| 22ITPX0 | Programme Elective | PEC | 3 | - | - | 3 |
| 22XXBX0 | Interdisciplinary Elective | IE | 3 | - | - | 3 |
| **THEORY CUM PRACTICAL** | | | | | | |
| 22IT550 | Web Technologies | PCC | 1 | - | 4 | 3 |
| **PRACTICAL** | | | | | | |
| 22IT570 | Information security Lab | PCC | - | - | 2 | 1 |
| 22IT580 | Cloud Computing Lab | PCC | - | - | 2 | 1 |
| **PROJECT** | | | | | | |
| 22IT590 | Project I | PW | - | - | 6 | 3 |
| **Total** | | | **16** | **-** | **14** | **23** |

BS : Basic Science
HSS : Humanities and Social Science
ESC : Engineering Science

L : Lecture
T : Tutorial
P : Practical

**Note**:
1 Hour Lecture is equivalent to 1 credit
1 Hour Tutorial is equivalent to 1 credit
2 Hours Practical is equivalent to 1 credit

**THIAGARAJAR COLLEGE OF ENGINEERING: MADURAI – 625 015**
**B.E. / B.Tech. Degree Programme**

**SCHEME OF EXAMINATIONS**
(For the candidates admitted from 2022-23 onwards)

**FIFTH SEMESTER**

| S.No. | Course Code | Name of the Course | Duration of Terminal Exam. in Hrs. | Marks | | | Minimum Marks for Pass | |
|---|---|---|---|---|---|---|---|---|
| | | | | Continuous Assessment * | Terminal Exam ** | Max. Marks | Terminal Exam | Total |
| **THEORY** | | | | | | | | |
| 1 | 22IT510 | Information security | 3 | 40 | 60 | 100 | 27 | 50 |
| 2 | 22IT520 | Machine Learning | 3 | 40 | 60 | 100 | 27 | 50 |
| 3 | 22IT530 | Cloud Computing | 3 | 40 | 60 | 100 | 27 | 50 |
| 4 | 22ITPX0 | Programme Elective | 3 | 40 | 60 | 100 | 27 | 50 |
| 5 | 22XXBX0 | Interdisciplinary Elective | 3 | 40 | 60 | 100 | 27 | 50 |
| **THEORY CUM PRACTICAL** | | | | | | | | |
| 6 | 22IT550 | Web Technologies | 3 | 50 | 50 | 100 | 22.5 | 50 |
| **PRACTICAL** | | | | | | | | |
| 6 | 22IT570 | Information security Lab | 3 | 60 | 40 | 100 | 18 | 50 |
| 7 | 22IT580 | Cloud Computing Lab | 3 | 60 | 40 | 100 | 18 | 50 |
| **PROJECT** | | | | | | | | |
| 9 | 22IT590 | Project I | 3 | 40 | 60 | 100 | 27 | 50 |

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

**22IT510 INFORMATION SECURITY**

| Category | L | T | P | Credit |
|---|---|---|---|---|
| PCC | 3 | 0 | 0 | 3 |

## Preamble

This course on Information Security focuses on the models, tools, and techniques for enforcement of security with emphasis on the use of cryptography. Upon completion of the course, the learners will be able to develop basic understanding of security, cryptography, system attacks and defences against them.

## Prerequisite

Nil

## Course Outcomes

On the successful completion of the course, students will be able to

| COs | Course Outcomes | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Perform Encryption/ Decryption of text using symmetric and asymmetric crypto algorithms to provide confidentiality. | TPS3 | 80 | 65 |
| CO2 | Compute hash and digital signature for the given message to provide integrity and non-repudiation service. | TPS3 | 80 | 65 |
| CO3 | Examine the strength of any cryptographic algorithm by cryptanalysis. | TPS3 | 70 | 60 |
| CO4 | Explain different types of authentication and key agreement protocols. | TPS2 | 90 | 75 |
| CO5 | Use security protocols such as SSL, IP Sec etc., at different layers of TCP/IP stack to develop security solutions | TPS3 | 80 | 65 |
| CO6 | Identify security attacks and vulnerabilities in any information system and provide preventive measures and solutions in adherence with security standards | TPS4 | 70 | 60 |

## Mapping with Programme Outcomes and Programme Specific Outcomes

| COs | PO1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | L | | L | | | | | | | | M | | |
| CO2 | S | M | L | | L | | | | | | | | M | | |
| CO3 | S | S | M | L | L | | | | | | | | S | | |
| CO4 | M | L | | | | | | | | | | | M | | |
| CO5 | S | M | L | | | | | | | | | | M | | |
| CO6 | S | S | M | L | M | | | S | M | M | | S | S | M | M |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | CAT1 | | | | Assignment 1 | | | | CAT2 | | | | Assignment 2 | | | | Terminal | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100 | | | | 100 | | | | 100 | | | | 100 | | | | 100 | | | |
| **TPS Scale** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** |
| CO1 | 8 | 8 | 34 | | | | 50 | | | | | | | | | | | 10 | 30 | |
| CO2 | | | 16 | | | | 25 | | | | | | | | | | | 5 | 10 | |
| CO3 | 9 | 9 | | 16 | | | | 25 | | | | 18 | | | | | | | | 10 |
| CO4 | | | | | | | | | 16 | | | | | | | | | 10 | | |
| CO5 | | | | | | | | | 16 | 16 | 16 | | | | 50 | | | 5 | 10 | |
| CO6 | | | | | | | | | | | | 18 | | | | 50 | | | | 10 |

***** Terminal examination should cover all Course Outcomes in the appropriate TPS Scale level.

## Syllabus

**Basics of Information Security** – Perspectives and Impact, Threats and vulnerabilities, Attacks, Security Services -CIA Triad and Security Models, Internet Law and Cyber Crimes, Security Standards

**Cryptography** - Mathematics for Cryptography – Number Theory - Modulo Arithmetic - Euclidean and extended Euclidean Theorem - Chinese Remainder Theorem - Euler and Fermat theorem, Galois Fields, Primality Testing Methods

Symmetric Key Cryptosystems –Hill Cipher, Advanced Encryption Standard, Public Key Cryptography - RSA , Elliptic Curve Cryptosystems , Integrity – Message Authentication Code and Hash , Application of Hash in Blockchain Technologies, Digital Signatures.

**Authentication and Key Exchange** – One way Authentication- Mutual Authentication- Dictionary Attacks- Kerberos- Biometrics- Multifactor Authentication. Key management – Digital certificates- Public Key Infrastructure.

**Security Protocols** Security at Application Layer – PGP, Electronic Payments – SET Security at Transport Layer –SSL and TLS, Security at Network layer –IP Sec

**Network Defense Tools** - Firewalls, Intrusion Prevention and Detection Systems.

**Secure Software Development** -Software Vulnerabilities – OWASP Web Application Security Concerns -Phishing, Buffer Overflows, Format String Attacks, Cross Site Scripting, SQL injection, DoS, DDoS, Session Hijacking and Pharming Attacks.

**Non cryptographic Protocol Vulnerabilities** –Viruses, Worms and Malwares -Case Studies

## Text Book

1. Behrouz. A. Foruzan and Debdeep Mukhopadhyay, “Cryptography and Network Security”, Tata McGraw Hill , Third Edition, 2016.

## Reference Books & web resources

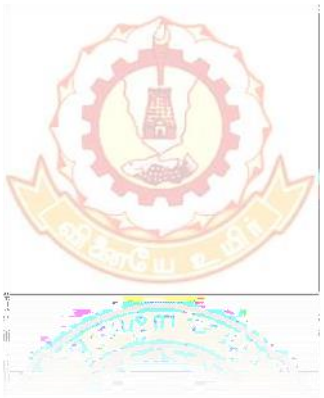
1. William Stallings, “Cryptography and Network Security: Principles and Practice”, Prentice Hall,Seventh Edition, 2017.
2. Bernard L Menezes, and Ravinder Kumar “Cryptography, Network Security and Cyber Laws”, Cengage Learning India Pvt Limited, 2018.
3. Charlie Kaufman and Radia Perlman, Mike Speciner, “Network Security, Private Communication in Public World”, Prentice Hall India, Second Edition, 2002.
4. William Stallings, "Network Security Essentials: Applications and Standards", Prentice Hall, Sixth Edition, 2016.
5. Man Young Rhee, "Internet Security Cryptographic Principles, Algorithms and Protocols", Wiley, First Edition, 2003.
6. Douglas R. Stinson, “Cryptography Theory and Practice”, Third Edition, Chapman & Hall/CRC, 2006.
7. https://onlinecourses.nptel.ac.in/noc22_cs90/preview

## Course Contents and Lecture Schedule

| Module No. | Topic | No. of Periods |
|---|---|---|
| **1** | **Basics of Information Security** | |
| 1.1 | Perspectives and Impact, Threats and vulnerabilities, Attacks, Security Services -CIA Triad and Security Models, Internet Law and Cyber Crimes, Security Standards | 2 |
| **2** | **Cryptography** | |
| 2.1<br>2.2<br>2.3 | **Mathematics for Cryptography – Number Theory**<br>Modulo Arithmetic<br>Euclidean and extended Euclidean Theorem, Chinese Remainder Theorem | 2 |
| 2.4 | Galois Fields | 2 |
| 2.5<br>2.6 | Euler and Fermat theorem<br>Primality Testing Methods | 1 |
| 2.7 | **Symmetric Key Cryptosystems** –Hill Cipher | 2 |
| 2.8 | Advanced Encryption Standard | 3 |
| 2.9 | **Public Key Cryptography** - RSA | 2 |
| 2.10 | Elliptic Curve Cryptosystems | 2 |
| 2.11 | Integrity – Message Authentication Code and Hash | 2 |
| 2.12 | Application of Hash in Blockchain Technologies, | 1 |
| 2.13 | Digital Signatures | 1 |
| **3** | **Authentication and Key Exchange** | |
| 3.1<br>3.2<br>3.3 | One way Authentication<br>Mutual Authentication<br>Passwords and Dictionary Attacks | 1 |
| 3.4 | Biometrics- Multifactor Authentication | 1 |
| 3.5<br>3.6 | **Key management**<br>Digital certificates<br>Public Key Infrastructure | 2 |
| **4** | **Security Protocols** | |
| 4.1 | Security at Application Layer – PGP, Electronic Payments- SET | 2 |
| 4.2 | Security at Transport Layer –SSL and TLS, | 1 |
| 4.3 | SET Security at Network layer –IP Sec | 1 |
| **5** | **Network Defense Tools** | |
| 5.1 | Firewalls | 1 |
| 5.2 | Intrusion Prevention and Detection Systems | 1 |
| 6 | **Secure Software Development**<br>OWASP Web Application Security Concerns | |
| 6.1<br>6.2<br>6.3 | Phishing<br>Buffer Overflows<br>Format String Attacks | 1 |
| 6.4 | Cross Site Scripting | 1 |
| 6.5<br>6.6 | SQL injection,<br>DoS and DDoS | 1 |
| 6.7<br>6.8 | Session Hijacking<br>Pharming Attacks | 1 |
| **7** | **Non cryptographic Protocol Vulnerabilities** | |
| 7.1<br>7.2<br>7.3 | Viruses<br>Worms<br>Malwares<br>Case Studies | 2 |
| | Total | 36 |

**Course Designer(s):**

1. Jeyamala.C, Associate Professor, jeyamala@tce.edu, Information Technology
2. Parkavi.R, Assistant Professor, rpit@tce.edu, Information Technology



**22IT520** **MACHINE LEARNING**

| Category | L | T | P | Credit |
|---|---|---|---|---|
| PCC | 3 | 0 | 0 | 3 |

## Preamble

The course on machine learning provides an emphasis on data dimensionality reduction techniques, supervised, unsupervised and reinforcement learning models. It also facilitates the student by interpreting the real world problems by examining with appropriate machine learning tools.

