T.E. Semester-VI Syllabus

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

T.E. Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="7">B.E.(Information Technology)</td><td colspan="4">T.E.(SEM : VI)</td></tr>
<tr><td colspan="7">Course Name : Professional Ethics and CSR</td><td colspan="4">Course Code : HSMC-IT 601</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="6">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="6">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment- Paper Duration – 1.5 Hours
ESE : End Semester Examination- Paper Duration - 3 Hours
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).</td></tr>
<tr><td colspan="10">Prerequisite: English Language and interpersonal skills</td></tr>
</table>

Course Objective:

The course intends to provide with the tools and the confidence necessary to help students effectively recognize and respond to ethical challenges that are an inevitable part of organizational life. The course also provides the understanding on professional ethics in business and recognize the corporate social responsibility.

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

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Define, understand and apply professional and business ethics	L1, L2, L3
2	Understand and apply engineering ethics in real-life situations	L1, L2, L3
3	Analyze and demonstrate professional and business ethics	L2, L3, L4
4	Describe and analyze different aspects of corporate social responsibility	L2, L3, L4
5	Understand interrelatedness of enterprises and corporate social responsibility	L2, L3, L4
6	Understand and scrutinize global ethics and issues in corporate social responsibility	L2, L3, L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Professional and Business Ethics** Concept, Definition and Meaning of Ethics, Personal and Business Ethics, The Nature of Business Ethics, Ethical Issues in Business, Moral Responsibility and Blame, Utilitarianism: Rights and Duties of Business Religion and Morality, Indian Ethical Traditions Case Studies	**06**	L1, L2, L3
2	**Engineering Ethics** Senses of Engineering Ethics, Variety of Moral Issues, Models of Professional Roles, Theories about Right Action, Competition and Self-interest, Professional Ethics and Environment, Uses of Ethical Theories Engineering as Experimentation Case Studies	**08**	L1, L2, L3
3	**Consumerism and Professional Ethics** Professional Ethics of Consumer Protection, Markets and Consumer Protection, Advertising Ethics Consumer Privacy Professional Ethics of Job Description, Nature of Job Description, Reservation of Jobs Case Studies	**08**	L2, L3, L4
4	**Introduction to Corporate Social Responsibility** Potential Business Benefits Triple Bottom Line Human Resources Risk Management Supplier Relations Criticisms and Concerns- Nature of Business, Motives and Misdirection Trajectory of Corporate Social Responsibility in India Case Studies	**06**	L2, L3, L4
5	**Corporate Social Responsibility and Enterprises** Articulation of Gandhian Trusteeship, CSR in India Corporate Social Responsibility and Small and Medium Enterprises (CSR and SMEs) in India Corporate Social Responsibility and Public Private Partnership (CSR and PPP) in India Case Studies	**06**	L2, L3, L4
6	**Corporate Social Responsibility: Global Scenario** Voluntary Guidelines, Multinational Corporations, Engineers as Managers, Expert Witnesses and Advisors Moral and Social Responsibility Legal Aspects of Corporate Social Responsibility: Companies Act, 2013 Case Studies	**08**	L2, L3, L4
	Total Hr.	**42**	

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Business Ethics: Texts and Cases from Indian Perspective	Anand Das Gupta	Springer	1st	2013
2.	Corporate Social Responsibility: Readings and Cases in a Global Context	Andrew Crane, Dirk Matten, Laura Spence	Routledge, New Delhi	5th	2007
3.	Business Ethics: Concept and Cases	Manuel G. Velasquez	Pearson, New Delhi	7th	2011
4.	Corporate Social Responsibility in India	Bidyut Chakrabarty	Routledge, New Delhi	1st	2015

Online Resources:

Sr. No.	Website Name	URL	Modules covered
1.	https://www.coursera.org/	https://www.coursera.org/learn/responsible-management	All
2.	https://www.coursera.org/	https://www.coursera.org/learn/global-sustainability-be-sustainable	All
3.	https://nptel.ac.in/	https://nptel.ac.in/courses/110/105/110105079/	M1
4.	https://nptel.ac.in/	https://nptel.ac.in/courses/110/105/110105081/	All

T.E. Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.E. (Information Technology)							**T.E.(SEM : VI)**		
Course Name :Data Ming and Business Intelligence							**Course Code : PCC-IT 601**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	
3	1	2	6	5	25	75	25	25	**150**
IA: In-Semester Assessment- Paper Duration – **1.5 Hours** **ESE : End Semester Examination-** Paper Duration - **3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).									
Prerequisite: Database Management System, Advanced Data Management Technology.									

Course Objective: The course intends to deliver the fundamentals of data mining as an important tool for enterprise data management which makes students well worse in data mining algorithms, methods of evaluation and also provide knowledge on how to gather and analyze large sets of data to gain useful business understanding.

Course Outcomes: Upon completion of the course student will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Demonstrate an understanding of the importance of data mining and the principles of business intelligence .	L1, L2
2	Perform exploratory analysis of the data to be used for mining.	L1,L2,L3
3	Organize and Prepare the data needed for data mining using pre preprocessing techniques	L1,L2,L3,L4,L5
4	Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.	L1,L2,L3,L4,L5
5	Define and apply metrics to measure the performance of various data mining algorithms.	L1,L2,L3,L4,L5
6	Apply BI to solve practical problems : Analyze the problem domain, use the data collected in enterprise, apply the appropriate data mining technique, interpret and visualize the results and provide decision support	L1,L2,L3,L4,L5,L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
0	**Prerequisite** Knowledge of databases and data warehousing, OLAP	**02**	**---**
1	**Introduction to Data Mining** What is Data Mining; kind of pattern to be mined; technologies used; kind of applications targeted, major issues in Data Mining	**03**	L1, L2
2	**Data Exploration and Data Preprocessing** Types of Attributes; Statistical Description of Data; Data Visualization; Measuring similarity and Dissimilarity; Why Preprocessing? Data Cleaning; Data Integration; Data Reduction: Attribute subset selection, Histograms, Clustering and Sampling; Data Transformation & Data Discretization: Normalization, Binning, Histogram Analysis and Concept Hierarchy generation	**08**	L1,L2,L3
3	**Frequent Pattern Mining** Market Based Analysis, Frequent Itemests, Closed Itemests and Association Rules; Frequent Itemest Mining Methods: The Apriori Algorithm for finding Frequent Itemsets using Candidate Generation, Generating Association Rules from Frequent Itemsets, A pattern growth approach for mining Frequent Itemsets; Mining Frequent itemsets using vertical data formats; Which patterns are interesting? Pattern evaluation methods.	**08**	L1,L2,L3,L4,L5
4	**Classification** Basic Concepts; Classification Methods; Decision Tree Induction: Attribute Selection Measures, Tree pruning; Bayesian Classification: "Naïve Bayes" Classifier; Rule based classification : using IF-THEN rule for classification; Accuracy and Error measures, Precision, Recall, Holdout, Random Sampling, Cross Validation.	**08**	L1,L2,L3,L4,L5
5	**Clustering** Cluster Analysis : Basic Concepts; Partitioning Methods: K-Mean, K-Medoids; Hierarchical Methods: Agglomerative, Divisive, BIRCH What are outliers? Types, Challenges; Outlier Detection Methods: Supervised, Semi Supervised, Unsupervised, Statistical, Proximity based, Clustering Based.	**08**	L1,L2,L3,L4,L5
6	**Business Intelligence** What is BI? Business Intelligence architecture; Definition of Decision support system, Development of business intelligence system Data mining for business application like fraud detection, clickstream mining, market segmentation, retail industry, telecommunication industry, banking & finance, CRM etc.	**08**	L1,L2,L3,L4,L5,L6
	Total Hr.	**45**	

