Vishwakarma Institute of Information Technology, Pune-48

Syllabus for
S.Y. M.Tech. (E&TC)
(Pattern 2018)

Department of
Electronics & Telecommunication
Engineering

VISION:

- Excellence in Electronics & Telecommunication Engineering Education

MISSION:

- Provide excellent blend of theory and practical knowledge. sustainable development of society
- Establish centre of excellence in post graduate studies and research.
- Prepare engineering professionals with highest ethical values and a sense of responsible citizenship.

Second Year M. Tech. (SYMT) Semester III (Pattern 2018)
(Electronics and Telecommunication Engineering)
MODULE I

Course Code	Course	Course Type	Teaching Scheme		Examination Scheme					Total	Credits
					Formative Assessment			Summative Assessment			
					ISE		CE	ESE	OR		
			L	P	T1	T2					
ETPA21181	Program Elective V	CE	3	-	-	-	50	-	-	50	3
IOEP21182	Open Elective	CE	3	-	-	-	50	-	-	50	3
ETPA21183A	Industry Internship Project – I	CE-OR	-	20	-	-	200	-	100	300	10
	Total		6	20	-	-	300	-	100	400	16

MODULE II

Course Code	Course	Course Type	Teaching Scheme		Examination Scheme					Total	Credits
					Formative Assessment			Summative Assessment			
					ISE		CE	ESE	OR		
			L	P	T1	T2					
ETPA21181	Program Elective V	CE	3	-	-	-	50	-	-	50	3
IOEP21182	Open Elective	CE	3	-	-	-	50	-	-	50	3
MEPA21183B/ CSPA21183B	Value added course	CE-OR	-	12	-	-	100	-	50	150	6
ETPA21184C	Dissertation Phase – I	CE-OR	-	8	-	-	100	-	50	150	4
	Total		6	20	-	-	300	-	100	400	16

Course code	Program Elective V	Course code	Open Elective
ETPA21181A	Image and Video Compression	IOEP21182A	Project Planning and Management
ETPA21181B	Wireless Sensor Networks	IOEP21182B	Ethical Hacking
ETPA21181C	Estimation and Detection Theory	IOEP21182C	Product Design Engineering

Course code	Value Added Course
MEPA21183B	CAE using ANSYS
CSPA21183B	Python Programming

BoS Chairman   Dean Academics   Director

Second Year M. Tech. (SYMT) Semester IV (Pattern 2018)
(Electronics and Telecommunication Engineering)

MODULE I

Course Code	Course	Course Type	Teaching Scheme		Examination Scheme						Total	Credits
					Formative Assessment			Summative Assessment				
			L	P	ISE		CE	ESE	OR			
					T1	T2						
ETPA22181A	Industry Internship Project - II	CE-OR	-	32	-	-	100	-	100	200	16
	Total		-	32	-	-	100	-	100	200	16

MODULE II

Course Code	Course	Course Type	Teaching Scheme		Examination Scheme						Total	Credits
					Formative Assessment			Summative Assessment				
			L	P	ISE		CE	ESE	OR			
					T1	T2						
ETPA22181B	Dissertation Phase – II	CE-OR	-	32	-	-	100	-	100	200	16
	Total		-	32	-	-	100	-	100	200	16

BoS Chairman   Dean Academics   Director

Semester – III

Elective 5A: Image and Video Compression (ETPA21181A)

Teaching Scheme	Examination Scheme
Credits : 3	Formative Assessment: 50 Marks
Lectures : 3 Hrs/week	

Prerequisite:

Course Objectives:
- To introduce students to various techniques such as Wavelets, DCT etc used for compressing Still Image and Videos.
- To introduce students to widely used Image and Video standards like JPEG2000, MPEG, H.264.
- To develop ability to select proper algorithm/ modify if required to suit specific application.

Course Outcomes:
By the end of the course, students will able to
1. Understand overview of compression standards like JPEG 2000, MPEG1, MPEG2
2. Gain knowledge of features of various compression standards.
3. Develop ability to choose compression standard for the given application.
4. Cognize techniques used in data compression.
5. Comprehend various video compression standards like MPEG4, H.263 and H.264 etc.
6. Know various audio coding techniques like mp3 and Dolby AC3.