## Prerequisite

Nil

## Course Outcomes

On the successful completion of the course, students will be able to

| CO | Course Outcomes | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Describe theory underlying machine learning concepts and techniques. | TPS2 | 70 | 70 |
| CO2 | Apply suitable dimensionality reduction techniques to select the features from the given dataset. | TPS3 | 70 | 65 |
| CO3 | Construct algorithms to learn linear and non-linear classification and Regression models. | TPS3 | 70 | 65 |
| CO4 | Implement data clustering algorithms such as Hierarchical Clustering, Gaussian Mixture Models, Expected Maximization and Hidden Markov Model to cluster the given dataset and hence identity the outliers. | TPS3 | 70 | 65 |
| CO5 | Apply reinforcement learning techniques for real life problems especially medical data set. | TPS3 | 70 | 65 |
| CO6 | Analyze the performance of various classifiers, regression models, clustering and reinforcement algorithms in terms of time and space complexity. | TPS4 | 70 | 60 |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | M | L | | | | | | | | | | | L | | |
| CO2 | S | M | L | | M | | | | | | | M | M | L | L |
| CO3 | S | M | L | | M | | | | | | | M | M | L | L |
| CO4 | S | M | L | | M | | | | | | | M | M | L | L |
| CO5 | S | M | L | | M | | | | | | | M | M | L | L |
| CO6 | S | S | M | L | S | M | | M | M | M | | S | S | S | M |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | Assessment 1 (Theory) | | | | | | | | Assessment 2 (Theory) | | | | | | | | Terminal (Theory) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CAT 1 | | | | Assignment 1 | | | | CAT 2 | | | | Assignment 2 | | | | | | | | | |
| TPS Scale | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 6 |
| CO1 | 2 | 20 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 10 | - | - | - | - |
| CO2 | 6 | 10 | 30 | - | - | - | 50 | - | - | - | - | - | - | - | - | - | 2 | 10 | 15 | - | - | - |
| CO3 | 2 | - | 30 | - | - | - | 50 | - | - | - | - | - | - | - | - | - | 2 | - | 15 | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | 4 | 10 | 30 | - | - | - | 30 | - | 2 | - | 15 | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | 4 | 10 | 30 | - | - | - | 30 | - | 2 | - | 15 | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | 2 | - | 10 | - | - | - | - | 40 | - | - | 10 | - | - | - |

*****Terminal examination should cover all Course Outcomes in the appropriate TPS Scale level.

## Syllabus

**Machine Learning**:

Introduction Basic Concepts - Probability, Linear Algebra, Convex Optimization Introduction to Machine Learning -Components of learning – Inductive Learning Hypotheses-Learning models – geometric models, probabilistic models, logic models,Statistical Decision Theory, Bayesian Learning (ML, MAP, Bayes estimates, Conjugate priors)**.**

**Dimensionality Reduction:**

Feature selection ,Regression – Types - Linear Regression -Polynomial Regression - Ridge and LASSO (Least Absolute Shrinkage and Selection Operator) Regression - Error Rate Estimation, Principal Component Analysis (PCA)-Linear Discriminant Analysis (LDA)-Independent Component Analysis (ICA) -Partial Least Squares (PLS).

**Supervised Learning** :

Decision Trees, Bayesian Learning- Bayes Optimal Classifier, Naive Bayes,Nearest Neighbour Models - Belief Network – SVM,Neural Networks - Basics, Early Models, Perceptron Learning, Backpropagation.

**Evaluation measures**:

Hypothesis testing, Ensemble Methods, Bagging Adaboost Gradient Boosting, Diagnosis and Regularization of Bias Vs Variance - Learning Curve.

**Unsupervised Learning:**

Clustering algorithms (K-means, hierarchical, spectral),Divisive and Agglomerative – Gaussian Mixture Models – Expectation Maximization ( EM) algorithm – Hidden Markov Model (HMM),Anomaly Detection – Outlier Types, Techniques of Anomaly Detection.

**Reinforcement Learning:**

RL Model, Types of RL, Optional videos (RL framework, TD learning, Solution Methods, Applications)**,**Q Learning – SARSA (State-Action-Reward-State-Action) Algorithms- Case study, Machine Learning Framework and Libraries-Matplotlib-NLTK–Pandas– Scikit learn

## Text Book

1. Tom M Mitchell, “Machine Learning”, McGraw-Hill, Indian Edition, 2017

## Reference Books& web resources


1. Manaranjan Pradhan, U Dinesh Kumar, “Machine Learning using Python”, Wiley, First Edition, 2019..
2. Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, “Learning from Data”, AML Book Publishers, First Edition, 2012.
3. P. Flach, “Machine Learning: The art and science of algorithms that make sense of data”, Cambridge University Press, First Edition, 2012.
4. K. P. Murphy, “Machine Learning: A probabilistic perspective”, MIT Press, First Edition, 2012
5. M. Mohri, A. Rostamizadeh, and A. Talwalkar, “Foundations of Machine Learning”, MIT Press, First Edition, 2012.

6. C. M. Bishop, “Pattern Recognition and Machine Learning”, Springer, First Edition, 2007.
7. https://nptel.ac.in/courses/106105152/ - Introduction to Machine Learning by Prof.Sudeshna Sarkar, IIT Kharagpur
8. https://www.coursera.org/learn/machine-learning - Machine Learning by Prof. Andrew Ng, Standford University

**Course Contents and Lecture Schedule**

| Module No. | Topic | No. of Periods |
|---|---|---|
| **1** | **Machine Learning** | |
| 1.1 | Introduction Basic Concepts - Probability | 1 |
| 1.2 | Linear Algebra | |
| 1.3 | Convex Optimization | |
| 1.4 | Introduction to Machine Learning– Components of learning | 1 |
| 1.5 | Inductive Learning Hypotheses | |
| 1.6 | Learning models – geometric models probabilistic models, logic models | 1 |
| 1.7 | Statistical Decision Theory | 1 |
| 1.8 | Bayesian Learning (ML, MAP, Bayes estimates, Conjugate priors) | 2 |
| **2** | **Dimensionality Reduction** | |
| 2.1 | Feature selection | 1 |
| 2.2 | Regression- Types-Linear Regression-Polynomial Regression | 1 |
| 2.3 | Ridge and LASSO (Least Absolute Shrinkage and Selection Operator) Regression - Error Rate Estimation | 1 |
| 2.4 | Principal Component Analysis (PCA) | 1 |
| 2.5 | Linear Discriminant Analysis (LDA) | 1 |
| 2.6 | Independent Component Analysis (ICA) | 1 |
| 2.7 | Partial Least Squares (PLS) | 1 |
| **3** | **Supervised Learning** | |
| 3.1 | Decision Trees | 1 |
| 3.2 | Bayesian Learning | 1 |
| 3.3 | Bayes Optimal Classifier | |
| 3.4 | Naive Bayes,Nearest Neighbour Models | 1 |
| 3.5 | Belief Network | 1 |
| 3.6 | SVM | 1 |

| Module No. | Topic | No. of Periods |
|---|---|---|
| 3.7 | Neural Networks - Basics, Early Models | 1 |
| 3.8 | Perceptron Learning | 1 |
| 3.9 | Backpropagation | 1 |
| **4** | **Evaluation measures** | |
| 4.1 | Hypothesis testing | 1 |
| 4.2 | Ensemble Methods | 1 |
| 4.3 | Bagging Adaboost Gradient Boosting | 1 |
| 4.4 | Diagnosis and Regularization of Bias Vs Variance | 1 |
| 4.5 | Learning Curve | |
| **5** | **Unsupervised Learning** | |
| 5.1 | Clustering algorithms (K-means, hierarchical, spectral),Divisive and Agglomerative | 1 |
| 5.2 | Gaussian Mixture Models | 1 |
| 5.3 | Expectation Maximization ( EM) algorithm | 1 |
| 5.4 | Hidden Markov Model (HMM) | 1 |
| 5.5 | Anomaly Detection– Outlier Types | 1 |
| 5.6 | Techniques of Anomaly Detection | |
| **6** | **Reinforcement Learning** | |
| 6.1 | RL Model | 1 |
| 6.2 | Types of RL | |
| 6.3 | Optional videos (RL framework, TD learning, Solution Methods, Applications) | 1 |
| 6.4 | Q Learning | 1 |
| 6.5 | SARSA(State-Action-Reward-State-Action) Algorithms-Case study | 1 |
| 6.6 | Machine Learning Framework and Libraries- Matplotlib- NLTK – Pandas – Scikit-learn | 2 |
| | Total | 36 |

**Course Designer(s):**

1. Dr.C.Deisy, Professor, IT cdcse@tce.edu
2. Ms.P.VijayaPraba, Assistant Professor, IT pvpit@tce.edu

**22IT530 CLOUD COMPUTING**

| Category | L | T | P | Credit |
|---|---|---|---|---|
| PCC | 3 | 0 | 0 | 3 |

## Preamble

The objective of the course is to provide fundamental knowledge in distributed and service computing that extends the comprehensive view of cloud computing architecture, service models, deployment methods, resource scheduling, migration methodologies and cloud programming framework to meet the on-demand service.

## Prerequisite

- **Nil**

## Course Outcomes

On the successful completion of the course, students will be able to

| CO | Course Outcomes | TPS Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Explain the key technologies, strengths, limitations, and applications of cloud computing. | TPS2 | 70 | 75 |
| CO2 | Apply the suitable virtualization concept for the given scenario. | TPS3 | 70 | 65 |
| CO3 | Categorize the cloud service types, architecture, contract negotiations needed for cloud service delivery and cloud software development. | TPS3 | 70 | 60 |
| CO4 | Identify the necessity, appropriate cloud architecture/model for deploying an application in a cloud environment based on the given requirements. | TPS3 | 70 | 65 |
| CO5 | Adapt the Resource Scheduling and Migration Methodologies based on VM Allocation. | TPS3 | 70 | 65 |
| CO6 | Examine the emerging technologies to incorporate in cloud computing platforms with appropriate programming models. | TPS4 | 70 | 75 |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | **M** | **L** | | | | | | | | | | **L** | **L** | | |
| CO2 | **S** | **M** | **L** | | **L** | | | **L** | **L** | **L** | | **M** | **M** | **L** | **L** |
| CO3 | **S** | **M** | **L** | | **M** | | | **M** | **M** | **M** | **L** | **M** | **M** | **L** | **M** |
| CO4 | **S** | **M** | **L** | | **M** | **L** | | **M** | **M** | **M** | **L** | **M** | **M** | **M** | **L** |
| CO5 | **S** | **M** | **L** | | **M** | | | **L** | **L** | **L** | | **M** | **M** | **L** | **L** |
| CO6 | **S** | **S** | **M** | **L** | **M** | | | **S** | **M** | **M** | | **S** | **S** | **M** | **M** |

**S- Strong; M-Medium; L-Low**

## Assessment Pattern

| CO | CAT1 | | | | Assignment 1 | | | | CAT2 | | | | Assignment 2 | | | | Terminal | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100 | | | | 100 | | | | 100 | | | | 100 | | | | 100 | | | |
| **TPS Scale** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** |
| CO1 | 5 | 15 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 5 | | - |
| CO2 | 5 | 15 | 20 | - | - | - | 50 | - | - | - | - | - | - | - | - | - | 2 | 5 | 12 | - |
| CO3 | 5 | 15 | 20 | - | - | - | 50 | - | - | - | - | - | - | - | - | - | 2 | 5 | 12 | - |
| CO4 | - | - | - | - | - | - | - | - | 5 | 10 | 20 | - | - | - | 20 | - | 2 | 5 | 12 | - |
| CO5 | - | - | - | - | - | - | - | - | 5 | 10 | 20 | - | - | - | 30 | - | 2 | 5 | 12 | - |
| CO6 | - | - | - | - | - | - | - | - | 5 | 10 | 15 | - | - | - | - | 50 | - | 5 | 12 | - |

***** Terminal examination should cover all Course Outcomes in the appropriate TPS Scale level.

## Syllabus

**Basics of Cloud:** Historical developments in computing- Definition of Cloud Computing-Essential Characteristics-Data center Design and Interconnection Network-Cloud Deployment Models-Benefits and Challenges-

**Virtualization:** Definition- Benefits of Virtualization-Types of Virtualization -Virtual Machine monitor-Virtual machine properties-Interpretation and binary translation-Types of VM: System VM, Process VM, HLL VM, Hypervisors: Xen, KVM , VMWare, Virtual Box, Hyper-V.

**Cloud Architecture:** Cloud Reference Model-SPI Framework-Market Oriented Cloud Architecture-SLA-Billing and Accounting- Economics of Scaling.

**Service Models:** SaaS – Multi-tenant OpenSaaS - PaaS – Leveraging PaaS for productivity-IaaS – Improving performance, System and storage redundancy, Cloud based NAS devices, Advantages, Server types- IDaaS – AAA model-Single Sign-on, OpenID- Database as a Service-Monitoring as a Service-Communication as services-XaaS. Case study: Open stack.

**Programming models:** Fundamental aspects of parallel and distributed programming models: MPI, OpenMP, Cloud programming models: Hadoop, Map reduce, Spark .

**Resource Allocation and Migrating**: Resource Allocation and Task Scheduling Algorithms**-** Seven Steps Migration Methodology-Cloud Migration Strategies-Application Migration to Cloud-Database Migration to Cloud-Data Migration to Cloud.

**Emerging Technologies:** Mobile Cloud Computing - IoT Applications- Fog and Edge computing- Serverless Computing-Green Cloud Computing.

## Text Book


1. Mehul Mahrishi Kamal Kant Hiran, Ruchi Doshi, Dr. Fagbola Temitayo, “Cloud Computing”, BPB Publications, First Edition,2019
2. Shailendra Singh, “Cloud Computing”, Oxford University Press, First edition, 2018.
3. RajkumarBuyya, Vecchiola, Selvi, “Mastering Cloud Computing”, McGraw Hill Education, First edition,2017.
4. Dac-Nhuong Le, Raghvendra Kumar, Gia Nhu Nguyen, Jyotir Moy Chatterjee , “Cloud Computing and Virtualization”, Wiley,2018.