List of Tutorials/Experiments:

Practical No.	Type of Experiment	Tutorial/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
	Basic experiment	2 tutorials		
1		a) Solving exercises in Data Exploration	3	L1, L2,L3
2		b) Solving exercises in Data preprocessing	3	L1, L2,L3
3	**Design Experiment**	Using open source tools implement Association Mining Algorithms	2	L1, L2,L3,L4,L5
4		Implementation of association mining algorithm using languages like JAVA/ python	2	L1, L2,L3,L4,L5
5		Using open source tools implement Classification algorithm	2	L1,L2,L3,L4,L5
6		Implementation of classification algorithm using languages like JAVA/ python	2	L1,L2,L3,L4,L5
7		Using open source tools implement Clustering Algorithms	2	L1,L2,L3,L4,L5
8		Implementation of Clustering Algorithms using languages like JAVA/ python	2	L1,L2,L3,L4,L5
9		Comparing Classifiers with different parameters	2	L1,L2,L3,L4,L5
10	**Group Activity/ Case study**	Detailed case study of any one BI tool (open source tools like Tabula can be used)	2	L1, L2,L3
11		**Business Intelligence Mini Project**: A BI report must be prepared outlining the following steps: a) Problem definition, identifying which data mining task is needed b) Identify and use a standard data mining dataset available for the problem. Some links for data mining datasets are: WEKA site, UCI Machine Learning Repository, KDD site, KDD Cup etc. c) Implement the data mining algorithm of choice d) Interpret and visualize the results e) Provide clearly the BI decision that is to be taken as a result of mining.	08	L1,L2,L3,L4,L5, L6
		Total Hrs.	**30**	

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Data Mining Concepts and Techniques	Jiawei Han, Micheline Kamber	Morgan Kaufmann	3rd	2012
2.	Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner	G. Shmueli, N.R. Patel, P.C. Bruce	Wiley	1st	2008
3.	Introduction to Data Mining	P. N. Tan, M. Steinbach, Vipin Kumar	Pearson Education	2nd	2006

Online Recourses:

Sr. No.	Website Name	URL	Modules covered
1.	https://data-flair.training	https://data-flair.training/blogs/data-mining-tutorial/	M1,M2
2.	https://hanj.cs.illinois.edu	https://hanj.cs.illinois.edu/bk3/bk3_slidesindex.htm	M3,M4,M5
3.	https://data-flair.training	https://data-flair.training/blogs/business-intelligence/	M6
4.	http://people.sabanciuniv.edu	http://people.sabanciuniv.edu/berrin/cs512/lectures/WEKA/WEKA%20Explorer%20Tutorial-REFERENCE.pdf	M3,M4,M5

T.E. Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.E.(Information Technology)					**T.E.(SEM :** VI)				
Course Name : Software Engineering with Project Management					**Course Code : PCC- IT 602**				
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	
3	-	2	5	4	25	75	25	25	**150**
IA: In-Semester Assessment- Paper Duration – **1Hours** **ESE : End Semester Examination-** Paper Duration - **3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Mini Project and presentation (40%) and Attendance /Learning Attitude (20%).									
Prerequisite: Object Oriented Paradigms, any one OOP language. Database management**.**									

Course Objective: The course intends to deliver the fundamentals of software engineering concepts and software development life cycle. Objective of the course is to provide the understanding of software life cycle process model, agile software development. It also focuses on concept concepts and principles of software design and user-centric approach and principles of effective user interfaces, testing methods and techniques, software quality assurance and configuration management, project management life cycle, project scheduling concept and risk management associated to various types of projects.

Course Outcomes: Upon completion of the course student will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Define various software application domains and remember different process model used in software development.	L1, L2
2	Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.	L1,L2,L3
3	Convert the requirements model into the design model and demonstrate use of software and user-interface design principles.	L2,L3,L4
4	Distinguish among SCM and SQA and can classify different testing strategies and tactics and compare them.	L1,L2,L3,
5	Justify role of SDLC in Software Project Development and they can evaluate importance of Software Engineering in PLC.	L1,L2,L3,L4
6	Generate project schedule and can construct, design and develop network diagram for different type of Projects. They can also organize different activities of project as per Risk impact factor.	L1,L2,L3,L4,L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
0	**Prerequisite**	**01**	**---**
	Nature of Software, Software Definition, Software Characteristics, Software Application Domains		
1	**The Software Process**	**07**	L1, L2
	Generic view of Process, Prescriptive Models: Waterfall Model, Incremental-RAD Model, Evolutionary Process Model-Prototyping, Spiral and Concurrent Development Model, Specialized Models: Component based, Aspect Oriented Development, Agile Methodology, Scrum and Extreme Programming		
2	**Requirements Engineering and Cost Estimation**	**07**	L1,L2,L3
	Requirement, Types of Requirements, Requirement gathering, Requirement Engineering Task, Identifying Stakeholders, Multiple viewpoints, SRS (Software Requirement Specification) Project Estimation, LOC based, FP based and Use case based estimation.		
3	**Analysis and Design Engineering**	**07**	L2,L3,L4
	Introduction of Analysis elements, Scenario based, Flow based, behaviour and class based Design Concepts and Principles, Architecture Design, Component Level Design, System Level Design, User Interface Design.		
4	**Quality &Configuration Management**	**07**	L1,L2,L3,
	Need for Testing, Testing Tactics, Testing strategies, McCall's Quality Factor, Software Configuration Management, SCM Process		
5	**IT Project Management**	**08**	L1,L2,L3,L4
	Introduction, 4 P's, W5HHPrinciple, Need for Project Management, Project Life cycle and ITPM, Project Feasibility, RFP,PMBOK Knowledge areas, Business Case, Project Planning, Project Charter and Project Scope.		
6	**Project Scheduling and Risk Management**	**08**	L1,L2,L3,L4,L5
	WBS, Developing the Project Schedule, Network Diagrams(AON, AOA), CPM and PERT, Gantt Chart, Risk Identification, Risk Projection and RMMM		
	Total Hr.	**45**	