Unit I : Image Compression using Vector Quantization
Introduction, Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree-Structured Vector Quantizers, Structured Vector Quantizers, Variations on the Theme, Concept of Fractals and compression using fractals.

Unit II : Wavelet based Image Compression
Introduction, Wavelets, Multiresolution Analysis and the Scaling Function, Implementation Using Filters, Image Compression, Embedded Zerotree Coder, Set Partitioning in Hierarchical Trees, JPEG 2000 compression standard- Preprocessor, Core encoder, Post processing, ROI encoding, scalability

Unit III : Video Compression basics
Analog and digital video, Temporal Redundancy, Motion estimation, Video Signal Representation

Unit IV : Video Compression Standards – I
MPEG1-Video structure, Group of Pictures, Picture slice, Macro- block and block, Motion estimation, Coding of I, P, B and D type pictures, Video Buffer, MPEG2- Difference between MPEG1 and MPEG2, scalability feature, applications.

Unit V : Video Compression Standards – II
MPEG4- Video object plane, shape coding, H.263 and H.264- Video coding for low bit rates, motion vector coding, coefficient coding, protection against error. Overview of MPEG-7 and MPEG -21

Unit VI : Audio Coding
Introduction , Spectral Masking, Temporal Masking, Psychoacoustic Model, MPEG Audio Coding, Layer II Coding, Layer III Coding—mp3, Dolby AC3 (Dolby Digital)

Text Books :
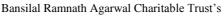1. Sayood, Khalid. "Introduction to data compression". Newnes, 2012.

2. Joshi, M. A., Raval, M. S., Dandawate, Y. H., Joshi, K. R., & Metkar, S. P. (2014). "Image and Video Compression: Fundamentals, Techniques, and Applications, CRC Press.

Reference Books :
1. Mohammed Ghanbari, Standard Codecs: Image Compression to Advanced Video Coding", IEE publication.
2. V. Bhaskaran and K. Konstantinides, "Image video compression standards: algorithms and architecture," Kluwer Academic Publishers
3. Joan Mitchell "MPEG and Video compression standard" Springer
4. Iain E. G. Richardson "H.264 and MPEG-4 Video Compression" Wiley publication

Elective 5B: Wireless Sensor Networks (ETPA21181B)

Teaching Scheme

Credits : 3
Lectures : 3 Hrs/week

Examination Scheme

Formative Assessment: 50 Marks

Prerequisite :
1. Wireless Communication.

Course Objectives:
- To understand the concept of wireless sensor network.
- To grasp the functionalities of specialized protocols used in WSN.
- To understand the parameters related to QoS in WSN.
- To familiarize the security issues related to WSN.

Course Outcomes:

After successfully completing the course the student will be able to
1. Use appropriate model of WSN
2. Comprehend energy efficient MAC protocols.
3. Apply the knowledge of WSN to solve any engineering problem related to WSN
4. Analyze WSN to meet QoS
5. Develop secure solutions for identified WSN.
6. Apply data aggregation techniques suitable for given applications.

Unit I : Introduction to Wireless Sensor Networks
Course Information, Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors, Network Architecture**:** Traditional layered stack, Cross-layer designs, Sensor Network Architecture, Hardware Platforms: Motes, Hardware parameters

Unit II :   Medium Access Control Protocols
Contention-Free and Contention-Based Medium Access , Wireless MAC Protocols, CSMA, MACA and MACAW, IEEE 802.11, IEEE 802.15.4 and ZigBee, Characteristics of MAC Protocols in Sensor Networks , Contention-Free MAC Protocols, Traffic-Adaptive Medium Access, Y-MAC, DESYNC-TDMA, Low-Energy Adaptive Clustering Hierarchy, Lightweight Medium Access Control , Contention-Based MAC Protocols , Power Aware Multi-Access with Signaling, Sensor MAC, Timeout MAC, Pattern MAC, Routing-Enhanced MAC, Data-Gathering MAC, Preamble Sampling and Wise MAC, Receiver-Initiated MAC, Hybrid MAC Protocols, Zebra MAC, Mobility Adaptive Hybrid MAC

Unit III : Routing protocols
Introduction, MANET protocols, Routing protocols for WSN: Resource-aware routing, Data-centric, Geographic Routing, Broadcast, Multicast Opportunistic Routing Analysis: Analysis of opportunistic routing (Markov Chain)

Unit IV : QoS, Data Gathering and Management
Quality of service/reliability, Transport protocols, Coverage and deployment - Sensing models, Coverage measures, Uniform random deployments: Poisson point processes, Coverage of random deployments: Boolean sensing model, Coverage of random deployments: general sensing model, Coverage determination, Coverage of grid deployments, Reliable data transport, Single packet delivery, Block delivery, Congestion control and rate control.