## Reference Books & web resources


1. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, “Mastering cloud computing” , Morgan Kaufman, 2013.
2. Dr. Kris Jamsa, —Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More‖, Jones and Bartlett learning, First edition, 2013.
3. ArshdeepBahga, Vijay Madisetti, —Cloud Computing: A Hands-On Approach‖, CreateSpace Independent Publishing Platform, 1st edition, 2013.
4. https://onlinecourses.nptel.ac.in/noc21_cs14/


## Course Contents and Lecture Schedule

| Module No. | Topic | No. of Periods |
|---|---|---|
| **1** | **Basics of Cloud** | |
| 1.1 | Historical developments in computing | 1 |
| 1.2 | Definition of Cloud Computing | 1 |
| 1.3 | Essential Characteristics | |
| 1.4 | Data center Design and Interconnection Network | 1 |
| 1.5 | Cloud Deployment Models | 1 |
| 1.6 | Benefits and Challenges | |
| 2 | **Virtualization** | |
| 2.1 | Definition | 1 |
| 2.2 | Benefits of Virtualization | |
| 2.3 | Types of Virtualization | 1 |
| 2.4 | Virtual Machine monitor | 2 |
| 2.5 | Virtual machine properties | |
| 2.6 | Interpretation and Binary translation | 2 |
| 2.7 | Types of VM: System VM, Process VM, HLL VM | |
| 2.8 | Hypervisors: Xen, KVM , VMWare, Virtual Box, Hyper-V. | 1 |
| **3** | **Cloud Architecture** | |
| 3.1 | Cloud Reference Model | 1 |
| 3.2 | SPI Framework | |
| 3.3 | Market Oriented Cloud Architecture | 1 |
| 3.4 | SLA-Billing and Accounting | 1 |
| 3.5 | Economics of Scaling. | |
| **4** | **Service Models** | |

| Module No. | Topic | No. of Periods |
|---|---|---|
| 4.1 | SaaS – Multi-tenant, OpenSaaS | 1 |
| 4.2 | PaaS – leveraging PaaS for productivity-IaaS – Improving performance | 1 |
| 4.3 | System and storage redundancy, Cloud based NAS devices | 1 |
| 4.4 | IDaaS – AAA model-Single Sign-on, OpenID | 1 |
| 4.5 | Database as a Service | 1 |
| 4.6 | Monitoring as a Service | 1 |
| 4.7 | Communication as services | |
| 4.8 | XaaS | 1 |
| 4.9 | Case study: Open stack. | |
| 5 | **Resource Allocation and Migrating** | |
| 5.1 | Resource Allocation and Task Scheduling Algorithms | 1 |
| 5.2 | Seven Steps Migration Methodology | 1 |
| 5.3 | Cloud Migration Strategies | 1 |
| 5.4 | Application Migration to Cloud | 1 |
| 5.5 | Database Migration to Cloud-. | 1 |
| 5.6 | Data Migration to Cloud | 1 |
| 6 | **Programming models:** | |
| 6.1 | Fundamental aspects of parallel and distributed programming models: MPI, OpenMP | 2 |
| 6.2 | Cloud programming models: Hadoop, Map reduce, Spark. | 2 |
| 7 | **Emerging Technologies** | |
| 7.1 | Mobile Cloud Computing | 2 |
| 7.2 | IoT Applications | |
| 7.3 | Fog and Edge computing | 2 |
| 7.4 | Serverless Computing | |
| 7.5 | Green Cloud Computing | 1 |
| | **Total Lectures** | **36** |

**Course Designer(s):**

1. Dr.S.Padmavathi, Professor, Dept. . of IT spmcse@tce.edu
2. Dr.K.Indira, Assistant Professor, Dept of IT kiit@tce.edu

| 22IT550 | WEB TECHNOLOGIES |
|---|---|

| Category | L | T | P | Credit |
|---|---|---|---|---|
| PCC | 1 | 0 | 4 | 3 |

**Terminal Exam Type:** Practical

## Preamble

This course covers the design and implementation of web-based applications including related software, database and interfaces. The students will learn about mark-up languages, scripting languages, interactive graphics and databases with current trends. It also covers various web services and testing technologies.

## Prerequisite

- NIL

## Course Outcomes

On the successful completion of the course, students will be able to

| COs | Course Outcomes | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Demonstrate essential software tools for webapplication development | TPS2 | 70 | 70 |
| CO2 | Use latest front-end technologies to build web applications that incorporate the latest user interface design trends and features | TPS3 | 70 | 70 |
| CO3 | Develop simple server-side applications using Node JS with DB | TPS3 | 70 | 70 |
| CO4 | Build applications using XML and JSON tostore data in a sharable manner. | TPS3 | 70 | 70 |
| CO5 | Utilize diverse software testing methodologies | TPS3 | 70 | 70 |
| CO6 | Analyse and interpret the appropriate web services for the application requirements/industry scenarios | TPS4 | 70 | 70 |

## Mapping with Programme Outcomes

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | M | L | | | L | | | L | L | L | | L | L | L | L |
| CO2 | S | M | L | | S | | | S | S | S | | S | M | S | S |
| CO3 | S | M | L | | S | | | S | S | S | | S | M | S | S |
| CO4 | S | M | L | | S | | | S | S | S | | S | M | S | S |
| CO5 | M | L | | | L | | | L | L | L | | L | L | L | L |
| CO6 | S | M | L | | S | | | S | S | S | | S | M | S | S |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | CAT 1 Theory | | | | | | CAT 2 Theory | | | | | | Model Lab & Record | | | | | | Terminal Practical | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPS Scale | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 |
| CO1 | 10 | 30 | 10 | | | | | | | | | | | | 10 | | | | | | 10 | | | |
| CO2 | 10 | | 20 | | | | | | | | | | | | 20 | | | | | | 20 | | | |
| CO3 | | | 20 | | | | | | | | | | | | 20 | | | | | | 20 | | | |
| CO4 | | | | | | | 10 | 10 | 20 | | | | | | 20 | | | | | | 20 | | | |
| CO5 | | | | | | | | 10 | 10 | | | | | | 20 | | | | | | 20 | | | |
| CO6 | | | | | | | 10 | | 10 | 20 | | | | | 10 | | | | | | 10 | | | |

***Terminal examination should cover all Course Outcomes in the appropriate TPS Scale level.

## Syllabus

**Web essentials:** IDE/ Editors, Deployment, Console, NPM, Architecture Patterns, UI design, UI Prototype tools using Figma.

**Front end:** HTML5, CSS3, Angular JS – data binding, controllers, scopes, dependency injection, filters, directives, services, factory, modules, components, animations. Debugging in front end- React JS Basics

**Back end:** Node JS – Express – console, events, modules - file system, HTTP, net, OS, path, DNS, DB - MySQL, MongoDB

**XML:** XML Basics, Structure, Elements, attributes, Namespaces, Working with DTD, Schema, Grouping elements, writing and Parsing XML Document, DOM, XML Formatters, CSS – XSLT, XPATH, XQUERY, JSON – element, value, object, members, array, string, data types, parsing.

**Application Testing** & **Web services**: Testing Tools – Selenium- JMeter - **Web services** - SOAP, WSDL, RDF, RSS, REST – types, resources, methods

## Text Books


1. Aristeidis Bampakos,"Angular Projects: Build modern web apps byexploring Angular 12 with 10 different projects and cutting-edge technologies, 2nd Edition", 2020.
2. iCode Academy,"Angular JS for Beginners", August 2017.
3. Mastering HTML, CSS & Javascript Web Publishing by Laura Lernay, Rafe Colburn, Jennifer Kyrnir, BPB Publications, 2016
4. Godbole, "Web Technologies", July 2017.


## Learning Resources

1. https://www.freecodecamp.org/
2. https://www.w3schools.com/
3. https://www.codecademy.com/

## Course Contents and Lecture Schedule

| Module No. | Topic | No. of Periods |
|---|---|---|
| **1** | **Web essentials** | |
| 1.1 | IDE/ Editors, Deployment, Console | 1 |
| 1.2 | NPM | |
| 1.3 | MVC, MVVM | 1 |
| 1.4 | UI design, UI Prototype tools –using Figma | |
| **2** | **Frontend** | |
| 2.1 | HTML5, CSS3 | 1 |
| 2.2 | AngularJS– databinding | |
| 2.3 | Controllers and scopes | |
| 2.4 | Dependency injection | |
| 2.5 | Filters, directives | 1 |
| 2.6 | Services, factory | |
| 2.7 | Modules, components | |
| 2.8 | Animations, Debugging in front end. | |
| **3** | **Backend** | |
| 3.1 | NodeJS–console | 1 |
| 3.2 | Events | |
| 3.3 | Modules-file system | |
| 3.4 | Express | |
| 3.5 | HTTP, net | 1 |
| 3.6 | OS,path, DNS | |
| 3.7 | DB–MySQL | |
| 3.8 | MongoDB | |
| **4** | **Data transportation** | |
| 4.1 | XML Basics, Structure, Elements, attributes | 1 |
| 4.2 | Namespaces, Working with DTD | |
| 4.3 | Schema, Grouping elements | |
| 4.4 | DOM | |
| 4.5 | XML Formatters, CSS–XSLT | 1 |
| 4.6 | XPATH, XQUERY | |
| 4.7 | JSON | |
| 5 | **Web Application Testing** | |
| 5.1 | Testing Tools – Selenium- JMeter | 2 |
| 6 | **Web services** | |
| 6.1 | SOAP, WSDL | 1 |
| 6.2 | RDF, RSS | |
| 6.3 | RESTful–types, Resources, methods | 1 |
| | **Total Hours** | **12** |

**List of Experiments:**

| Ex.No | Experiment Name | No. of Hours | Cos |
|---|---|---|---|
| 1. | Prepare the UI Prototype using Figma | 2 | CO1 |
| 2. | Design a web application front-end using HTML, CSS, JS | 2 | CO2 |
| 3. | Design the front-end part of the application using Angular Js and React JS | 4 | CO2 |
| 4. | Experiment with code debugging | 2 | CO2 |
| 5. | Design Backend part of the Application Using DJango Framework | 4 | CO2 |
| 6. | Develop the Back-end part of the application using SQL and MongoDB | 4 | CO3 |
| 7. | Practice with ExpressJS | 3 | CO3 |
| 8. | Practice with XML Formatters | 4 | CO4 |
| 9. | Practice with XML DTD | 3 | CO4 |
| 10. | Perform various testing such as functional,usability, interface using testing tools such as selenium | 4 | CO5 |
| 11. | Practice with CI/CD (Continuous Integration and Continuous Deployment) | 4 | CO5 |
| 12. | Improvement in the web application code after testing and customer feedback | 4 | CO5 |
| 13. | Practice with Web Services | 4 | CO6 |
| 14. | Implement the web service using your chosen programming language and web framework and interact with a database or other backend systems to retrieve or store data. | 2 | CO6 |
| 15. | Write a report summarizing your findings and providing a recommendation for which web service to use. Include details on the pros and cons of each service, any limitations you encountered, and any other relevant information. | 2 | CO6 |
| | **Total Hours** | **48** | |

**Course Designer(s):**

1. Dr.S.Karthiga, Assistant Professor, Department of Information Technology — skait@tce.edu
2. Dr.M.Akila Rani, Assistant Professor, Department of Information Technology — marit@tce.edu

| 22IT570 | INFORMATION SECURITY LAB |
|---|---|

| Category | L | T | P | Credit |
|---|---|---|---|---|
| PCC | 0 | 0 | 2 | 1 |

## Preamble

The laboratory course on Information security aims to provide hands on experience in using various crypto libraries for securing computer applications. Practical exposure on usage of various network security tools for analyzing security vulnerabilities and protection is provided.

## Prerequisite

None

## Course Outcomes

On the successful completion of the course, students will be able to

| COs | Course Outcomes | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Utilize symmetric and public key cryptography to offer confidentiality in simple application development | TPS3 | 80 | 70 |
| CO2 | Perform message and entity authentication using hashing and digital signatures | TPS3 | 80 | 70 |
| CO3 | Use standard crypto libraries for crypt analysis | TPS4 | 80 | 70 |
| CO4 | Configure and manage network defense tools like Firewalls and Intrusion Detection Systems | TPS3 | 80 | 70 |
| CO5 | Identify software vulnerabilities such as SQL injection and provide solutions for prevention and detection | TPS4 | 80 | 70 |
| CO6 | Analyze the network attacks and identify the malwares in the network | TPS4 | 80 | 70 |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | L | | M | | | M | L | | | M | M | M | L |
| CO2 | S | M | L | | M | | | M | L | | | M | M | M | L |
| CO3 | S | S | M | L | M | | | M | L | | | M | S | M | L |
| CO4 | S | M | L | | M | | | M | L | | | M | M | M | L |
| CO5 | S | S | M | L | M | | | M | L | L | | M | S | M | L |
| CO6 | S | S | M | L | M | | | M | L | L | | M | S | M | L |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| Cognitive Levels | Model Examination | Terminal Examination |
|---|---|---|
| Remember | | |
| Understand | | |
| Apply | 60 | 60 |
| Analyse | 40 | 40 |
| Evaluate | | |
| Create | | |

.