Mini Project Guide Lines

1. Students should take one case study as a mini project work which is to be conducted by a group of three students
2. Each group will be associated with a subject In charge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.
3. The students must be able to identify Object oriented Technologies, Basic expression of Classes, Attributes and operations.
4. Students must develop a Conceptual Model of the UML for above case study.
5. Students should define Classes, Relationships, Class Diagrams, Advanced Classes and Relationship, Object Diagrams for above case study.
6. Students should define Use Cases, Use case Diagrams, Activity Diagrams, Interaction Diagrams, State Chart Diagrams for above case study.
7. Students should define Components, Deployment, Collaborations, Component Diagrams, and Deployment Diagrams for above case study
8. Students should define SRS, WBS, Network Diagram, Gantt chart, and Cost Estimation Techniques
9. Demonstration it using Scrum Tool
10. Each group may present their work in various project competitions and paper presentations.
11. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
4.	Software Engineering : A Practitioner's Approach	Roger S Pressman	McGraw-Hill	7th Edition	2010
5.	Information Technology Project Management	Jack T. Marchewka,	Wiley India	4th Edition	2016
6.	Software Engineering	Ian Sommerville	Pearson Education	9th edition	2011

Online Recourses:

Sr. No.	Website Name	URL	Modules covered
5.	https://nptel.ac.in	https://nptel.ac.in/courses/106101061/ https://nptel.ac.in/courses/106105087/	M1,M2
6.	https://nptel.ac.in	https://nptel.ac.in/courses/106108103/	M3
7.	https://www.guru99.com	https://www.guru99.com/software-configuration-management-tutorial.html	M4
8.	https://nptel.ac.in	https://nptel.ac.in/courses/110107081/	M5,M6

T.E. Semester-VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="6">B.E (Information Technology)</td><td colspan="4">T.E.(SEM : VI)</td></tr>
<tr><td colspan="6">Course Name: Ethical hacking and Digital Forensics</td><td colspan="4">Course Code : PEC- IT 6011</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
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ESE : End Semester Examination- Paper Duration - 3 Hours
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)
@ Capstone Project</td></tr>
<tr><td colspan="10">Prerequisite: Cryptography and Security, Computer Networks</td></tr>
</table>

Course Objective:

The course intends to deliver the fundamentals of current cyber security issues, knowledge about ethical hacking Methodology, various tool of ethical hacking, underlying principles and techniques associated with the digital forensic practices and cybercrime, importance of evidence handling and storage for various devices, investigation of attacks and apply digital forensic knowledge to use computer forensic tools, investigate attacks and report writing.

Course Outcomes: Upon completion of the course students will be able to:

SN	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Define the concept of ethical hacking and its associated applications in Information Communication Technology (ICT) world.	L1, L2
2	Explore ,apply and analysis the various ethical hacking tools using kali linux	L1,L2,L3,L4
3	Underline the need of digital forensic and role of digital evidences.	L1, L2
4	Explain the methodology of incident response and various security issues in ICT world, and identify digital forensic tools for data collection.	L1, L2,L3
5	Recognize the importance of digital forensic duplication and various tools for analysis to achieve adequate perspectives of digital forensic investigation in various applications /devices like Windows/Unix system.	L1, L2, L3,L4
6	List the method to generate legal evidence and supporting investigation reports and will also be able to use various digital forensic tools .	L1, L2, L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Cyber Crime and Ethical Hacking**	5	L1, L2
	Introduction of Cybercrime: Types of cybercrime, categories cybercrime, Computers' roles in crimes, Prevention from Cybercrime, Hackers, Crackers, Phreakers. Ethical Hacking :Difference between Hacking and Ethical hacking : Steps of Ethical Hacking, Need of ethical hackers , advantage and limitation of hacking, Skill of ethical hackers		
2	**Ethical Hacking tools with kali Linux**	10	L1,L2,L3,L4
	Installation of kali linux and configuration , Information gathering tools –Nmap , Zeen Map , Stealth Scan, Searchsploit, DNS Tools, Hping3 Vulnerability Analyses Tools- Cisco Tools, Cisco Auditing Tool, BED , Website Penetration testing tool- Vega usage, ZapProxy, Database tool – Sqlmap, exploring to Sql Injection, Social engineering tool-SET, Sniffing & Spoofing		
3	**Introduction to Digital Forensics and Digital Evidences**	5	L1, L2
	Digital Forensic, Rules for Digital Forensic The Need for Digital Forensics, Types of Digital Forensics, Ethics in Digital Forensics Digital Evidences: Types and characteristics and challenges for Evidence Handling.		
4	**Computer Security Incident Response Methodology**	8	L1, L2,L3
	Introduction to Computer Security Incident -Goals of Incident response, Incident Response Methodology, Formulating Response Strategy. IR Process – Initial Response, Investigation, Remediation, Tracking of Significant ,Investigative Information, Reporting Pre-Incident Preparation, Incident Detection and Characterization. Live Data Collection: Live Data Collection on Microsoft Windows Systems, Live Data Collection on Unix-Based Systems		
5	**Forensic Duplication and Disk Analysis, and Investigation**	8	L1, L2, L3,L4
	Forensic Duplication: Forensic Image Formats, Duplication, Live System Duplication, Forensic Duplication tools. Disk and File System Analysis: Media Analysis Concepts, File System Abstraction Model Partitioning and Disk Layouts : Partition Identification and Recovery, Redundant Array of Inexpensive Disks Special Containers : Virtual Machine Disk Images , Forensic Containers Hashing,Carving :Foremost Forensic Imaging : Deleted Data , File Slack , dd , dcfldd , dc3dd Data Analysis: Analysis, Methodology Investigating Windows systems, Investigating UNIX systems ,Investigating Applications, Web Browsers, Email, Malware Handling: Static and Dynamic Analysis		
6	**Forensic Investigation Report and Forensic Tools**	9	L1, L2, L3.L4
	Investigative Report, Guidelines for Writing a Report, sample for writing a forensic report. Computer Forensic Tools: need and types of computer forensic tools, task performed by computer forensic tools. Study of open source Tools like SFIT, Autopsy etc. to acquire, search, analyze and store digital evidence		
	Total Hrs.	**45**	