Unit V : Privacy and Security in WSN
Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks, Security

Attacks in Sensor Networks, Denial-of-Service, Attacks on Routing, Attacks on Transport Layer, Attacks on Data Aggregation, Privacy Attacks, Protocols and Mechanisms for Security, Symmetric and Public Key Cryptography, Key Management, Defenses Against DoS Attacks, Defenses Against Aggregation Attacks, Defenses Against Routing Attacks, Security Protocols for Sensor Networks TinySec, Localized Encryption and Authentication Protocol, IEEE 802.15.4 and ZigBee Security

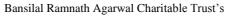**Unit VI : Specialized features**

Energy preservation and efficiency; security challenges; fault tolerance, Issues related to Localization, connectivity and topology, Sensor deployment mechanisms; coverage issues; sensor Web; sensor Grid, Open issues for future research, and Enabling technologies in wireless sensor network.

Text Books :
1. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice," Wiley.
2. Holger Karl, Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks," Wiley.

Reference Books :
1. Edgar H. Callaway, Jr. and Edgar H. Callaway, "Wireless Sensor Networks: Architectures and Protocols," CRC Press.
2. Anna Hac, "Wireless Sensor Network Designs," John Wiley & Sons.
3. Robert Faludi, "Building Wireless Sensor Networks: A Practical Guide to the ZigBee Mesh Networking Protocol," Shroff Publishers.

Elective 5C: Estimation and Detection Theory (ETPA21181C)

Teaching Scheme	**Examination Scheme**
Credits : 3	Formative Assessment: 50 Marks
Lectures : 3 Hrs/week	

Prerequisite :
1. Fundamentals of probability.

Course Objectives:
- To make students understand linear models and their relationship with probability distributions
- To make students aware of Computation of Cramer Rao Lower Bounds
- To estimate parameters with multiple criteria: minimum variance, maximum likelihood, Bayesian assumptions
- To make students learn to Detect multiple types of signals: deterministic signals, random signals, signals with unknown parameters

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Course Outcomes:
At the end of the course, student will be able to
1. Acquire basics of statistical decision theory used for signal detection and estimation.
2. Examine the detection of deterministic signals using statistical models.
3. Examine the detection of random signals using statistical models.
4. Examine the performance of signal parameters using optimal estimators.
5. Analyze signal estimation in discrete-time domain using filters.
6. Cognize various applications of estimation and detection theory.

Unit I : Statistical Decision Theory
Bayesian, minimax, and Neyman-Pearson decision rules, likelihood ratio, receiver operating characteristics, composite hypothesis testing, locally optimum tests, detector comparison techniques, asymptotic relative efficiency.

Unit II : Detection of Deterministic Signals
Matched filter detector and its performance; generalized matched filter; detection of sinusoid with unknown amplitude, phase, frequency and arrival time, linear model.

Unit III : Detection of Random Signals
Estimator-correlator, linear model, general Gaussian detection, detection of Gaussian random signal with unknown parameters, weak signal detection.

Unit IV : Estimation of Signal Parameters
Minimum variance unbiased estimation, Fisher information matrix, Cramer-Rao bound, sufficient statistics, minimum statistics, complete statistics; linear models; best linear unbiased estimation; maximum likelihood estimation, invariance principle; estimation efficiency; Bayesian estimation: philosophy, nuisance parameters, risk functions, minimum mean square error estimation, maximum a posteriori estimation.

Unit V : Signal Estimation in Discrete-Time
Linear Bayesian estimation, Weiner filtering, dynamical signal model, Discrete Kalman filtering.

Unit VI : Applications of Estimation and Detection
Applications in various domains viz. Control systems, Object tracking, non- linear prediction etc.
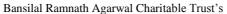
Text Books :
1. H. L. Van Trees, "Detection, Estimation and Modulation Theory: Part I, II, and III", John Wiley, NY, 1968.
2. S. M. Kay, "Fundamentals of Statistical Signal Processing: Estimation Theory", Prentice Hall PTR, 1993.