## Course Contents

| Ex. No. | Topic | No. of Sessions | COs |
|---|---|---|---|
| 1 | Implementation and Crypt analysis of Hill Cipher | 1 | CO1/CO3 |
| 2 | Develop a secure client server communication using symmetric key algorithms (Use Standard crypto Libraries) | 1 | CO1/CO3 |
| 3 | Implement RSA cryptosystem with key management | 1 | CO1/CO3 |
| 4 | Verify integrity of client server communication using Hashing techniques | 1 | CO2 |
| 5 | Perform Man in the middle attack in Diffie Hellman Key Exchange protocol | 1 | CO1 |
| 6 | Perform password extraction, cracking and recovery from target system | 1 | CO4 |
| 7 | Simulation of SQL Injection attack - Testing Web applications for SQL injection vulnerabilities, Scanning web servers, analyzing logs, Securing web application | 1 | CO5 |
| 8 | Configuration of Firewalls in system environment / using OPNET or Cisco Packet Tracer or GNS3 | 1 | CO4 |
| 9 | Simulation of Virtual Private Network using OPNET or Cisco Packet Tracer or GNS3 | 1 | CO4 |
| 10 | Study of Transport Layer Security Protocol using Wireshark | 1 | CO4 |
| 11 | Configure Intrusion Detection System tool for monitoring events in a host to detect malicious activities | 1 | CO4 |
| 12 | Creation, Detection and Prevention of Buffer overflow attack, Cross site scripting | 1 | CO6 |
| | **Total Sessions** | **12** | |

## Course Designer(s):

1. Dr.C.Jeyamala, Associate Professor, Department of IT jeyamala@tce.edu
2. Mrs.R.Parkavi, Assistant Professor, Department of IT rpit@tce.edu

**22IT580 CLOUD COMPUTING LAB**

Category L T P Credit

PCC 0 0 2 1

**Preamble**

This laboratory course will make the students to experience the key techniques and concepts of web service creation, consuming service, cloud computing service, data processing platform and simulation computing platform. The students will be competent with the design, programming, and application of cloud computing systems through hands-on experience**.**

**Prerequisite**

NIL

**Course Outcomes**

On the successful completion of the course, students will be able to

| COs | Course Outcomes | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Build RESTful web service and consume Service in client application. | TPS3 | 90 | 80 |
| CO2 | Develop and Implement applications using different cloud services. | TPS3 | 90 | 80 |
| CO3 | Apply parallel programming model to perform data intensive application. | TPS3 | 90 | 70 |
| CO4 | Build data intensive application in Hadoop Platform. | TPS3 | 90 | 80 |
| CO5 | Simulate a cloud environment to implement new schedulers by analyzing the parameters affecting performance. | TPS4 | 90 | 70 |
| CO6 | Develop and Implement applications using Dockers Containers | TPS3 | 90 | 80 |

**Mapping with Programme Outcomes**

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | L | | M | L | | S | L | L | | S | M | M | L |
| CO2 | S | M | L | | M | L | | S | L | L | | S | M | M | L |
| CO3 | S | M | L | | L | | | S | L | L | | S | M | L | L |
| CO4 | S | M | L | | M | | | S | L | L | | S | S | L | M |
| CO5 | S | S | M | L | M | | | S | L | L | | L | S | L | L |
| CO6 | S | M | L | | M | L | | S | M | M | M | S | S | M | M |

S- Strong; M-Medium; L-Low

**Assessment Pattern**

| Cognitive Levels | Model Examination | Terminal Examination |
|---|---|---|
| Remember | 0 | 0 |
| Understand | 0 | 0 |
| Apply | 80 | 80 |
| Analyze | 20 | 20 |
| Evaluate | 0 | 0 |
| Create | 0 | 0 |

**Course Contents and Lecture Schedule**

| Ex. No. | Topic | No. of Sessions | COs Mapping |
|---|---|---|---|
| 1. | Study of Different Computing Paradigms with performance measures. | 1 | CO1 |
| 2. | Building RESTful web service and consume the service in the client application | 1 | CO1 |
| 3. | Building web application and hosts the necessary databases, services and authentication using different hosting platforms. | 1 | CO2 |
| 4. | Implementation of Database as a service for an application with CRUD operations. | 1 | CO2 |
| 5. | Implementation of an application using Single Sign On as identity management. | 1 | CO2 |
| 6. | Implementation of Storage as a service for an application using Dropbox. | 1 | CO2 |
| 7. | Implementation of Parallel Programming with MPI to perform Task Management. | 1 | CO3 |
| 8. | Implementation of Hadoop Single and Multi-Node cluster for an application data processing. | 1 | CO4 |
| 9. | Implementation of Apache Spark Deployment on top of HDFS for an application. | 1 | CO4 |
| 10. | Analyzing various Resource Scheduling Management using iFogSim. | 1 | CO5 |
| 11. | Simulation of Large Scale application based Data center and Users allocation in Cloud Analyst under various deployment configurations. | 1 | CO5 |
| 12. | Deployment of Restful Application in Docker/Kubernetes platform. | 1 | CO6 |
| | **Total** | **12** | |

**Course Designer(s):**

1. Dr.S.Padmavathi, Professor, Dept of IT spmcse@tce.edu
2. Dr.K.Indira, Assistant Professor, Dept of IT kiit@tce.edu

**22ITPJ0 MOBILE COMMUNICATION**

| Category | L | T | P | Credit |
|---|---|---|---|---|
| PSE | 3 | 0 | 0 | 3 |

## Preamble

The course aims at exploring the concepts of mobile communications in Physical, MAC, Network and Transport layer level. It also explores the WLAN, GSM, LTE, 5G telecommunication system and Ad Hoc routing schemes. This course induces research practice through the team assignment on recent methods/protocols with simulation tools.

## Prerequisite

Nil

## Course Outcomes

On the successful completion of the course, students will be able to

| S.No | Course Outcomes | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Experiment with the wireless multiplexing, modulation and spread spectrum techniques for the given scenario | TPS3 | 70 | 70 |
| CO2 | Choose the suitable wireless MAC mechanisms - SDMA, TDMA, FDMA and CDMA for solving the given problem | TPS3 | 70 | 70 |
| CO3 | Outline the working principle of Mobile IP and Mobile TCP | TPS2 | 70 | 80 |
| CO4 | Demonstrate the various functions of Wireless LAN and GSM, LTE, 5G telecommunication system | TPS2 | 70 | 80 |
| CO5 | Solve the given wireless ad hoc network routing problem with suitable routing schemes | TPS3 | 70 | 70 |
| CO6 | Apply anyone of the schemes in a given mobile communication network environment and study their performance through simulation tools such as NS3 | TPS3 | 70 | 70 |

## Mapping with Programme Outcomes

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1. | S | M | L | | | | | | | | | | M | | |
| CO2. | S | M | L | | | | | | | | | | M | | |
| CO3 | M | L | | | | | | | | | | | L | | |
| CO4 | M | L | | | | | | | | | | | L | | |
| CO5 | S | M | L | | | | | | | | | | M | | |
| CO6 | S | S | M | L | M | | | S | S | S | | S | M | L | M |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | CAT1 | | | Assignment -1 | | | CAT2 | | | Assignment -2 | | | Terminal | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPS Scale | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| CO1 | 10 | 10 | 10 | | 40 | | | | | | | | | 5 | 10 |
| CO2 | 10 | 10 | 30 | | 50 | | | | | | | | 5 | 10 | 10 |
| CO3 | | 20 | | | 10 | | | | | | | | 5 | 10 | |
| CO4 | | | | | | | 10 | 20 | | | 20 | | 5 | 10 | |
| CO5 | | | | | | | 10 | 20 | 40 | | 10 | | 5 | 5 | 10 |
| CO6 | | | | | | | | | | | | 70 | | | 10 |

## Syllabus

**Physical Layer:** Signal propagation - Multiplexing - SDM, TDM, FDM, CDM – Modulation – ASK, PSK, FSK, MSK - Spread spectrum – DSSS, FHSS

**MAC Layer:** CSMA/CD - SDMA, FDMA, TDMA – Aloha, Slotted Aloha, PRMA, ISMA – CDMA – MACA, Comparisons

**Network and Transport Layer:** Mobile IP – Packet Delivery, Agent Registration, Reply, Triangular Routing - Mobile TCP - Snooping TCP

**Wireless LAN**: Transmission Technologies – System Architecture - Physical Layer – IR, FHSS, DSSS - DFWMAC

**Telecommunication Systems:** GSM - Services – Architecture – Protocol Stack – Call Routing – Handover, LTE, 5G

**Wireless Ad Hoc Networks – Routing**: Challenges – Table driven, On-demand, Power aware Routing schemes, QoS

## Text Book

1. Jochen.H.Schiller, “Mobile Communications”, Pearson, second edition 2008.

## Reference Books& web resources

1. T.S.Rappaport, “Wireless Communications Principles and Practices”, Pearson Education, Asia, NewDelhi, second edition, 2010
2. C.Siva Ram Murthy and B.S. Manoj, “Ad Hoc Wireless Networks- Architectures and Protocols”, second Edition, 2004.
3. https://archive.nptel.ac.in/courses/106/106/106106167/

## Course Content and Lecture Schedule

| Module No | Topic | No. of Lecture Hours |
|---|---|---|
| **1** | **Physical Layer** | |
| 1.1 | Signal propagation | 1 |
| 1.2 | Multiplexing – SDM, TDM, FDM, CDM | 2 |
| 1.3 | Modulation – ASK, PSK, FSK, MSK | 2 |
| 1.4 | Spread Spectrum – DSSS, FHSS | 2 |
| **2** | **Medium Access Control Layer** | |
| 2.1 | CSMA/CD | 1 |
| 2.2 | SDMA, FDMA | 1 |
| 2.3 | TDMA – Aloha, Slotted Aloha | 1 |
| 2.4 | PRMA, ISMA | 2 |
| 2.5 | CDMA | 1 |
| 2.6 | MACA, Comparisons | 1 |
| **3** | **Network and Transport Layer** | |
| 3.1 | Mobile IP – Introduction | 2 |

| | | |
|---|---|---|
| 3.1.1 | Packet Delivery | 1 |
| 3.1.2 | Agent Registration, Reply, Triangular Routing | 2 |
| 3.2 | Mobile TCP – Snooping TCP | 1 |
| 3.3 | Wireless LAN | 1 |
| 3.3.1 | Transmission Technologies, System Architecture | 1 |
| 3.3.2 | Physical Layer – IR, FHSS, DSSS | 1 |
| 3.3.3 | DFWMAC | 2 |
| **4** | **Telecommunication System** | |
| 4.1 | GSM – Introduction | 1 |
| 4.1.1 | Services, Architecture, Protocol Stack | 1 |
| 4.1.2 | Call Routing, Handover | 1 |
| 4.2 | LTE, 5G | 2 |
| **5** | **Wireless Ad Hoc Networks** | |
| 5.1 | Routing Challenges | 1 |
| 5.2 | Table Driven routing schemes | 2 |
| 5.3 | On-demand routing schemes | 3 |
| | **Total** | 36 |

**Course Designer(s):**

1. Dr.S.Muthuramalingam smrit@tce.edu
2. Dr.P.Karthikeyan karthikit@tce.edu

| 22ITPP0 | AUGMENTED REALITY AND VIRTUAL REALITY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PSE | 2 | 0 | 2 | 3 |
| | | Exam Type: Theory | | | | |

## Preamble

This course provides the basic principles about Augmented and Virtual Reality technologies, knowledge on developing AR/VR and interacting with the virtual environment through interactive devices and also facilitates the technologies involved in the development of AR/VR application.

## Prerequisite

NIL

## Course Outcomes

| CO1 | Course Outcome Statement | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Explain the basic concepts of Augmented reality, Virtual reality, Mixed reality | TSP2 | 70 | 80 |
| CO2 | Design a scene which relates to any application including light, optics etc., | TSP3 | 70 | 70 |
| CO3 | Track the system and Interact with the application using various interactive devices | TSP3 | 70 | 60 |
| CO4 | Develop an augmented reality application using Unity3D including context and content determination | TSP3 | 70 | 70 |
| CO5 | Create a VR application, render the scenes and apply all scientific principles in it such as vision, audio, etc., | TSP3 | 70 | 70 |
| CO6 | Investigate case studies for Medical, Gaming and other emerging fields | TSP4 | 70 | 60 |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1. | M | L | | | M | M | | | | | | M | L | | L |
| CO2. | S | M | L | | S | S | | | | | | M | L | | L |
| CO3. | S | M | L | | S | S | | | | | | M | M | | L |
| CO4. | S | M | L | | S | S | | L | M | M | | S | M | L | L |
| CO5. | S | S | M | L | S | S | | L | M | M | | S | S | S | M |
| CO6. | S | S | M | L | S | S | M | M | S | S | | S | S | S | M |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | Theory | | | | | | | | Practical | | | | | Terminal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CAT 1 | | | | CAT2 | | | | Test | | | | OCR | (Theory) | | | | | |
| TPS Scale | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | | 1 | 2 | 3 | 4 | 5 | 6 |
| CO1 | 4 | 10 | - | - | - | - | - | - | - | - | - | - | - | 6 | 5 | - | - | - | - |
| CO2 | 4 | 10 | 30 | - | - | - | - | - | - | - | 20 | - | 20 | 2 | 5 | 10 | - | - | - |
| CO3 | 2 | 10 | 30 | - | - | - | - | - | - | - | 20 | - | 20 | 2 | 5 | 10 | - | - | - |
| CO4 | - | - | - | - | 4 | - | 20 | - | - | - | 20 | - | 20 | 2 | 5 | 10 | - | - | - |
| CO5 | - | - | - | - | 4 | 10 | 20 | - | - | - | 20 | - | 20 | 6 | - | 10 | - | - | - |
| CO6 | - | - | - | - | 2 | 10 | 20 | 10 | - | - | 20 | | 20 | 2 | - | 10 | 10 | - | - |

***** Terminal examination should cover all Course Outcomes in the appropriate TPS Scale level.

## Syllabus

**AR VR Background**: Working Principle of AR, A typical AR system, VR modern experiences, historical perspective, The Mixed Reality Continuum.