Capstone Project hours:

Work to be done	**Hrs.**	**Cognitive levels of attainment as per Bloom's Taxonomy**
Identification and Study ethical hacking and forensic tools	4	L1,L2
Project Title Identification	2	L1,L2
Understand the digital evidence and note down the observations	2	L1,L2,L3
Perform duplication and acquisition using software and hardware tools of digital forensic	4	L1,L2,L3
Design and develop system for live data collection for digital forensic of identified project	6	L1,L2,L3,L5
Perform data analysis using various tools of digital forensic for identified project	4	L2,L3,L4
Design or use the tool for network forensic for identified project	4	L2,L3
Preparation forensic investigation report of your project	4	L1,L2,L3,L
Total Hours	**30**	

Books and References:

Sr. No.	**Title**	**Authors**	**Publisher**	**Edition**	**Year**
1.	Digital Forensic : The fascinating world of Digital Evidences	Nilakshi Jain, Dhananjay Kalbande	Wiley publication	1st edition	2017
2.	Incident Response and computer forensics	Jason Luttgens, Matthew Pepe, Kevin Mandia	Tata McGraw Hill,	3rd Edition	2014
3.	Network Security Assessment	Chris McNab	O'Reily	2nd edition	2013
4.	Digital Forensics for Network, Internet, and Cloud Computing A forensic evidence guide for moving targets and data	Clint P Garrison	Syngress Publishing, Inc.	1st edition	2010
5.	Scene of the Cybercrime: Computer Forensics Handbook	Debra Littlejohn Shinder Michael Cross	Syngress Publishing	2nd edition	2008

Online References

Sr. No.	Website Name	URL	Modules Covered
1	https://www.itu.int	https://www.itu.int/en/ITU-D/Cybersecurity/Documents/Introduction%20to%20the%20Concept%20of%20IT%20Security.pdf	M1
2	https://onlinecourses.nptel.ac.in https://www.tutorialspoint.com	https://onlinecourses.nptel.ac.in/noc19_cs68/preview https://www.tutorialspoint.com/kali_linux/index.htm	M2
2	https://searchsecurity.techtarget.com	https://searchsecurity.techtarget.com/definition/incident-response	M3
3	https://www.educba.com	https://www.educba.com/32-most-important-cyber-security-tools/	M4,M5
4	https://digital-forensics.sans.org	https://digital-forensics.sans.org/blog/2010/08/25/intro-report-writing-digital-forensics/	M6

T.E. Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.E. Information Technology							**T.E. SEM: VI**		
Course Name: Computer Graphics & Virtual Reality							**Course Code: PEC-IT 6012**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	**150**
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IA: In-Semester Assessment- Paper Duration – **1.5 Hours** **ESE : End Semester Examination-** Paper Duration - **3 Hours** **The weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%) @ Capstone Project									
Prerequisite: mathematics & any programming language **RBT :** Revised Bloom's Taxonomy									

Course Objectives: The course intend to deliver the fundamentals of components of graphics system and apply 3-dimensional computer graphics to convert geometrical primitives, transform shapes, develop computer games, information visualization business applications and analyze the fundamentals of animation, virtual reality.

Course Outcomes: Upon completion of the course student will be able to:

Sr. No.	Course Outcomes	RBT level
1	Understand basic concepts used in computer graphics.	L1, L2
2	Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.	L1, L2, L3,L4,
3	Implement & Describe the importance of viewing and projections.	L1, L2, L3,L4
4	Define the fundamentals of animation, virtual reality and its related technologies.	L1, L2, L3,L4
5	Understand a typical graphics pipeline.	L1, L2
6	Understand & explain Modeling & programming in VR	L1, L2,L3

Detailed Syllabus:

Module No.	Topics	Hrs.	RBT Levels
	Prerequisites Basic mathematics & any programming language	-	
1	**Introduction to Computer graphics and Output primitives1**	8	
	Display Devices, Bitmap and Vector based graphics, Overview of Coordinate System. **Scan Conversion of:** point, line using Digital differential analyzer & Bresenham's algorithm, circle using midpoint approach, **Curve Generation:** Bezier and B-Spline curves. Introduction to fractals: generation procedure, classification, dimension and Koch Curve.		L1, L2
2	**Area Filling, Transformations (2D & 3D)**	8	L1, L2, L3,L4
	Area filling: Inside/Outside Test, Scan line Polygon Fill Algorithm, Boundary Fill and Flood Fill algorithm. Basic Geometrical 2D Transformations: Translation, Rotation, Scaling, Reflection, Shear, their homogeneous Matrix representation and Composite transformation. Three Dimensional transformations: Translation, Scaling, Rotations, Composite		
3	**Viewing (2D and 3D) Projection and Clipping**	6	L1, L2, L3,L4
	Viewing: Introduction, Viewing Pipeline, View Coordinate reference frame, Window to viewport transformation. Three-Dimensional Viewing: 3D Pipeline, Viewing transformation, Projections: Parallel (Oblique and orthographic), Perspective (one point) , Clipping: Point clipping, Line clipping: Cohen Sutherland Algorithm, Liang Barsky algorithms, Polygon clipping: Sutherland Hodgeman polygon clipping and Weiler Atherton. Text Clipping		
4	**Introduction to Animation** **Animation:** Key Frame Animation, Animation Sequence, Motion Control Methods, **Morphing, Warping**- Mesh Warping.	5	L1, L2,L3,L4
5	**Introduction to Virtual Reality**	8	
	Virtual Reality: Basic Concepts, Overview and perspective on virtual reality, Human sensation and perception. Classical Components of VR System, Types of VR Systems, Three-Dimensional Position Trackers, Navigation and Manipulation Interfaces, Gesture Interfaces, Input Devices, Graphical Display, Sound displays, and Haptic Feedback. Graphical Rendering Pipeline, Haptic Rendering Pipeline, Open GL rendering pipeline.		L1, L2
6	**VR Modeling and Programming** **Geometric Modeling:** Virtual Object Shape, Object Visual Appearance. **Kinematics Modeling:** Object Position, Transformation Invariants, Object Hierarchies, **Physical Modeling:** Collision Detection, Surface Deformation, Force Computation. **Behavior Modeling:** Programming through VRML/X3D: Defining and Using Nodes and Shapes, VRML Browsers, Java 3D, OpenCV for augmented reality	8	L1, L2,L3
	Total Hours	45	