Reference Books :
1. S. M. Kay, "Fundamentals of Statistical Signal Processing: Detection Theory", Prentice Hall PTR, 1998.
2. Signal Detection and Estimation Second Edition by Mourad Barkat, Pearson education

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Open Elective: Project Planning and Management (IOEP21182A)

Teaching Scheme   **Examination Scheme**
Credits : 3   **Formative Assessment : 50 Marks**
Lectures : 3 Hrs/week

Course Objectives:
• To impart knowledge of project life cycle.
• To introduce students to Project Identification Process, Project Initiation
• To understand studies related to Pre-Feasibility Study and Project feasibility Studies.
• To construct CPM, PERT network for a project.
• To introduce students to Steps in Risk Management, Risk Identification, Risk Analysis and Reducing Risks
• To introduce students to process of project Performance Measurement, Evaluation and closeout.

Course Outcomes:
Upon the completion of the course, students will be able to
1. understand phases of project life cycle
2. understand the Project Identification Process, Project Initiation.
3. Understand Pre-Feasibility Study and Project feasibility Studies of a project.
4. construct CPM, PERT network for a project.
5. understand the concept of Risk Management
6. **understand the process of project Performance Measurement, Evaluation and closeout.**

Unit I :	Basics of Project Management (PM)

Introduction, Need, Project Management Knowledge Areas and Processes, Concept of Organizational Structure and types, The Project Life Cycle (preferably with case study), Essentials PM.

Unit II :	Project Identification and Selection

Introduction, Project Identification Process, Project Initiation, Pre-Feasibility Study, Feasibility Studies, Project Break-even point. Case study is preferred.

Unit III :	Project Planning

Introduction, Need for Project Planning, Work Breakdown Structure (WBS), LOB, CPM and PERT, Network Cost System, Resource Allocation, Scheduling, Project Cost Estimate and Budgets.

Unit IV :	Project Risk Management and Quality Management

Introduction, Risk, Risk Management, Role of Risk Management in Overall Project Management, Steps in Risk Management, Risk Identification, Risk Analysis, Reducing Risks. Introduction to Quality, Quality Concepts, Value, Engineering. Case study is preferred.

Unit V :	Project Performance Measurement, Evaluation and closeout

Introduction, Performance Measurement, Productivity, Project Performance Evaluation, Benefits and Challenges of Performance Measurement and Evaluation, Controlling the Projects. Project Close-out, Steps for Closing the Project, Project Termination, and Project Follow-up. Case study is preferred.

Unit VI :	Operation Research in Management

 Introduction, Operation Research as tool for Decision Support System, Overview of OR

Research Techniques, Formulation of Linear Programming Problem, Linear Programming Models, Assumptions of Linear Programming, Graphical Method and Simplex method for solving LP problem.

Text Books :
1. Premkumar Gupta and D.S. Hira, "Operations Research." S. Chand Publications
2. K. Nagrajan, "Project Management," New Age International Ltd.
3. Ahuja H. N., "Project Management," John Wiely, New York.

Open Elective: Ethical Hacking (IOEP21182B)

Teaching Scheme	**Examination Scheme**
Credits : 3	**Formative Assessment : 50 Marks**
Lectures : 3 Hrs/week	

Course Objectives :
- Understand basics of network security and hacking.
- Aware of legal perspective of cybercrime including Indian IT ACT 2008.
- Learn techniques of gathering network information.
- Identify security tools including, but not limited to intrusion detection and firewall software.
- Learn to perform different kind of attacks.
- Understand functioning of various protocols

Course Outcomes :
After completion of the course, student will be able to
1. Use basics knowledge of network security and hacking.
2. Understand and use the IT Laws as and when required.
3. Gather required information to perform a attack.
4. Use various tools and methods for Vulnerability Assessment.
5. Perform different attacks on Dummy scenario.
6. Analyze the use of protocols studied

Unit I :	Introduction to Network and security

Basics of Computer Networks: OSI Model, TCP/IP Model, Network topology (Physical & logical), Network Hardware Components: Connectors, Repeaters, hubs, NICs, Bridges and Switches.
Basics of Computer Networks Security: Essential Terminology, Elements of Information Security, Types of Hackers, Steps for Ethical hacking, Types of Attacks.