**Geometry of virtual worlds:** 3D transformations - Geometric modeling, Transforming rigid bodies, Light and Optics: Light propagation, Lenses and images.

**Tracking and Interaction:** Tracking -3D user interfaces- Interaction techniques for locomotion and manipulation

**Augmented Reality:** Augmented Reality- The Content - Connecting Context and Content in AR System, Various types of contents, Marker based and Marker less AR -AR Application Areas.

**Virtual Reality**: Software and Hardware Technology on Stereoscopic Display - Ethical and social implications, Spatial audio for immersive experience

**Case studies:** AR and VR Technology in Medical Field -Physical Exercises and Gaming-Film and TV Production- Architecture and Civil, Commercial and other emerging fields

## Text Book

1. Steven M. LaValle, “Virtual Reality”, University of Illinios, Published by Cambridge university, 2017.
2. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc., © 2003-2017.
3. Dieter Schmalstieg and Tobias Hollerer, “Augmented Reality: Principles & Practice”,2016

## Reference Books

1. William R.Sherman, Alan Craig, “Understanding Virtual Reality, interface, Application and Design”, Elsevier(Morgan Kaufmann), 2003.
2. David H.Eberly, “3D Game Engine Design”, Elsevier, 2012.
3. John Vince, “Virtual Reality Systems”, Pearson Education, 2007.
4. Alan B. Craig; William R. Sherman; Jeffrey D. Will, “Developing Virtual Reality Applications: Foundations of Effective Design”, 2009
5. Cawood, “Augmented Reality: A Practical Guide”,2008

## Course Contents and Lecture Schedule

| Module No. | Topic | No. of Periods |
|---|---|---|
| **1** | **AR VR Background** | |
| 1.1 | Working Principle of AR | 1 |
| 1.1.1 | A typical AR system | |
| 1.2 | VR Modern experiences | 1 |
| 1.2.1 | Historical perspective | |
| 1.3 | The Mixed Reality Continuum | 1 |
| **2** | **Geometry of virtual worlds** | |
| 2.1 | 3D transformations | 1 |
| 2.2 | Geometric modeling | 1 |
| 2.3 | Transforming rigid bodies | 1 |
| 2.4 | Light and Optics: Light propagation | 1 |
| 2.4.1 | Lenses and images | |
| **3** | **Tracking and Interaction** | |
| 3.1 | Tracking | 1 |
| 3.2 | 3D user interfaces | 1 |
| 3.3 | Interaction techniques for Locomotion | 1 |
| 3.4 | Manipulation | 1 |
| **4** | **Augmented Reality** | |
| 4.1 | Augmented Reality- The Content | 1 |
| 4.1.1 | Connecting Context and Content in AR System | 1 |
| 4.1.2 | Various types of contents | 1 |
| 4.2 | Marker based and Marker less AR | 2 |
| 4.3 | AR Application Areas | 1 |
| **5** | **Virtual Reality** | |
| 5.1 | Software and Hardware Technology on Stereoscopic Display | 1 |

| Module No. | Topic | No. of Periods |
|---|---|---|
| 5.2 | Ethical and social implications | 1 |
| 5.3 | Spatial audio for immersive experience | 1 |
| **6** | **Case studies** | |
| 6.1 | AR and VR Technology in Medical Field | 1 |
| 6.2 | Physical Exercises and Gaming | 1 |
| 6.3 | Film and TV Production | 1 |
| 6.4 | Architecture and Civil, Commercial and other emerging fields | 1 |
| | **TOTAL** | **24** |

**List of Experiments:**

The List of experiments can be applied to any domain inclusive of Industry, Medical and Gaming but not limited to

| Module No. | Topic | No. of Periods |
|---|---|---|
| 1 | Study of tools like Unity3D/Unreal, Vuforia and Blender. | 2 |
| 2 | Install Software and Choose the Project | 2 |
| 3 | Develop AR enabled simple applications using Marker based trigger. | 4 |
| 4 | Develop AR enabled simple applications using Marker less trigger. | 4 |
| 5 | Create the 3D model using Blender - Apply various lighting and shading effects to the downloaded objects from asset store. | 4 |
| 6 | Create three dimensional virtual environment using Unity / Unreal | 4 |
| 7 | User Interface for the Project in AR / VR | 4 |
| | **TOTAL** | **24** |

**Course Designer(s):**

1. D.Tamilselvi , Professor, dtamilselvi@tce.edu, Information Technology
2. P.Vijaya Praba, Assistant Professor, pvpit@tce.edu, Information Technology
3. M.Akila Rani, Assistant Professor, marit@tce.edu, Information Technology

**22ITPQ0 C# AND .NET FRAMEWORK**

| Category | L | T | P | Credit |
|---|---|---|---|---|
| PSE | 3 | 0 | 0 | 3 |

## Preamble

This subject will enable students to understand the .Net Framework as a whole and technologies that constitute the framework. The student will gain programming skills in C# both in basic and advanced levels. It will help them to develop applications (web-based application and web services) using C#.

## Prerequisite

- 22IT320-Object Oriented Programming

## Course Outcomes

On the successful completion of the course, students will be able to

| CO | Course Outcome | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Explain the .Net framework components of CLR, CTS and JIT | TPS2 | 70 | 75 |
| CO2 | Implement the basic concepts of OOP and delegates, events using C# programming language | TPS3 | 70 | 70 |
| CO3 | Develop C# applications using Language Integrated Query and assembly components | TPS3 | 70 | 70 |
| CO4 | Construct different web applications, web services and able to retrieve data using ADO.Net | TPS3 | 70 | 70 |
| CO5 | Make use of Windows Communication Foundation, Windows Presentation Foundation, Windows Workflow Foundation | TPS3 | 70 | 70 |
| CO6 | Examine a simple project that incorporates all important features of .NET Framework | TPS4 | 70 | 65 |

## Mapping with Programme Outcomes

| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | **M** | **L** | | | | | | | | | | | **L** | | |
| CO2 | **S** | **M** | **L** | | **M** | | | **M** | **M** | **M** | | | | **L** | **L** |
| CO3 | **S** | **M** | **L** | | **M** | | | **M** | **M** | **M** | | | | **L** | **L** |
| CO4 | **S** | **M** | **L** | | **M** | | | **M** | **M** | **M** | | | | **L** | **L** |
| CO5 | **S** | **M** | **L** | | **M** | | | **M** | **M** | **M** | | | | **L** | **L** |
| CO6 | **S** | **S** | **M** | **L** | **M** | | | **M** | **M** | **M** | **L** | **L** | | **L** | **L** |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | CAT1 | | | | | | CAT2 | | | | | | Assignment 1 | | Assignment 2 | | Terminal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | |
| TPS Scale | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 2 | 3 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 6 |
| CO1 | 10 | 20 | | | | | | | | | | | 20 | | | | 2 | 5 | | | | |
| CO2 | 10 | 20 | 20 | | | | | | | | | | | 40 | | | 2 | 5 | 15 | | | |
| CO3 | | | 20 | | | | | | | | | | | 40 | | | 2 | 5 | 10 | | | |
| CO4 | | | | | | | 10 | 20 | 20 | | | | | | 30 | | 2 | 5 | 15 | | | |
| CO5 | | | | | | | 10 | 10 | 20 | | | | | | 30 | | 2 | 5 | 15 | | | |
| CO6 | | | | | | | | | | 10 | | | | | 30 | 10 | | | | 10 | | |

Attainment of course outcome 6 is evaluated through mini project which involves design and development of simple applications in .NET framework.

Some of the assignment problems include: (but not limited to)

1. Develop an online quiz application where students can take quizzes on various subjects.
2. Create an expense tracker application for students to track their expenses and manage budgets
3. Build a task management application for organizing and tracking tasks, assignments, and deadlines.
4. Build a hospital management system for managing patient records, appointments, and medical staff.
5. Create a weather forecast application that fetches weather data from an API and displays it to users.

## Syllabus

**The .Net framework:**.Net Framework Architecture, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Compiler, Framework Base Classes

**C -Sharp Language**: Language Syntax, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Conditional Statements, Looping Structures- Delegates and Events - Generic Classes-Generic methods- Generic Interface

**Other Attributes and Assembly**: Implicitly Typed Local Variable- Anonymous Type- Lambda Expression- Language Integrated Query- Assemblies- Versioning- Attributes- Reflection.

**Application Development on .NET:** Windows based Applications - Accessing Data with ADO.NET, MVC Framework, and Entity Framework -Web applications with Web Forms- Razor application- Web Services

**Overview of Advanced .Net features:** Windows Communication Foundation - Windows Presentation Foundation-Windows Workflow Foundation-Case study: Synchronous and Asynchronous Programming

## Text Book


1. Andrew Troelsen, —Pro C#5 and the .NET 4.5 Framework‖, AndrewTroelsen, Apress, Sixth Edition 2012
2. Herbert Schildt, —C# 4.0 The Complete Reference‖, McGraw-Hill, 2010.
3. Karli Watson, Christian Nagel, etal, Professional C# 4.0 and .NET 4, Wrox, 2010
4. John Sharp, Microsoft Visual C# Step by Step, 10th Edition 2022

## Reference Book & Web resources

1. Joseph Albahari, Ben Albahari, C# 7.0 in a Nutshell, Publisher - O'Reilly Media, 2017
2. https://msdn.microsoft.com
3. https://www.telerikacademy.com/alpha/csharp
4. http://www.csharphelp.com/index.html

## Course Contents and Lecture Schedule

| Module No. | Topic | No. of Periods |
|---|---|---|
| **1** | **The .Net framework** | |
| 1.1 | .Net Framework Architecture | 1 |
| 1.2 | Common Language Runtime (CLR) | 1 |
| 1.3 | Common Type System (CTS), Common Language Specification (CLS) | 1 |
| 1.4 | Microsoft Intermediate Language (MSIL), Just-In – Compiler | 2 |
| 1.5 | Framework Base Classes | 1 |
| **2** | **C -Sharp Language** | |
| 2.1 | Language Syntax, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings | 3 |
| 2.2 | Conditional Statements | 1 |
| 2.3 | Looping Structures | 1 |
| 2.4 | Delegates and Events | 1 |
| 2.5 | Generic Classes-Generic methods- Generic Interface | 2 |
| **3** | **Other Attributes and Assembly** | |
| 3.1 | Implicitly Typed Local Variable | 1 |
| 3.2 | Anonymous Type -Lambda Expression | 1 |
| 3.3 | Language Integrated Query | 1 |
| 3.4 | Assemblies- Versioning | 1 |
| 3.5 | Attributes-Reflection | 1 |
| **4** | **Application Development on .NET** | |
| 4.1 | Windows based Applications | 1 |

| Module No. | Topic | No. of Periods |
|---|---|---|
| 4.2 | Accessing Data with ADO.NET | 2 |
| 4.3 | MVC Framework | 1 |
| 4.4 | Entity Framework | 1 |
| 4.5 | Web applications with Web Forms | 2 |
| 4.6 | Razor application | 1 |
| 4.7 | Web Services | 1 |
| **5** | **Overview of Advanced .Net features** | |
| 5.1 | Windows Communication Foundation | 1 |
| 5.2 | Windows Presentation Foundation | 1 |
| 5.3 | Windows Workflow Foundation | 1 |
| 5.4 | Case study: Synchronous and Asynchronous Programming | 1 |
| 5.5 | Mini project | 4 |
| | Total | 36 |

**Course Designer(s):**

1. Ms.S.Sujitha, Assistant Professor, ssiit@tce.edu, Information Technology
2. Dr.G.Vennila, Assistant Professor, gvait@tce.edu, Information Technology

**22ITPJ0 MOBILE COMMUNICATION**

| Category | L | T | P | Credit |
|---|---|---|---|---|
| PSE | 3 | 0 | 0 | 3 |

## Preamble

The course aims at exploring the concepts of mobile communications in Physical, MAC, Network and Transport layer level. It also explores the WLAN, GSM, LTE, 5G telecommunication system and Ad Hoc routing schemes. This course induces research practice through the team assignment on recent methods/protocols with simulation tools.