Capstone Project:

Work to be done	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
Identification and Study of computer graphics commands & loading graphics driver on system, implementation of viewing and clipping.	4	L1,L2,L3
Project Title Identification	2	L1,L2,L3
Modelling or prototype design	2	L1,L2,L3
Graphics Design	8	L1,L2,L3,L4,L5
Implementation	8	L1,L2,L3,L4,L5
Testing of Mini Project	2	L1,L2,L3,L4,L5
Preparation of Report	4	L1,L2,L3,L4,L5
Total Hours	**30**	

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	Computer Graphics	Donald Hearn and M. Pauline Baker	Pearson Education.	Second	2008
2	Computer Graphics with Virtual Reality	R. K Maurya	Wiley India	First	2009
3	Virtual Reality Technology	Grigore Burdea, Philippe Coiffet	Wiley	Second	2005
4	Computer Graphics	Steven Harrington	McGraw Hill	First	2007
5	Procedural Elements of Computer Graphics	Rogers	Tata McGraw Hill	First	2001
6	Virtual Reality Systems	Vince	Pearson Education	First	2007
7	Computer Graphics using Open GL	F.S. Hill, Stephen M. Kelley	Prentice Hall	First	2007
8	Learning OpenCV 3 Application Development	Samyak Datta	Packt	First	2016

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://www.tutorialspoint.com/computer_graphics/	http://ecomputernotes.com/computer-graphics/basic-of-computer-graphics/introduction-to-computer-graphics, https://www.tutorialspoint.com/computer_graphics/computer_graphics_basics.htm, https://www.tutorialspoint.com/computer_graphics/line_generation_algorithm.htm, https://www.tutorialspoint.com/computer_graphics/circle_generation_algorithm.htm, https://www.tutorialspoint.com/computer_graphics/computer_graphics_curves.htm	M1
2	https://www.tutorialspoint.com/computer_graphics/	https://www.tutorialspoint.com/computer_graphics/2d_transformation.htm, https://www.tutorialspoint.com/computer_graphics/3d_transformation.htm	M2
3	https://www.tutorialspoint.com/computer_graphics/	https://www.tutorialspoint.com/computer_graphics/viewing_and_clipping.htm	M3
4	https://www.tutorialspoint.com/computer_graphics/	https://www.tutorialspoint.com/computer_graphics/computer_animation.htm	M4
5	https://www.marxentlabs.com/what-is-virtual-reality/, https://www.vrs.org.uk/virtual-reality-applications/	https://www.marxentlabs.com/what-is-virtual-reality/, https://www.vrs.org.uk/virtual-reality-applications/, http://www.iamwire.com/2017/10/19-ways-on-how-to-get-the-most-from-virtual-reality/167724, https://www.realitytechnologies.com/virtual-reality/	M5
6	https://www.explainthatstuff.com/virtualreality.html	https://www.explainthatstuff.com/virtualreality.html http://what-when-how.com/Tutorial/topic-8032kh/Interactive-Web-Based-Virtual-Reality-with-Java-3D-22.html, https://www.whoishostingthis.com/resources/vrml/	M6

T.E. Semester –VI
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="7">T.E. (Information Technology)</td><td colspan="3">T.E. (SEM: VI)</td></tr>
<tr><td colspan="7">Course Name: Advanced Data Structures & Analysis of Algorithms</td><td colspan="3">Course Code: PEC-IT 6013</td></tr>
<tr><td colspan="7">Contact Hours Per Week : 3</td><td colspan="3">Credits : 4</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>Oral</td><td>TW</td><td rowspan="2">150</td></tr>
<tr><td>3</td><td>-</td><td>2@</td><td>5</td><td>4</td><td>25</td><td>75</td><td>25</td><td>25</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment- Paper Duration – 1.5 Hours
ESE : End Semester Examination- Paper Duration - 3 Hours
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)
@ Capstone Project</td></tr>
<tr><td colspan="10">Prerequisite: Data Structure and Algorithms
RBT : Revised Bloom’s Taxonomy</td></tr>
</table>

Course Objective: The course intends to apply the concept of Advanced Data Structures

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	RBT level
1	Choose appropriate advanced data structure for given problem	L1,L2,L3,L4,L5,L6
2	Calculate complexity of the problem	L1,L2,L3
3	Select appropriate design techniques to solve real world problems	L1,L2,L3,L4
4	Analyze the dynamic programming technique to solve the problems	L1,L2,L3,L4
5	Analyze the greedy programming technique to solve the problems	L1,L2,L3,L4
6	Select a proper pattern matching algorithm for given problem	L1,L2,L3,L4,L5,L6

Detailed Syllabus:

Module No.	Topics	Hrs.	RBT Levels
	Prerequisites Knowledge Any Programming Language, Data structures and Analysis	-	
1	**Introduction Advanced Data Structures**	8	
	Introduction to advanced data structures: Introduction/Fundamentals of the analysis of algorithms. Recurrences: The substitution method, Recursive tree method, Masters method. Probabilistic analysis, Amortized analysis, Randomized algorithms, Mathematical aspects and analysis of algorithms		L1,L2,L3,L4,L5, L6
2	**Advanced Data Structures**	8	
	Introduction. AVL tree, Huffman algorithm, B/B+ tree, 2-3 tree operations, Red-Black Trees, tries, Heap operations, Implementation of priority, queue using heap, Topological sort		L1,L2,L3
3	**Divide and Conquer**	7	
	Introduction. Binary search, Finding the minimum and maximum, Merge sort, Quick sort, Strassen's matrix multiplication, Analysis of All problems		L1,L2,L3,L4
4	**Greedy algorithms** Introduction. Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Kruskal's algorithm, Prim's algorithm. Optimal storage on tapes, Optimal merge pattern, Subset cover problem, Container loading problem. Analysis of All problems	8	L1,L2,L3,L4
5	**Dynamic algorithms & NP-Hard and NP-Complete**	8	
	Introduction Dynamic algorithms. All pair shortest path, 0/1 knapsack, Travelling salesman problem, Coin Changing Problem, Matrix Chain Multiplication, Flow shop scheduling, Optimal binary search tree (OBST), Analysis of All problems, Introduction to NP-Hard And NP-complete Problems		L1,L2,L3,L4
6	**String Matching** Introduction. The naïve string matching algorithm, Rabin Karp algorithm, Knuth-Morris-Pratt algorithm (KMP), Longest common subsequence(LCS), Analysis of All problems, Genetic algorithms	6	L1,L2,L3,L4,L5, L6
	Total Hours	45	