Unit II :	Legal Perspective

The Indian IT Act, Challenges to Indian law, Cybercrime scenario in India, 2008 amendments to Indian IT Act, Intellectual property in the cyberspace.

Unit III :	Information Gathering Techniques

Active information gathering, passive information gathering, Trace route, Interacting with DNS Servers, SNMP and SMTP attacks.

Unit IV :	Port Scanning and Vulnerability Assessment

Target Enumeration and Port Scanning Techniques: Scanning for Open Ports and Services, Types of Port Scanning, Firewall/IDS Evading Techniques
Vulnerability Assessment: Vulnerability Scanners and How Do They Work, Pros and Cons of a Vulnerability Scanner, Vulnerability Assessment with Nmap, Nessus

Unit V :	Network Sniffing

Introduction, Types of Sniffing, ARP Protocol Basics, ARP Attacks, Denial of Service Attacks, Man in the Middle Attacks.

Unit VI :	Remote Exploitation

Understanding Network Protocols: TCP,UDP,ICMP, Server Protocols: FTP,HTTP,SMTP

Text Books :
1. Rafay baloch, "Ethical hacking and Penetration Testing guide", CRC press, 2015, ISBN: 13: 978-1-4822-3162-5 (eBook - PDF)
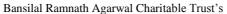
2. Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY Publications, 2015.

Reference Books :
1. Behrouz Fourzon, "Data Communication and Computer Networks", Pearson Education, 5th edition.
2. Andrew S. Tanenbaum, *"Computer Networks"*, International Economy Edition, 5th edition.

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Open Elective: Product Design Engineering (IOEP21182C)

Teaching Scheme	Examination Scheme
Credits : 3	Formative Assessment: 50 Marks
Lectures : 3 Hrs/week	

Course objectives:
• To understand basic techniques for particular phases of product development. • Make and manage design teams for product development in a company.

Course Outcomes:

Upon completion of this course, the student will be able to:

1. Describe an engineering design and development process
2. Employ engineering, scientific, and mathematical principles to execute a design from concept to finished product
3. Create 3D solid models of mechanical components from the perspective of aesthetic, ergonomic and functional requirement using CAD software
4. Work collaboratively on a team.
5. Create new product based on mechanical design engineering.
6. Investigate contemporary issues and their impact on provided solution.

Unit 1 – Introduction to Product Design

Characteristics of Successful Product Development, Innovative Thinking, Challenges to Product Development, Product Development Process, Concept Development, Economics – Cost Vs Performance, Design Considerations

Unit 2 – Product Development Process

Product development process- Identification of customer needs- customer requirements, product development process flows. Product specifications and concept generation, concept selection, concept screening, concept testing, reverse engineering, product architecture

Unit 3 –Product Design Tools

Creativity and Problem Solving –Creativity methods-Theory of Inventive Problem Solving (TRIZ), Product function tree, Life cycle analysis, Quality Function Deployment, Competing Product Analysis, SWOT analysis, Failure Mode Effect Analysis.

Unit 4 – Design for Manufacture and Assembly

Design for assembly, design for disassembly, design for environment, design for graphics and packaging

Unit 5 – Rapid Prototyping

Understanding Prototypes, Principles of Prototyping, Prototyping Technologies, Planning for Prototypes

Unit-6: Product Testing and Validation

Time value of Money, Analytical technique, Product and Process, Evaluation of component, subassembly, assembly, Reliability Goals, Computer simulations and Bench test results, Comprehensive test plans and reports.

Text Books:

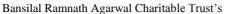1. Product Design-Techniques in Reverse Engineering and New Product Development, Kevin Otto,

Kristion Wood, Pearson Education, ISBN 978-81-7758-821-7.