## Prerequisite

Nil

## Course Outcomes

On the successful completion of the course, students will be able to

| S.No | Course Outcomes | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Experiment with the wireless multiplexing, modulation and spread spectrum techniques for the given scenario | TPS3 | 70 | 70 |
| CO2 | Choose the suitable wireless MAC mechanisms - SDMA, TDMA, FDMA and CDMA for solving the given problem | TPS3 | 70 | 70 |
| CO3 | Outline the working principle of Mobile IP and Mobile TCP | TPS2 | 70 | 80 |
| CO4 | Demonstrate the various functions of Wireless LAN and GSM, LTE, 5G telecommunication system | TPS2 | 70 | 80 |
| CO5 | Solve the given wireless ad hoc network routing problem with suitable routing schemes | TPS3 | 70 | 70 |
| CO6 | Apply anyone of the schemes in a given mobile communication network environment and study their performance through simulation tools such as NS3 | TPS3 | 70 | 70 |

## Mapping with Programme Outcomes

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1. | S | M | L | | | | | | | | | | M | | |
| CO2. | S | M | L | | | | | | | | | | M | | |
| CO3 | M | L | | | | | | | | | | | L | | |
| CO4 | M | L | | | | | | | | | | | L | | |
| CO5 | S | M | L | | | | | | | | | | M | | |
| CO6 | S | S | M | L | M | | | S | S | S | | S | M | L | M |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | CAT1 | | | Assignment -1 | | | CAT2 | | | Assignment -2 | | | Terminal | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPS Scale | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| CO1 | 10 | 10 | 10 | | 40 | | | | | | | | | 5 | 10 |
| CO2 | 10 | 10 | 30 | | 50 | | | | | | | | 5 | 10 | 10 |
| CO3 | | 20 | | | 10 | | | | | | | | 5 | 10 | |
| CO4 | | | | | | | 10 | 20 | | | 20 | | 5 | 10 | |
| CO5 | | | | | | | 10 | 20 | 40 | | 10 | | 5 | 5 | 10 |
| CO6 | | | | | | | | | | | | 70 | | | 10 |

## Syllabus

**Physical Layer:** Signal propagation - Multiplexing - SDM, TDM, FDM, CDM – Modulation – ASK, PSK, FSK, MSK - Spread spectrum – DSSS, FHSS

**MAC Layer:** CSMA/CD - SDMA, FDMA, TDMA – Aloha, Slotted Aloha, PRMA, ISMA – CDMA – MACA, Comparisons

**Network and Transport Layer:** Mobile IP – Packet Delivery, Agent Registration, Reply, Triangular Routing - Mobile TCP - Snooping TCP

**Wireless LAN**: Transmission Technologies – System Architecture - Physical Layer – IR, FHSS, DSSS - DFWMAC

**Telecommunication Systems:** GSM - Services – Architecture – Protocol Stack – Call Routing – Handover, LTE, 5G

**Wireless Ad Hoc Networks – Routing**: Challenges – Table driven, On-demand, Power aware Routing schemes, QoS

## Text Book

1. Jochen.H.Schiller, “Mobile Communications”, Pearson, second edition 2008.

## Reference Books& web resources

1. T.S.Rappaport, “Wireless Communications Principles and Practices”, Pearson Education, Asia, NewDelhi, second edition, 2010
2. C.Siva Ram Murthy and B.S. Manoj, “Ad Hoc Wireless Networks- Architectures and Protocols”, second Edition, 2004.
3. https://archive.nptel.ac.in/courses/106/106/106106167/

## Course Content and Lecture Schedule

| Module No | Topic | No. of Lecture Hours |
|---|---|---|
| **1** | **Physical Layer** | |
| 1.1 | Signal propagation | 1 |
| 1.2 | Multiplexing – SDM, TDM, FDM, CDM | 2 |
| 1.3 | Modulation – ASK, PSK, FSK, MSK | 2 |
| 1.4 | Spread Spectrum – DSSS, FHSS | 2 |
| **2** | **Medium Access Control Layer** | |
| 2.1 | CSMA/CD | 1 |
| 2.2 | SDMA, FDMA | 1 |
| 2.3 | TDMA – Aloha, Slotted Aloha | 1 |
| 2.4 | PRMA, ISMA | 2 |
| 2.5 | CDMA | 1 |
| 2.6 | MACA, Comparisons | 1 |
| **3** | **Network and Transport Layer** | |
| 3.1 | Mobile IP – Introduction | 2 |

| | | |
|---|---|---|
| 3.1.1 | Packet Delivery | 1 |
| 3.1.2 | Agent Registration, Reply, Triangular Routing | 2 |
| 3.2 | Mobile TCP – Snooping TCP | 1 |
| 3.3 | Wireless LAN | 1 |
| 3.3.1 | Transmission Technologies, System Architecture | 1 |
| 3.3.2 | Physical Layer – IR, FHSS, DSSS | 1 |
| 3.3.3 | DFWMAC | 2 |
| **4** | **Telecommunication System** | |
| 4.1 | GSM – Introduction | 1 |
| 4.1.1 | Services, Architecture, Protocol Stack | 1 |
| 4.1.2 | Call Routing, Handover | 1 |
| 4.2 | LTE, 5G | 2 |
| **5** | **Wireless Ad Hoc Networks** | |
| 5.1 | Routing Challenges | 1 |
| 5.2 | Table Driven routing schemes | 2 |
| 5.3 | On-demand routing schemes | 3 |
| | **Total** | 36 |

**Course Designer(s):**

1. Dr.S.Muthuramalingam smrit@tce.edu
2. Dr.P.Karthikeyan karthikit@tce.edu

| 22ITPP0 | AUGMENTED REALITY AND VIRTUAL REALITY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PSE | 2 | 0 | 2 | 3 |
| | | Exam Type: Theory | | | | |

## Preamble

This course provides the basic principles about Augmented and Virtual Reality technologies, knowledge on developing AR/VR and interacting with the virtual environment through interactive devices and also facilitates the technologies involved in the development of AR/VR application.

## Prerequisite

NIL

## Course Outcomes

| CO1 | Course Outcome Statement | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Explain the basic concepts of Augmented reality, Virtual reality, Mixed reality | TSP2 | 70 | 80 |
| CO2 | Design a scene which relates to any application including light, optics etc., | TSP3 | 70 | 70 |
| CO3 | Track the system and Interact with the application using various interactive devices | TSP3 | 70 | 60 |
| CO4 | Develop an augmented reality application using Unity3D including context and content determination | TSP3 | 70 | 70 |
| CO5 | Create a VR application, render the scenes and apply all scientific principles in it such as vision, audio, etc., | TSP3 | 70 | 70 |
| CO6 | Investigate case studies for Medical, Gaming and other emerging fields | TSP4 | 70 | 60 |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1. | M | L | | | M | M | | | | | | M | L | | L |
| CO2. | S | M | L | | S | S | | | | | | M | L | | L |
| CO3. | S | M | L | | S | S | | | | | | M | M | | L |
| CO4. | S | M | L | | S | S | | L | M | M | | S | M | L | L |
| CO5. | S | S | M | L | S | S | | L | M | M | | S | S | S | M |
| CO6. | S | S | M | L | S | S | M | M | S | S | | S | S | S | M |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | Theory | | | | | | | | Practical | | | | | Terminal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CAT 1 | | | | CAT2 | | | | Test | | | | OCR | (Theory) | | | | | |
| TPS Scale | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | | 1 | 2 | 3 | 4 | 5 | 6 |
| CO1 | 4 | 10 | - | - | - | - | - | - | - | - | - | - | - | 6 | 5 | - | - | - | - |
| CO2 | 4 | 10 | 30 | - | - | - | - | - | - | - | 20 | - | 20 | 2 | 5 | 10 | - | - | - |
| CO3 | 2 | 10 | 30 | - | - | - | - | - | - | - | 20 | - | 20 | 2 | 5 | 10 | - | - | - |
| CO4 | - | - | - | - | 4 | - | 20 | - | - | - | 20 | - | 20 | 2 | 5 | 10 | - | - | - |
| CO5 | - | - | - | - | 4 | 10 | 20 | - | - | - | 20 | - | 20 | 6 | - | 10 | - | - | - |
| CO6 | - | - | - | - | 2 | 10 | 20 | 10 | - | - | 20 | | 20 | 2 | - | 10 | 10 | - | - |

***** Terminal examination should cover all Course Outcomes in the appropriate TPS Scale level.

## Syllabus

**AR VR Background**: Working Principle of AR, A typical AR system, VR modern experiences, historical perspective, The Mixed Reality Continuum.

**Geometry of virtual worlds:** 3D transformations - Geometric modeling, Transforming rigid bodies, Light and Optics: Light propagation, Lenses and images.

**Tracking and Interaction:** Tracking -3D user interfaces- Interaction techniques for locomotion and manipulation

**Augmented Reality:** Augmented Reality- The Content - Connecting Context and Content in AR System, Various types of contents, Marker based and Marker less AR -AR Application Areas.

**Virtual Reality**: Software and Hardware Technology on Stereoscopic Display - Ethical and social implications, Spatial audio for immersive experience

**Case studies:** AR and VR Technology in Medical Field -Physical Exercises and Gaming-Film and TV Production- Architecture and Civil, Commercial and other emerging fields

## Text Book

1. Steven M. LaValle, “Virtual Reality”, University of Illinios, Published by Cambridge university, 2017.
2. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc., © 2003-2017.
3. Dieter Schmalstieg and Tobias Hollerer, “Augmented Reality: Principles & Practice”,2016

## Reference Books

1. William R.Sherman, Alan Craig, “Understanding Virtual Reality, interface, Application and Design”, Elsevier(Morgan Kaufmann), 2003.
2. David H.Eberly, “3D Game Engine Design”, Elsevier, 2012.
3. John Vince, “Virtual Reality Systems”, Pearson Education, 2007.
4. Alan B. Craig; William R. Sherman; Jeffrey D. Will, “Developing Virtual Reality Applications: Foundations of Effective Design”, 2009
5. Cawood, “Augmented Reality: A Practical Guide”,2008

## Course Contents and Lecture Schedule

| Module No. | Topic | No. of Periods |
|---|---|---|
| **1** | **AR VR Background** | |
| 1.1 | Working Principle of AR | 1 |
| 1.1.1 | A typical AR system | |
| 1.2 | VR Modern experiences | 1 |
| 1.2.1 | Historical perspective | |
| 1.3 | The Mixed Reality Continuum | 1 |
| **2** | **Geometry of virtual worlds** | |
| 2.1 | 3D transformations | 1 |
| 2.2 | Geometric modeling | 1 |
| 2.3 | Transforming rigid bodies | 1 |
| 2.4 | Light and Optics: Light propagation | 1 |
| 2.4.1 | Lenses and images | |
| **3** | **Tracking and Interaction** | |
| 3.1 | Tracking | 1 |
| 3.2 | 3D user interfaces | 1 |
| 3.3 | Interaction techniques for Locomotion | 1 |
| 3.4 | Manipulation | 1 |
| **4** | **Augmented Reality** | |
| 4.1 | Augmented Reality- The Content | 1 |
| 4.1.1 | Connecting Context and Content in AR System | 1 |
| 4.1.2 | Various types of contents | 1 |
| 4.2 | Marker based and Marker less AR | 2 |
| 4.3 | AR Application Areas | 1 |
| **5** | **Virtual Reality** | |
| 5.1 | Software and Hardware Technology on Stereoscopic Display | 1 |

| Module No. | Topic | No. of Periods |
|---|---|---|
| 5.2 | Ethical and social implications | 1 |
| 5.3 | Spatial audio for immersive experience | 1 |
| **6** | **Case studies** | |
| 6.1 | AR and VR Technology in Medical Field | 1 |
| 6.2 | Physical Exercises and Gaming | 1 |
| 6.3 | Film and TV Production | 1 |
| 6.4 | Architecture and Civil, Commercial and other emerging fields | 1 |
| | **TOTAL** | **24** |

**List of Experiments:**

The List of experiments can be applied to any domain inclusive of Industry, Medical and Gaming but not limited to

| Module No. | Topic | No. of Periods |
|---|---|---|
| 1 | Study of tools like Unity3D/Unreal, Vuforia and Blender. | 2 |
| 2 | Install Software and Choose the Project | 2 |
| 3 | Develop AR enabled simple applications using Marker based trigger. | 4 |
| 4 | Develop AR enabled simple applications using Marker less trigger. | 4 |
| 5 | Create the 3D model using Blender - Apply various lighting and shading effects to the downloaded objects from asset store. | 4 |
| 6 | Create three dimensional virtual environment using Unity / Unreal | 4 |
| 7 | User Interface for the Project in AR / VR | 4 |
| | **TOTAL** | **24** |

**Course Designer(s):**

1. D.Tamilselvi , Professor, dtamilselvi@tce.edu, Information Technology
2. P.Vijaya Praba, Assistant Professor, pvpit@tce.edu, Information Technology
3. M.Akila Rani, Assistant Professor, marit@tce.edu, Information Technology

**22ITPQ0 C# AND .NET FRAMEWORK**

| Category | L | T | P | Credit |
|---|---|---|---|---|
| PSE | 3 | 0 | 0 | 3 |

## Preamble

This subject will enable students to understand the .Net Framework as a whole and technologies that constitute the framework. The student will gain programming skills in C# both in basic and advanced levels. It will help them to develop applications (web-based application and web services) using C#.