Capstone Project Hours Distribution:

S NO	Work to be done	No. of Hours	Cognitive levels of attainment as per Bloom's Taxonomy
1	Study Research papers, articles, mini project title identification	**4**	L1,L2
2	Project Title finalization and development of Modules	**2**	L1,L2
3	Design methodology and tools for implementation	**4**	L1,L2
4	Implementation of Modules phase 1	**4**	L1,L2,L3
5	Result Phase I	**2**	L1,L2,L3,L4
6	Implementation of Modules Phase 2	**4**	L1,L2,L3
7	Result Phase II	**2**	L1,L2,L3,L4
8	Testing	**2**	L1,L2,L3,L4
9	Result validation	**2**	L1,L2,L3,L4,L5
10	Report Writing	**4**	L1,L2
	Total Hours	**30**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Introduction to ALGORITHMS	Cormen, Leiserson, Rivest, Stein	PHI	3rd Edition	2011
2	Algorithms: Design and Analysis	Harsh Bhasin	Oxford Publication	3rd Edition	2016

3	Fundamentals of Computer Algorithms	Horowitz, Sahani, Rajsekaran	Universities Press	2nd	2005
4	C and Data structures	Deshpande, Kakde	Dream Tech	3rd	2017
5	Data Structures and Algorithms in C++	Goodritch, Tamassia, Mount	Wiley	1st	2011

Online References:

S. No.	Website Name	URL	Modules Covered
1.	NPTEL	https://nptel.ac.in/courses/106102064/	M1
2.	NPTEL	https://nptel.ac.in/courses/106102064/6	M2
3.	NPTEL	https://nptel.ac.in/courses/106102064/14	M3
4.	NPTEL	https://nptel.ac.in/courses/106102064/33	M4
5.	Tutorials point.com	https://www.tutorialspoint.com/analysis_of_algorithm/dynamic_programming_travelling_salesman_problem.asp	M5
6.	Technopedia.com	https://www.techopedia.com/definition/17137/genetic-algorithm	M6

T.E. Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.E. (Information Technology)					T.E. (SEM: VI)				
Course Name: Internet of Everything					Course Code: PEC-IT-6014				
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (50)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	OR	TW	
3	-	2 @	5	4	25	75	25	25	150

IA: In-Semester Assessment- Paper Duration – **1.5 Hours**
ESE: End Semester Examination- Paper Duration - **3 Hours**
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).
@: Professional Elective Courses Lab will be conducted in the form Capstone Project

Prerequisite: IOT Lab, Sensor Lab, Wireless Network

Course Objective: The course intends to deliver the fundamentals of IOT concepts used for smart city development, IoT technologies, applications, protocols, and analytics of data in IOT

Course Outcomes: Upon completion of the course student will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Apply the concepts of IOT	L1, L2,L3
2	Identify the different technology	L1, L2,L3
3	Apply IOT to different applications	L1, L2,L3
4	Analysis and evaluate protocols used in IOT	L1, L2,L3,L4
5	Design and develop smart city in IOT	L1, L2,L3,L4, L5,L6
6	Analysis and evaluate the data received through sensors in IOT	L1, L2,L3,L4,L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
0	**Prerequisites** What are sensors, Sensor family, Architecture of single node	03	L1
1	**Introduction** Introduction, History of IOT, Objects in IOT, Identifier in IOT, Technologies in IOT	03	L1, L2,L3
2	**RFID** Introduction, Principle of RFID, Components of RFID system, RFID tag,	07	L1,L2,L3
3	**RFID** RFID applications: Logistics and Supply chain, Production, Monitoring and Maintenance, product safety, quality and information, access control and tracking and tracing of individuals, payment, loyality, household etc. Hardware, Hardware issues, protocols: pure aloha, slotted aloha, frame slotted aloha, tree protocols, tree splitting algorithms, binary search algorithms, bitwise arbitration protocols. Main query tree protocols.	08	L1, L2, L3
4	**Wireless Sensor Networks** History and context, Node, Connecting Nodes, Networking Nodes, Securing Communication, Standards and Fora. Networking and Internet – IP Addressing, Protocols-MQTT, CoAP, REST Transferring data.	08	L1, L2, L3, L4
5	**Mobility and** Introduction, localization, mobility management, localization and handover management, technology considerations, performance evaluation, simulation setup, performance results. Identification of IOT (Data formats, IPv6, identifiers and locaters, tag etc.)	08	L1, L2, L3, L4, L5 L6
6	**Tools & Application for IOE** Introduction, Apache, Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Using Apache Storm for Real-time Data Analysis, Agriculture & Health Monitoring Case Study. Tools for IOT: Chef, Chef Case studies, Puppet, Puppet Case Study	08	L1, L2, L3, L4, L5
	Total Hr.	45	

Capstone Project:

Subject – Internet of everything

Title: A Case study of RFID & Mini Project:

Work to be done	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
Identification and Study of Internet of Things - (Parameters require – different types of sensors & tools for IOT)	2	L1, L2, L3
Project Title Identification as per literature survey	2	L1, L2, L3, L4
Finalize design requirements of IOT system for Industry, Smart City--- Gathering the hardware, software requirements to deploy network etc.(as per Project Title)	4	L1, L2, L3, L4, L5
Selection of Communication Technologies: Introduction to ZigBee, BLE, WiFi, LTE, IEEE 802.11ah, Discuss data rate, range, power, computations/bandwidth, QoS	2	L1, L2, L3, L4
Case Study: Any RFID Application	2	L1, L2, L3, L4
Study Tools for IOT: tools used in IT industries to facilitate the infrastructure as Code. (Any One Tool)	4	L1, L2, L3, L4
Study performance evaluation for WSN Protocol: LEACH	4	L1, L2, L3
Hands-on in IoT: Projects based on some Hardware (Raspberry pi, Arduino, Intel, IITH Mote, Smartphones), Software (Contiki, TinyOS, Android), IoT Fabricator etc. can be used.	1	L1, L2, L3, L4
Use An Application to connect Phone to the CloudMQTT Broker OR Create and interface using Mobile/Web to publish or remotely access the data on Internet.	3	L1, L2, L3, L4, L5, L6
IOE Mini Project – Technical feasibility study to be carried out for effective operations	2	L1, L2, L3, L4, L5, L6
Preparation of Report	4	L1, L2, L3, L4, L5, L6
Total Hours	30	