2. Karl T.U. And Steven D.E., Product Design and Development, McGraw Hill, Ed 2000.

Reference Books :

1. Dieter GE, Engineering Design-Material and Processing Approach, McGraw Hill, Ed 2000

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Department of Electronics and Telecommunication Engineering

Value Added Course: CAE using ANSYS (MEPA21183B)

Teaching Scheme
Credits : 6
Practical : 12 Hrs/week

Examination Scheme
Formative Assessment: 100 Marks
Summative Assessment (Oral): 50 Marks

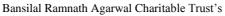| Course objectives: |
|---|
| ➢ To understand basic techniques of CAE and ANSYS
➢ Model and analyze the Mechanical Elements using ANSYS |
| **Course Outcomes:**

Upon completion of this course, the student will be able to:

1. Describe a basics of FEA process
2. Employ engineering, scientific, and mathematical principles to execute Pre-Processing
3. Create 3D solid models of mechanical components and applying effective meshing.
4. Model and analyze the mechanical elements
5. Understand the post processing in ANSYS.
6. Investigate different case studies on linear and nonlinear analysis. |
| **Unit 1 – Basics of Finite Element Analysis (FEA)** |
| Theory of Finite Element Analysis, Nodes, Elements, Shape Function, Selection of Material Model, Element Type, Stiffness Matrix Formulation & Solving Methods, Extracting Deformation, Strain & Stress |
| **Unit 2 – Pre-Processing** |
| CAD Modeling In design Modeler, Sketching, Dimensioning, Constraints, 2D & 3D CAD Modelling, Importing CAD Geometry, Advanced CAD Cleanup, CAD Preparation for Contacts, Meshing & Analysis, CAD Parametrization, Body Selection Logic & Named Selection |
| **Unit 3 –Meshing** |
| Meshing Pre-Perquisite's, Selecting Mesh Methods, Meshing Settings, Mesh Overrides, Meshing Errors & Its Resolutions |
| **Unit 4 – Analysis** |
| Selecting Type of Analysis, Boundary Conditions, Types & Assignment, Type of Loads, Selecting Solver, Solver Settings, Non Convergence Issues & Its Resolution. |
| **Unit 5 – Post-Processing** |
| FEA Error Estimation, Checking Accuracy of Solution, Sections & Animation, Plots & Charts, Detailed Report Preparation |
| **Unit-6: FEA in Practice** |
| Material Models (Nonlinear Materials) & There Selection, Types of Analysis (Modal, Thermal, Thermo-Structural, Pre-Stress Modal) |

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Text Books:

1. Finite Element simulations using ANSYS, Esam M. AlawadhiCRC Press , ISBN 9781482261974 - CAT# K24312,
2. Karl ANSYS Mechanical APDL for Finite Element Analysis by John Martin Thompson and Mary Kathryn Thompson, B&H Publisher, 2015

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Value Added Course: Python Programming (CSPA21183B)

Teaching Scheme   **Examination Scheme**
Credits   : 6   Formative Assessment: 100 Marks
Practical : 12 Hrs/week   Summative Assessment (Oral): 50 Marks

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Prerequisites :

- Basic programming knowledge

Course Objective :

- In-depth knowledge of the various libraries and packages required to perform data analysis, data visualization, web scraping, machine learning and natural language processing using Python.

Course Outcomes :

After completion of the course, student will be able to
1. Install the required Python environment and other auxiliary tools and libraries.
2. Create and manipulate regular Python lists.
3. Use functions and import packages.
4. Build Numpy arrays, and perform interesting calculations.
5. Create and customize plots on real data.
6. Supercharge scripts with control flow.
7. Use Pandas DataFrame for EDA.
8. Build ML models using Scikit-learn library.
9. Develop full stack web application using django framework.

Unit I :	Python Fundamentals

Introduction to Python Language: History, Features Installing python on Linux, Setting up path, Working with Python. Basic Syntax, Variable and Data Types , Operator, Conditional, Loop, Control statements, String manipulations, Lists, Tuple, Dictionaries, Sets Functions, Modules, Input-Ouput, Exception Handling

Unit II :	Advance Python

OOPs , Regular Expressions, CGI, Database connectivity and queries, Multithreading, Network Programming, GUI :Tkinter programming and widgets,
Python Programming environments: IAnaconda, Jupyter Notebooks, DE like PyCharm
Accessing Data From Multiple Sources: Reading and writing data from local files (.txt,.csv,.xls, .json, etc), Reading data from remote files, Scraping tables from web pages (.html)