## Prerequisite

- 22IT320-Object Oriented Programming

## Course Outcomes

On the successful completion of the course, students will be able to

| CO | Course Outcome | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Explain the .Net framework components of CLR, CTS and JIT | TPS2 | 70 | 75 |
| CO2 | Implement the basic concepts of OOP and delegates, events using C# programming language | TPS3 | 70 | 70 |
| CO3 | Develop C# applications using Language Integrated Query and assembly components | TPS3 | 70 | 70 |
| CO4 | Construct different web applications, web services and able to retrieve data using ADO.Net | TPS3 | 70 | 70 |
| CO5 | Make use of Windows Communication Foundation, Windows Presentation Foundation, Windows Workflow Foundation | TPS3 | 70 | 70 |
| CO6 | Examine a simple project that incorporates all important features of .NET Framework | TPS4 | 70 | 65 |

## Mapping with Programme Outcomes

| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | **M** | **L** | | | | | | | | | | | **L** | | |
| CO2 | **S** | **M** | **L** | | **M** | | | **M** | **M** | **M** | | | | **L** | **L** |
| CO3 | **S** | **M** | **L** | | **M** | | | **M** | **M** | **M** | | | | **L** | **L** |
| CO4 | **S** | **M** | **L** | | **M** | | | **M** | **M** | **M** | | | | **L** | **L** |
| CO5 | **S** | **M** | **L** | | **M** | | | **M** | **M** | **M** | | | | **L** | **L** |
| CO6 | **S** | **S** | **M** | **L** | **M** | | | **M** | **M** | **M** | **L** | **L** | | **L** | **L** |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | CAT1 | | | | | | CAT2 | | | | | | Assignment 1 | | Assignment 2 | | Terminal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | |
| TPS Scale | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 2 | 3 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 6 |
| CO1 | 10 | 20 | | | | | | | | | | | 20 | | | | 2 | 5 | | | | |
| CO2 | 10 | 20 | 20 | | | | | | | | | | | 40 | | | 2 | 5 | 15 | | | |
| CO3 | | | 20 | | | | | | | | | | | 40 | | | 2 | 5 | 10 | | | |
| CO4 | | | | | | | 10 | 20 | 20 | | | | | | 30 | | 2 | 5 | 15 | | | |
| CO5 | | | | | | | 10 | 10 | 20 | | | | | | 30 | | 2 | 5 | 15 | | | |
| CO6 | | | | | | | | | | 10 | | | | | 30 | 10 | | | | 10 | | |

Attainment of course outcome 6 is evaluated through mini project which involves design and development of simple applications in .NET framework.

Some of the assignment problems include: (but not limited to)

1. Develop an online quiz application where students can take quizzes on various subjects.
2. Create an expense tracker application for students to track their expenses and manage budgets
3. Build a task management application for organizing and tracking tasks, assignments, and deadlines.
4. Build a hospital management system for managing patient records, appointments, and medical staff.
5. Create a weather forecast application that fetches weather data from an API and displays it to users.

## Syllabus

**The .Net framework:**.Net Framework Architecture, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Compiler, Framework Base Classes

**C -Sharp Language**: Language Syntax, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Conditional Statements, Looping Structures- Delegates and Events - Generic Classes-Generic methods- Generic Interface

**Other Attributes and Assembly**: Implicitly Typed Local Variable- Anonymous Type- Lambda Expression- Language Integrated Query- Assemblies- Versioning- Attributes- Reflection.

**Application Development on .NET:** Windows based Applications - Accessing Data with ADO.NET, MVC Framework, and Entity Framework -Web applications with Web Forms- Razor application- Web Services

**Overview of Advanced .Net features:** Windows Communication Foundation - Windows Presentation Foundation-Windows Workflow Foundation-Case study: Synchronous and Asynchronous Programming

## Text Book


1. Andrew Troelsen, —Pro C#5 and the .NET 4.5 Framework‖, AndrewTroelsen, Apress, Sixth Edition 2012
2. Herbert Schildt, —C# 4.0 The Complete Reference‖, McGraw-Hill, 2010.
3. Karli Watson, Christian Nagel, etal, Professional C# 4.0 and .NET 4, Wrox, 2010
4. John Sharp, Microsoft Visual C# Step by Step, 10th Edition 2022

## Reference Book & Web resources

1. Joseph Albahari, Ben Albahari, C# 7.0 in a Nutshell, Publisher - O'Reilly Media, 2017
2. https://msdn.microsoft.com
3. https://www.telerikacademy.com/alpha/csharp
4. http://www.csharphelp.com/index.html

## Course Contents and Lecture Schedule

| Module No. | Topic | No. of Periods |
|---|---|---|
| **1** | **The .Net framework** | |
| 1.1 | .Net Framework Architecture | 1 |
| 1.2 | Common Language Runtime (CLR) | 1 |
| 1.3 | Common Type System (CTS), Common Language Specification (CLS) | 1 |
| 1.4 | Microsoft Intermediate Language (MSIL), Just-In – Compiler | 2 |
| 1.5 | Framework Base Classes | 1 |
| **2** | **C -Sharp Language** | |
| 2.1 | Language Syntax, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings | 3 |
| 2.2 | Conditional Statements | 1 |
| 2.3 | Looping Structures | 1 |
| 2.4 | Delegates and Events | 1 |
| 2.5 | Generic Classes-Generic methods- Generic Interface | 2 |
| **3** | **Other Attributes and Assembly** | |
| 3.1 | Implicitly Typed Local Variable | 1 |
| 3.2 | Anonymous Type -Lambda Expression | 1 |
| 3.3 | Language Integrated Query | 1 |
| 3.4 | Assemblies- Versioning | 1 |
| 3.5 | Attributes-Reflection | 1 |
| **4** | **Application Development on .NET** | |
| 4.1 | Windows based Applications | 1 |

| Module No. | Topic | No. of Periods |
|---|---|---|
| 4.2 | Accessing Data with ADO.NET | 2 |
| 4.3 | MVC Framework | 1 |
| 4.4 | Entity Framework | 1 |
| 4.5 | Web applications with Web Forms | 2 |
| 4.6 | Razor application | 1 |
| 4.7 | Web Services | 1 |
| **5** | **Overview of Advanced .Net features** | |
| 5.1 | Windows Communication Foundation | 1 |
| 5.2 | Windows Presentation Foundation | 1 |
| 5.3 | Windows Workflow Foundation | 1 |
| 5.4 | Case study: Synchronous and Asynchronous Programming | 1 |
| 5.5 | Mini project | 4 |
| | Total | 36 |

**Course Designer(s):**

1. Ms.S.Sujitha, Assistant Professor, ssiit@tce.edu, Information Technology
2. Dr.G.Vennila, Assistant Professor, gvait@tce.edu, Information Technology

| 22ITPK0 | FULL STACK TECHNOLOGIES | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PSE | 3 | 0 | 0 | 3 |

## Preamble

This course covers the Front-end Development Environment for handling view layer, Component Management, Life Cycle Handling, State Management of the web application. It also covers the navigation controls and emphasizes the deployment environment with a backend as a service. The concepts will be illustrated with appropriate examples and tools.

## Prerequisite

- Nil

## Course Outcomes

On the successful completion of the course, students will be able to

| CO | Course Outcome | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Understand the Full stack components and develop responsive web pages using Bootstrap 4 | TSP2 | 70 | 80 |
| CO2 | Develop dynamic and responsive single-page applications using React Js and React Router | TSP3 | 70 | 70 |
| CO3 | Use scalable state management solutions for complex React applications with seamless data flow and asynchronous behavior | TSP3 | 70 | 70 |
| CO4 | Build a full-fledged backend for a web application using Express Js | TSP3 | 70 | 70 |
| CO5 | Integrate MongoDB as the storage option in Full stack development ecosystem | TSP3 | 70 | 70 |
| CO6 | Design and implement RESTful APIs to facilitate communication between frontend and backend layers of an application | TSP3 | 70 | 70 |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | M | L | | | | | | | | | | | L | | |
| CO2 | S | M | L | | S | | | S | | | | S | M | M | L |
| CO3 | S | M | L | | S | | | S | | | | S | M | M | L |
| CO4 | S | M | L | | S | | | S | | | | S | M | M | L |
| CO5 | S | M | L | | S | | | S | | | | S | M | M | L |
| CO6 | S | M | L | | S | | | S | | | | S | M | M | L |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| CO | CAT 1 | | | Assignment 1 | | | CAT 2 | | | Assignment 2 | | | Terminal | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPS Scale | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| CO1 | 10 | 10 | | | 20 | | | | | | | | 4 | | |
| CO2 | 10 | 10 | 20 | | | 30 | | | | | | | 4 | 5 | 15 |
| CO3 | | 10 | 30 | | | 50 | | | | | | | 4 | | |
| CO4 | | | | | | | 10 | 10 | 30 | | | 30 | 4 | 5 | 15 |
| CO5 | | | | | | | | 10 | 30 | | | 30 | 4 | 5 | 15 |
| CO6 | | | | | | | 10 | | | | | 40 | | 5 | 15 |

## Syllabus

**Introduction –** Foundation Paradigms - Full Stack Development Stack and architecture – Responsive Web Design - Bootstrap4 Web UI components Basics – Grids - Themes – Bootstrap JS – jQuery selectors and events.

**Front End Development with React JS** – React JS Basics - React Router and Single Page Applications – Presentational and Container Components- Setting Up React Development Environment – React Forms – Components - React DOM

**State Management and Redux** -State and Props - Lifecycle Methods - Introduction to Redux - Controlled Forms and form Validation-Uncontrolled Components - Flux Architecture- Redux Actions- React Animation - Redux Thunk

**Back End Development** - Express - Routing - Request Matching - Route parameters - Route Lookup – Handler Function - Request Object - Response Object - Middleware - GraphQL - Error Handling – MongoDB - CRUD Operations

**Full Stack Integration** - REST API - Connecting frontend and backend using AJAX and Fetch API - Authentication and authorization- Deployment strategies and hosting options – AWS – Heroku

## Learning Resources

1. ALBERT TETTEH ADJEI , “Full Stack Web Development: Building End-to-End Web Applications with Modern Technologies: A Comprehensive Guide to End-to-End Development Technologies”, TechTales Chronicles 2023.
2. David Choi and Nate “Full-Stack React, TypeScript, and Node" , Apress Publishers, Year: 2020
3. Colin Ihrig, Adam Bretz, and Markus Oberlehner, “Full Stack JavaScript Development with MEAN" , Packt Publishing, Year: 2018
4. https://reactjs.org/

## Course Contents and Lecture Schedule

| Module No. | Topic | No. of Lectures |
|---|---|---|
| **1** | **Introduction** | |
| 1.1 | Foundation Paradigms | 1 |
| 1.2 | Full Stack Development Stack and architecture | 1 |
| 1.3 | Responsive Web Design | 1 |

| | | |
|---|---|---|
| 1.4 | Bootstrap4 Web UI components Basics | 1 |
| 1.5 | Grids, Themes and Bootstrap JS | 1 |
| 1.6 | jQuery selectors and events. | 1 |
| **2** | **Front End Development with React** | |
| 2.1 | React Basics | 2 |
| 2.2 | React Router and Single Page Applications | 1 |
| 2.3 | Presentational and Container Components | 1 |
| 2.4 | Setting Up React Development Environment | 1 |
| 2.5 | React Forms and Components | 1 |
| 2.6 | React DOM | 1 |
| **3** | **State Management and Redux** | |
| 3.1 | State and Props | 2 |
| 3.2 | Lifecycle Methods | 1 |
| 3.3 | Introduction to Redux | 2 |
| 3.4 | Controlled Forms and form Validation | 1 |
| 3.5 | Uncontrolled Components | 1 |
| 3.6 | Flux Architecture | 1 |
| 3.7 | Redux Actions and Thunk | 1 |
| 3.8 | React Animations | 1 |
| **4** | **Back End Development** | |
| 4.1 | Express - Routing | 1 |
| 4.2 | Request Matching, Route parameters | |
| 4.3 | Route Lookup , Handler Function | 1 |
| 4.4 | Request Object - Response Object | 1 |
| 4.5 | Middleware, GraphQL | 1 |
| 4.6 | Error Handling | 1 |
| 4.7 | MongoDB | 1 |
| 4.8 | CRUD Operations | 1 |
| **5** | **Full Stack Integration** | |
| 5.1 | REST API | 1 |
| 5.2 | Connecting frontend and backend using AJAX and Fetch API | 1 |
| 5.3 | Authentication and authorization | 1 |
| 5.4 | Deployment strategies and hosting options – AWS – Heroku | 2 |
| | Total | 36 |

**Course Designer(s):**

1. Dr.S.Karthiga, Assistant Professor, Department of Information Technology skait@tce.edu
2. Ms.C.V.Nisha Angeline, Assistant Professor, Department of Information Technology cvnait@tce.edu

# GUIDELINES FOR PROJECT COURSES

## Project I, Project II, Project III and Project IV

## B.E. / B.Tech. DEGREE PROGRAMME

**FOR THE STUDENTS ADMITTED IN THE**

**ACADEMIC YEAR 2022-23 ONWARDS**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**
**THIAGARAJAR COLLEGE OF ENGINEERING**
(A Government Aided Autonomous Institution Affiliated to Anna University)
**MADURAI – 625 015, TAMILNADU**
Phone : 0452 – 2482240, 41
Fax : 0452 2483427
Web : www.tce.edu

Passed in BoS Meeting 27.04.2024 Approved in Academic Council Meeting 25.05.2024

# THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI 625015

## GUIDELINES FOR PROJECT COURSES

In the curriculum of 2022 B.E./B.Tech. Programmes, 12 credits have been assigned for **Project work in the specific discipline**. The curriculum was designed based on around 4 focus/broad areas. This has been split into **4 project courses** namely Project I, Project II, Project III and Project IV in semesters 5,6, 7 and 8 respectively.