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Internet of Things connecting objects to the web	Hakima Chaouchi	Wiley	1st	2010
2.	Internet of Things (A Hands-on Approach)	Arshdeep Bhaga and Vijay Madisetti.	--	---	2014
3.	The Internet of Things	Samuel Greengard	MIT Press	2nd	2015
4.	RFID and the Internet of Things	Herve chabanne	Wiley	1st	2013

5.	Fundamentals of Sensor Network Programming: Applications and Technology	S. Sitharama Iyengar, Nandan Parameshwaran, Vir V. Phoha, N. Balakrishnan, Chuka D.	John Wiley & Sons	1st	2010
6.	Building the internet of things with ipv6 and mipv6, The Evolving World of M2M	Daniel Minoli	John Wiley & Sons	1st	2013
7.	6LoWPAN: The Wireless Embedded Internet	Zach Shelby, Carsten Bormann	Wiley	1st	2009
8.	Interconnecting Smart Objects with IP: The Next Internet	Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann	Elsevier	1st	2010
9.	Designing the Internet of Things	Adrian McEwen (Author), Hakim Cassimally	John Wiley & Sons	1st	2013
10.	Internet of Things: Converging Technologies for Smart Environments and	Dr. Ovidiu Vermesan, Dr. Peter Friess	River Publishers	1st	2013
11.	Internet of Things (A Hands-on- Approach)	Vijay Madisetti , Arshdeep Bahga	John Wiley & Sons	1st	2014

Online Recourses:

Sr. No.	Website Name	URL	Modules covered
1.	https://www.nptel.ac.in	https://nptel.ac.in/courses/106105166/	M1,M2,M3, M4,M5,M6
2.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/internet_of_things/net_of_things_pdf	M1,M2,M3, M6
3.	http://www.listingtec.com	http://www.listingtec.com/nptel-iot-assignment-8-answers-introduction-to-internet-of-things/	M1,M4,M5, M6

T.E. Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="5">B.E. (Information Technology)</td><td colspan="4">T.E. (SEM: VI)</td></tr>
<tr><td colspan="5">Course Name: Mobile Application Development</td><td colspan="4">Course Code: PEC- IT 6015</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5" rowspan="2">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>OR</td><td>TW</td><td rowspan="2">150</td></tr>
<tr><td>3</td><td>-</td><td>2@</td><td>5</td><td>4</td><td>25</td><td>75</td><td>25</td><td>25</td></tr>
<tr><td colspan="9">IA: In-Semester Assessment- Paper Duration – 1Hours</td></tr>
<tr><td colspan="9">ESE: End Semester Examination- Paper Duration - 3 Hours</td></tr>
<tr><td colspan="9">Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%),
Mini Project and presentation (40%) and Attendance /Learning Attitude (20%).
@ Capstone Project</td></tr>
<tr><td colspan="9">Prerequisite: JAVA Programming, Internet Programming</td></tr>
</table>

Course Objective: The course intends to deliver the fundamental knowledge of Android platform and its architecture, apply and create Android UI designing, broadcast receivers, Internet services, SQLite Database, integrate multimedia, camera, Location based services and know about Mobile security issues.

Course Outcomes: Upon completion of the course student will be able to:

S. No	Course Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Describe Android platform, Architecture and features.	L1, L2, L3, L4
2	Design User Interface and develop activity for Android App.	L1, L2, L3, L4, L6
3	Use Intent, Broadcast receivers and Internet services in Android App.	L1, L2, L3, L4, L6
4	Design and implement Database Application and Content providers.	L1, L2, L3, L4, L6
5	Use multimedia, camera and Location based services in Android App.	L1, L2, L3, L4, L6
6	Discuss various security issues in Android platform	L1, L2, L3, L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Android and Architecture of Android** Introduction of Android platform, Android features, Android Marketplace, Evolution of Android OS, Android Application Architecture, Android Development Tools, First Android application, How to run and debug applications (Emulator vs. Real device), Android project structure, XML files, Enhancing the first app	07	L1, L2, L3, L4
2	**Applications, Activities and Building User Interface** Application: Application Manifest File, Externalizing Resources, Android Application Lifecycle and Android Application Class. User Interface: Fundamental Android UI Design, Layouts, Toast, Button, Toggle Button, Switch Button, Image Button, CheckBox, RadioBox, AlertDialog, Spinner, Auto Complete TextView, RatingBar, DatePicker, TimePicker, ProgressBar, File Download, Introduction to fragments Fragment, Fragment Example. Android Activity: Activity Lifecycle and Android Activity classes, Activity Example, Lifecycle, Creating new views, widget toolbox, Adapters(ArrayAdapters, BaseAdapters)	08	L1, L2, L3, L4, L6
3	**Intents, Broad Cast receiver and Internet Resources** Intents, Types of Intents (Implicit and Explicit), Linking Activities Using intents, Calling Built-in Applications Using intents, displaying notifications, Creating Intent Filters, Broadcast Receivers, Downloading and Parsing Internet Resources, Using the Download Manager, Internet Services, connecting to Google App Engine, Downloading Data Without Draining the Battery.	08	L1, L2, L3, L4, L6
4	**Data Persistence and Content Providers** Content Providers: Introducing Android Databases, Introducing SQLiteDatabse, DML & DDL Queries in brief, SQLiteOpenHelper, Cursor, SQLite Programming, Android Debug Bridge(adb) tool, Parsing an XML document, Parsing JSON data, Creating Content Providers, Using Content Providers. Adding Search to Your Application, Native Android Content Providers.	08	L1, L2, L3, L4, L6
5	**Audio, Video, Camera, Maps, Geocoding and Location Based Services** Playing Audio and Video, Manipulating Raw Audio, Using Audio, Using the Camera for Taking Pictures, Recording Video, Using Media Effects, Adding Media to the Media Store. Using Location-Based Services, Using the Emulator with Location-Based Services, selecting a Location Provider, Finding Your Current Location, Location Updates, Proximity Alerts, Geocoder, Map-Based Activities, Displaying Maps.	08	L1, L2, L3, L4, L6
6	**Securing and Publishing Android Application** Android Security Model, Android's Manifest Permissions, Mobile Security Issues, Recent Android Attacks, Pen Testing Android. Preparing for Publishing, Deploying APK Files.	06	L1, L2, L3, L6
	Total Hr.	45	

Capstone Project Guide Lines

1. The mini project work is to be conducted by a group of three students
2. Each group will be associated with a subject Incharge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.

3. The students may do survey for different application which they can create Apps using Android.

4. Students will do Installation, configuration of Android Studio & to create AVD and also try for Cross platform Integrated Development Environment (Any Open Source Tool).