Unit III :	Python Libraries for Data Cleaning, Preparation, and Wrangling

Understanding the N-dimensional data structure, Creating arrays, Indexing arrays by slicing or more generally with indices or masks, Basic operations and manipulations on N-dimensional arrays, **NumPy and 2D Plotting,** Plotting with matplotlib
Pandas: Working with Pandas data structures: Series and DataFrames, Accessing your data: indexing, slicing, fancy indexing, boolean indexing, Data wrangling, including dealing with

dates and times and missing datas, Adding, dropping, selecting, creating, and combining rows and columns

Database access : Executing SQL commands from Pandas, Loading database data into a DataFrame, Combining and manipulating DataFrames: merge, join, concatenate

Unit IV :	Data Analysis using Python

Split-apply-combine with DataFrames, Data summarization and aggregation methods Pandas powerful groupby method , Reshaping, pivoting, and transforming your data, Simple and rolling statistics

Data visualization: scatter plots, line plots, box plots, bar charts,and histograms with matplotlib, Customizing plots: important attributes and arguments, Scikit library for ML: Regression, Classification and Clustering, Text processing using nltk library

Unit V :	Python web development with Django

Introduction to Django, models.py, urls.py, views.py, Setting up database connections, Managing Users & the Django admin tool, Django URL Patterns and Views: Designing a good URL scheme, Generic Views, Django Forms: Form classes, Validation, Authentication, Advanced Forms processing techniques

Unit VI :	REST APIs Unit Testing with Django

Django REST framework, Django-piston, Overview / Refresher on Unit Testing and why it's good, Using Python's unittest2 library, Test Databases, Doctests, Debugging

Text Books :		
	1	Learning Python: Powerful Object-Oriented Programming

Industry Internship Project – I (ETPA21183A)

Teaching Scheme	**Examination Scheme**
Credits : 10	Formative Assessment: 200 Marks
Practical : 20 Hrs/week	Summative Assessment (Oral): 100 Marks

Upon completion of an internship, students will be able to demonstrate the following outcomes:

- Experience of applying the existing engineering knowledge in similar or new situations
- Ability to identify when new engineering knowledge is required, and apply it
- Understanding of lifelong learning processes through critical reflection of internship experiences.

The preferred duration of an Engineering internship is 3 months, full-time placement with an industry/organization/consultancy work etc. (8 x 15=120 hour work week). This is equal to 8 units of academic credit

Subject to approval from the Internship Host Organization, students should complete an internship full-time, but the internship must be completed (and all assessment items submitted) before September 2018.

Continuous Assessment of Performance during Internship:

During the internship semester, the organization with whom the student is undertaking the internship programme conducts periodic assessments of the intern's progress, performance and achievements.

A monthly presentation and report should also be submitted to VIIT, Pune as per the following schedule:

1st Internship presentation: End of July

2nd Internship Presentation: End of August

3rd Internship Presentation: End of September.

In order to ensure that the internship remains meaningful, Guide of the respective student from VIIT, Pune will maintains close contact with organizations/ Industry/Consultancy etc.

Summative Assessment (SA):

After completion of the program, the student submits a detailed report of his internship experience and makes a presentation of the same at VIIT, Pune. This will be a part of SA.

Dissertation Phase - I (ETPA21184C)

Teaching Scheme	Examination Scheme
Credits: 4	Formative Assessment: 100 Marks
Practical: 8 Hrs/week	Summative Assessment (Oral): 50 Marks

Course Objectives:

- To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
- To develop the methodology to solve the identified problem.
- To train the students in preparing project reports and to face reviews and viva - voce examination.

Course Outcomes:

At the end of the course the students will have a clear idea of his/her area of work and they are in a position to carry out the remaining phase II work in a systematic way.

The project work will start in semester III, and should preferably be a live problem in the industry or macro-issue having a bearing on performance of the construction industry and should involve scientific research, design, collection, and analysis of data, determining solutions and must preferably bring out the individuals contribution.