**Choice of Focus Areas:** HoDs are requested to provide choice for the students to choose one of the broad/focus areas to carry out project work in 5, 6, 7 and 8th semesters. The number of students in each broad/focus areas shall be based on the faculty and infrastructure availability.

**Project Continuity and Switching:** The students shall be given a big project in the chosen broad/focus area so that it can be spread over all four semesters with specific outcomes at each semester. In case, a student wants to switch from one focus area to other area. It has to be approved by the Head of the Department and project coordinator.

**Internal Marks:** Three reviews shall be conducted in each semester to monitor the progress of the project. Review 1; 10 Marks, Review 2: 15 Marks, Review 3: 15 Marks. Total = 40 Marks.

**Viva Voce Examinations:** For external examinations, HoD shall appoint two examiners in each focus/broad area to conduct the Viva Voce examination in semesters 5. 6 and 7. Project guides are also one of the examiners, along with the two examiners appointed by the HoD. External exam will be conducted for 60 Marks.

**Final Viva Voce Examination:** In 8th Semester, Viva Voce will be conducted by an external examiner, HoD / HoD Nominee as internal examiner and Project Guides. External exam will be conducted for 60 Marks.

This structured approach ensures that students engage in a comprehensive project experience throughout their undergraduate studies, with regular monitoring of progress and formal evaluation through viva voce examinations. It also allows for flexibility by permitting students to switch focus areas with appropriate approvals.

# SYLLABI

# FOR

# AUDIT COURSES

## 23CHAD0 INDIAN CONSTITUTION AND KNOWLEDGE SYSTEMS

## 23CHAE0 UNIVERSAL HUMAN VALUES AND ETHICS

**B.E. / B.Tech. DEGREE PROGRAMME**

**FOR THE STUDENTS ADMITTED IN THE**

**ACADEMIC YEAR 2023-24 ONWARDS**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**
**THIAGARAJAR COLLEGE OF ENGINEERING**
(A Government Aided Autonomous Institution Affiliated to Anna University)
**MADURAI – 625 015, TAMILNADU**
Phone : 0452 – 2482240, 41
Fax : 0452 2483427
Web : www.tce.edu

Passed in BoS Meeting 18.11.2024 Approved in Academic Council Meeting 21.12.2024

| 23CHAD0 | INDIAN CONSTITUTION AND KNOWLEDGE SYSTEMS |
|---|---|

| Category | L | T | P | Credit |
|---|---|---|---|---|
| AC | 2 | 0 | 0 | 0 |

## Preamble

This course offers a comprehensive exploration of India's constitutional framework and its rich traditional knowledge systems, fostering a universal approach to value-based education. It helps students develop a deeper understanding of reality through self-exploration and value-based learning. The course highlights how ancient Indian practices in areas like literature, arts, science, healthcare, and agriculture align with modern governance principles. Students will learn to appreciate the relevance of these traditions in solving today's challenges. By the end of the course, students will understand how India's knowledge heritage and constitutional values work together to support sustainable and inclusive development.

## Prerequisite

Nil

## Course Outcomes

On the successful completion of the course, students will be able to

| CO | Course Outcome | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Explain the core principles, features, and structure of the Indian Constitution, including its role in shaping modern democracy and governance. | TPS2 | 70 | 85 |
| CO2 | Interpret the fundamental rights, duties, and directive principles enshrined in the Constitution and their implications for individual and societal development. | TPS2 | 70 | 85 |
| CO3 | Assess the significance of the Constitution in addressing contemporary issues and promoting justice, equality, and sustainable development. | TPS2 | 70 | 85 |
| CO4 | Describe the key concepts, diversity, and significance of Indian traditional knowledge systems across various domains such as arts, sciences, and ecology. | TPS2 | 70 | 85 |
| CO5 | Compare Indian traditional knowledge with modern knowledge systems and identify their complementary roles in addressing societal challenges. | TPS2 | 70 | 85 |
| CO6 | Demonstrate the application of traditional knowledge in modern contexts, emphasizing sustainability, holistic living, and cultural reservation. | TPS2 | 70 | 85 |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | M | L | | | | M | | | L | M | |
| CO2 | M | L | | | | M | | | L | M | |
| CO3 | M | L | | | | M | | | L | M | |
| CO4 | M | L | | | | M | | | L | M | |
| CO5 | M | L | | | | M | | | L | M | |
| CO6 | M | L | | | | M | | | L | M | |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| Bloom's category | Continuous Assessment Tests | | Seminar |
|---|---|---|---|
| | 1 | 2 | - |
| Remember | 40 | 40 | 0 |
| Understand | 60 | 60 | 100 |
| Apply | 0 | 0 | 0 |
| Analyze | 0 | 0 | 0 |
| Evaluate | 0 | 0 | 0 |
| Create | 0 | 0 | 0 |

## Syllabus

**Indian Constitution**

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

**Indian Knowledge Systems**

**Traditional and Modern Knowledge: Two Worlds of Knowledge**

Phases of Exploration: Contributions of Sir Arthur Cotton in irrigation, smallpox vaccination advancements, and agricultural reforms by Voelcker and Howard.

Indian Art and Science: Havell's work in Indian art, Gaekwad of Baroda's push for technical education, and contributions to Ayurveda (Hakim Ajmal Khan) and indigenous drugs (R.N. Chopra).

**Linking Science and Rural Development**

Pioneering Models: Tagore's Sriniketan experiment, YMCA's Marthandam model, Gandhi's rural development ideas, and Nehru's perspectives on growth.

Post-Independence and Global Recognition

**Modernization of Knowledge**: Integration of traditional practices in modernization efforts and the rise of activism for traditional knowledge recognition.

Global Mechanisms: Efforts by UNESCO, WHO, UNEP, WIPO, and WTO for protecting and sharing traditional knowledge.

**Intellectual Property Rights (IPR) and Traditional Knowledge**

Theoretical Background: Strategies for safeguarding traditional knowledge through positive protections and defensive mechanisms.

**Traditional Knowledge for Basic Needs**

Cultural Practices: Midwifery traditions (Dai System), surface flow irrigation tanks, and community housing rights.

Biodiversity and Genetic Resources: Success stories like Jeevani (Kanis' herbal medicine) and AYUSH-based cosmetics.

**Traditional Knowledge in Manufacturing and Industry**

Notable Contributions: Channa Patna toys, Payyanur sacred rings, and innovations in drug discovery.

**Cultural Expressions**

Heritage and Modern Relevance: Banarasi sarees, classical music, yoga's evolution, and Sanskrit's role in artificial intelligence.

## Text Book

- Durga Das Basu, 'Introduction to The Constitution of India', LexisNexis Butterworths Wadhwa, 20th Edition, Reprint 2011.
- Constitution of India, National Portal of India, Web link: https://www.india.gov.in/my-government/constitution-india
- Nirmal Sengupta "Traditional Knowledge in Modern India Preservation, Promotion, Ethical Access and Benefit Sharing Mechanisms" Springer, 2019.

## Reference Books & web resources

- Amit Jha, "Traditional Knowledge System in India", Atlantic Publishers and Distributors Pvt Ltd, 2009.
- Basanta Kumar Mohanta, Vipin Kumar Singh "Traditional Knowledge System and Technology in India", Pratibha Prakashan, 2012.
- Kapil Kapoor, Michel Danino "Knowledge Traditions and Practices of India", Central Board of Secondary Education, 2012.
- NPTEL video lecture on "Ayurvedic Inheritance of India", Video link: https://nptel.ac.in/courses/121/106/121106003/#.
- YouTube video on "Introduction to Indian Knowledge Systems", Video link: https://www.youtube.com/watch?v=LZP1StpYEPM.
- YouTube video on "12 Great achievements of Indian Civilization", Video link: https://www.youtube.com/watch?v=xmogKGCmclE)

## Course Designers

Adopted from AICTE MODEL CURRICULUM 2022

| 23CHAE0 | UNIVERSAL HUMAN VALUES AND ETHICS |
|---|---|

| Category | L | T | P | Credit |
|---|---|---|---|---|
| AC | 2 | 0 | 0 | 0 |

## Preamble

This course presents a universal approach to value education by developing the right understanding of reality through the process of self-exploration. The course primarily focus es on affecting a qualitative transformation in the life of the student rather than just a transfer of information. The course introduces the holistic worldview and its implications, a critical appraisal of the prevailing notions is also made to enable the students discern the difference on their own right.

## Prerequisite

Nil

## Course Outcomes

On the successful completion of the course, students will be able to

| COs | Course Outcome | TCE Proficiency Scale | Expected Proficiency in % | Expected Attainment Level % |
|---|---|---|---|---|
| CO1 | Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society. | TPS2 | 70 | 85 |
| CO2 | Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body. | TPS2 | 70 | 85 |
| CO3 | Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society | TPS2 | 70 | 85 |
| CO4 | Understand the harmony in nature and existence and work out their mutually fulfilling participation in nature | TPS2 | 70 | 85 |
| CO5 | Distinguish between ethical and unethical practices. | TPS2 | 70 | 85 |
| CO6 | Prepare strategy to actualize a harmonious environment wherever they work and lead an ethical life Course | TPS2 | 70 | 85 |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | M | | | L | M | |
| CO2 | | | | | | M | | | L | M | |
| CO3 | | | | | | M | | | L | M | |
| CO4 | | | | | | M | | | L | M | |
| CO5 | | | | | | M | | | L | M | |
| CO6 | | | | | | M | | | L | M | |

S- Strong; M-Medium; L-Low

## Assessment Pattern

| Bloom's category | Continuous Assessment Tests | | Seminar |
|---|---|---|---|
| | 1 | 2 | - |
| Remember | 40 | 40 | 0 |
| Understand | 60 | 60 | 100 |
| Apply | 0 | 0 | 0 |
| Analyze | 0 | 0 | 0 |
| Evaluate | 0 | 0 | 0 |
| Create | 0 | 0 | 0 |

## Syllabus

**INTRODUCTION TO VALUE EDUCATION**

Value Education – Need, Basic Guidelines, Content and Process, Self-Exploration – meaning, importance and process, Continuous Happiness and Prosperity – A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities – The basic requirements, Understanding Happiness and Prosperity – A critical appraisal of the current scenario, Method to fulfil the above human aspirations – UNDERSTANDING and living in harmony at various levels.

**HARMONY IN THE HUMAN BEING**

An understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' – Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, the meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

**HARMONY IN THE FAMILY AND SOCIETY**

Understanding harmony in the family – The basic unit of human interaction, understanding values in a human-to-human relationship; Understanding Trust – The foundational value in relationship, Difference between intention and competence, Understanding Respect – as the right evaluation, Difference between respect and differentiation; the other salient values in a relationship, Understanding the harmony in the society – comprehensive Human Goals, Visualizing a universal harmonious order in society– Undivided Society, Universal Order – From family to world family!

**HARMONY IN NATURE AND EXISTENCE**

Understanding the harmony in Nature, Interconnectedness, self-regulation and mutual fulfilment among the four orders of nature – recyclability, Understanding Existence as Coexistence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

**IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS**

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in

Professional Ethics – augmenting universal human order, the scope and characteristics of people-friendly and eco-friendly, Holistic Technologies, production systems and management models – Case studies, Strategy for the transition from the present state to Universal Human Order – At the level of individual: as socially and ecologically responsible engineers, technologists and managers, At the level of society: as mutually enriching institutions and organizations.

**Text Book**

- R R Gaur, R Sangal, G P Bagaria, “A Foundation Course in Human Values and Professional Ethics”, Excel Books, New Delhi, 2nd Revised Edition, 2019.

**Reference Books & web resources**

- A Nagaraj, “Jeevan Vidya: Ek Parichaya”, Jeevan Vidya Prakashan, Amarkantak, 1999.
- A N Tripathi, “Human Values”, New Age Intl Publishers, New Delhi, 2004.
- “The Story of Stuff” (Book).
- Mohandas Karamchand Gandhi, “The Story of My Experiments with Truth”.
- E F Schumacher, “Small is Beautiful”
- Cecile Andrews, “Slow is Beautiful”
- J C Kumarappa, “The Economy of Permanence”
- Pandit Sunderlal, “Bharat Mein Angreji Raj”
- Dharampal, “Rediscovering India”
- Mohandas K Gandhi, “Hind Swaraj or Indian Home Rule”
- Maulana Abdul Kalam Azad, “India Wins Freedom”
- Romain Rolland, “Vivekananda” (English)
- Romain Rolland, “Gandhi” (English)

**Course Designer(s):**

Adopted from AICTE Model Curriculum 2022