The dissertation stage I report should be presented in a standard format, in a spiral bound hard copy, preferably printed on both the sides of paper ,containing the following contents.
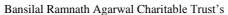
i. Introduction including objectives, limitations of study.
ii. Literature Survey, background to the research.
iii. Problem statement and methodology of work
iv. Theoretical contents associated with topic of research
v. Field Applications, case studies
vi. Data collection from field/organizations or details of experimental work/analytical work
vii. Part analysis / inferences
viii. Details of remaining work to be completed during the project work stage II
ix. References

Students should prepare a power point presentation to be delivered in 25 minutes and should be able to answer questions asked in remaining five minutes

The student shall submit the report of project work completed partly in standard format discussed in Annexure I.
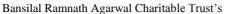
Semester - IV

Industry Internship Project – II (ETPA22181A)

Teaching Scheme   **Examination Scheme**
Credits   : 16   Formative Assessment: 200 Marks
Practical : 32 Hrs/week   Summative Assessment (Oral): 100 Marks

It is a continuation of Industry Internship Project – I work carried out in semester III.

Dissertation Phase - II (ETPA22181B)

Teaching Scheme	**Examination Scheme**
Credits: 16	Formative Assessment: 100 Marks
Lectures:	Summative Assessment (Oral): 100 Marks
Laboratory Work: 32 Hrs/week	

Course Objectives:

- Considerably more in-depth knowledge of the major subject/field of study, including deeper insight into current research and development work.
- The capability to clearly present and discuss the conclusions as well as the knowledge and arguments that form the basis for these findings in written and spoken English.

Course Outcomes:

By the end of the course, students will be able to

1. Demonstrate a depth of knowledge in the respective specialization.
2. Demonstrate an ability to present and defend their research work to a panel of experts.

The final dissertation should be submitted in black bound hard copy preferably typed on both the sides of paper as well as a soft copy on CD. The format for dissertation is attached in Annexure I.

(The due weight will be given for the paper(s) on topic of project presented in conference/s or published in referred journals.)

The Term Work of Dissertation of semester IV will be assessed jointly by the pair of internal and external examiners, along with oral examination of the same.

ANNEXURE I

Vishwakarma Institute of Information Technology

Department of Electronics & Telecommunication Engineering

Industry Internship Project – I/II or Dissertation Phase I/II Report on (Title)

By:

(Name)------------------

(GR No)------------

Batch 20xx-xx

Semester III

For the partial fulfillment of M. Tech. degree in (E&TC Engineering)

of

Savitribai Phule Pune University

Under the guidance of

Name of Guide

2019 – 2020

Vishwakarma Institute of Information Technology

Department of Electronics & Telecommunication Engineering

CERTIFICATE

This is to certify that the Industry Internship Project – I/II or Dissertation Phase I/II report entitled "_____

_____" is submitted by ------------------------- bearing G.R. No ----------------------- for the partial fulfillment of M. Tech. degree in Electronics and Telecommunication Engineering of Savitribai Phule Pune University, Pune.

GUIDE   **GUIDE**   **EXTERNAL EXAMINER**
(Internal)   (External)

HEAD OF DEPARTMENT   **DIRECTOR**

GUIDELINES FOR REPORT

- No. of copies required are **Three with spiral bound.** (One each for guide, Department and student)

- **Insert page numbers**: bottom center 11 Times New Roman
- **Do not number the sections**

1. Use MS-word: for typing the paper in A-4 size paper

2. Margins: left, right, top, bottom 25 mm.

3. Spacing: single line spacing

4. Font type: Times new roman

5. Font size:

   - 14 for the title (Bold)
   - 12 for Author name (Bold, Title case)
   - 12 bold for caption of Figures and Tables
   - Main heading: Bold, all caps
   - Subheading: Bold, Title case
   - Lower level heading: Bold
   - 10 for Abstract and abstract heading

6. Title page:

Title: all caps, bold and centered, Make sure the title is not more than 80 characters in length, including space between the words.

Abstract: should be between 100 to 150 words

7. Heading and Text:

   - Left justified bold,
   - No numbering of main and subheadings,
   - leave one line blank before and after heading
   - No underlines or foot notes
   - Each paragraph should be separated by one blank line

8. Equations:

   - Use equation editor
   - Typed and numbered in sequence
   - Write equation numbers in bracket, right justified

9. Figures and Tables:

   - Centered and numbered in sequence
   - The caption of Figure should be below and centered
   - The caption of Table should be above and centered

10. Reference:

- Each reference should be cited in the text by the last name of the author(s) and year of publication of the reference
- Reference should include year of publication, full title, name of source, volume, and page numbers.