5. Students will try to Design and implement following points in their Mini Project (Android Apps)
   a) Widget box for Android phone.
   b) Use Layouts
   c) Use Intents
   d) Use Activity
   e) Use SQLite
   f) Use Camera
   g) Use Location API
   h) Generate APK file

6. Each group along with the concerned faculty shall identify a potential problem statement for Apps development, on which the study and implementation is to be conducted.

7. Each group may present their work in various project competitions and paper presentations.

8. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Capstone Project Hours Distribution:

Sr. No.	Work to be done	No. of Hours	Cognitive levels of attainment as per Bloom's Taxonomy
1	Study Research papers, articles, mini project title Identification	4	L1, L2
2	Project Title finalization and development of Modules	2	L1, L2
3	Design methodology and tools for implementation	4	L1, L2
4	Implementation of Modules phase 1	4	L1, L2, L3
5	Result Phase I	2	L1, L2, L3, L4
6	Implementation of Modules Phase 2	4	L1, L2, L3
7	Result Phase II	2	L1, L2, L3, L4
8	Testing	2	L1, L2, L3, L4
9	Result validation	2	L1, L2, L3, L4, L5
10	Report Writing	4	L1, L2
	Total Hours	30	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Professional Android 4 Application Development	RETO MEIER	Wrox publication	3rd	2012
2	Android Security attack and defenses, by CRC Press	Abhishek Dubey, Anmol Misra	CRC Press	1st	2013
3	Beginning Android Application Development	Wei-meng Lee	Wrox publication	1st	2011
4	Android Application Development For Dummies	Michael Burton, DonnFelker	John Wiley & Sons	2nd	2012
5	Android Cookbook	Ian F. Darwin	O'Reilly Media	1st	2011

Online Recourses:

Sr. No.	Website Name	URL	Modules Covered
1.	https://developer.android.com www.tutlane.com www.tutorialspoint.com	https://developer.android.com/training/basics/firstapp https://www.tutlane.com/tutorial/android/android-introduction https://www.tutorialspoint.com/android/android_environment_setup.htm https://www.tutorialspoint.com/android/android_application_components.htm	M1
2.	www.tutlane.com www.tutorialspoint.com	https://www.tutlane.com/tutorial/android/android-ui-controls-textview-edittext-radio-button-checkbox https://www.tutorialspoint.com/android/android_acitivities.htm	M2
3.	www.udemy.com www.coursera.org/ www.tutlane.com www.tutorialspoint.com	https://www.udemy.com/learn-android-application-development-y/ https://www.coursera.org/specializations/android-app-development https://www.tutorialspoint.com/android/android_intents_filters.htm	M3
4.	www.tutlane.com www.tutorialspoint.com	https://www.tutlane.com/tutorial/android/android-content-providers-with-examples https://www.tutlane.com/tutorial/android/android-sqlite-database-with-examples https://www.tutorialspoint.com/android/android_json_parser.htm	M4
5.	www.tutlane.com www.tutorialspoint.com	https://www.tutlane.com/tutorial/android/android-google-maps-api-with-examples https://www.tutorialspoint.com/android/android_location_based_services.htm https://www.tutorialspoint.com/android/android_camera.htm https://www.tutlane.com/tutorial/android/android-audio-media-player-with-examples	M5
6.	www.tutlane.com www.tutorialspoint.com	https://www.tutlane.com/tutorial/android/android-test-app-on-real-device-mobile-phone https://www.tutlane.com/tutorial/android/android-publish-app-on-google-play-store	M6

T.E. Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

BE Information Technology							**T.E (SEM : VI)**		
Course Name: Digital Marketing							**Course Code:OEC -IT 6011**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
3	-	-	3	3	25	75	-	-	**100**
IA: In-Semester Assessment- Paper Duration – **1.5 Hours** **ESE : End Semester Examination-** Paper Duration - **3 Hours**									
Prerequisite: Marketing Fundamentals, Digital Assets, Digital System Setup and automation									

Course Objective: The course will transform you into a complete digital marketer with expertise in the top eight digital marketing domains — search engine optimization, social media, pay-per-click, conversion optimization, digital analytics, content, mobile, and email marketing. Fast-track your career in digital marketing today with practical training you can apply on the job.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Understand Digital Business Models	L1,L2
2	Understand A.I. and machine learning terminologies, mind-set and its application in marketing	L1,L2
3	Build sophisticated machine learning models – learn how to gather and clean data, select an algorithm, train, evaluate and deploy a model	L1,L2
4	Predict churn, sales or score leads with tools	L1,L2,L5
5	Segment customers; build clustering models to drive personalization.	L1,L2,L5,L6
6	Build computer vision models for social visual listening, use natural language processing to predict consumption preferences.	L2,L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction - Digital Marketing** Digital Marketing Skills empowered by AI :SEO, Search Engine Marketing, Social Media Marketing, Web Analytics, Email Marketing, Content Marketing, Influencer Marketing, Conversion Rate Optimization, Tools Based Marketing, Lifecycle Marketing Automation.	7	L1,L2
2	**Full Funnel Marketing** **Acquisition:** Content marketing, landing page testing, campaign optimization, conversion rate optimization, lead scoring, competition and trend analysis, predict sales, optimize product pricing,	8	L1,L2,L3

	programmatic media buying, segmentation and clustering for targeting, personalization. **Activation** Personalization, psychographic segmentation, behavioral segmentation **Retention** Predict churn, customer care chatbot, sentiment analysis, visual social listening, personalization **Revenue** Predict and maximize customer lifetime value, recommender systems, market basket analysis **Referral** Predict whether user recommend your product		
3	**Marketing framework and tools** **Planning:**Hubspot, Brightedge, Node, Crayon, Equals3, Marketmuse, Pathmatics, Calibermind, Alegion, Netra **Production** : Acrolinx, Narrative Science,Clarifai, GumGum, phrasee, curate Attentioninsight **Personalization** : Uberflip, Klevu, Seventh Sense, Blueshift, **Promotion** : Yext, Albert, Onespot, Cortex, Siftrock, inPowered, **Performance :**Monkeylearn, PaveAI,	8	L1,L2,L3,L5
4	**Predictive Analytics** Fundamentals of predictive analytics, Prediction model for lead scoring and sales forecasting, churn prediction model, Predictive modelling for customer behaviour, automated segmentation	7	L1,L2,L3,L5
5	**Psychographics, NLP and Computer Vision** Customer psychographics, leveraging personality traits to predict consumption preferences using NLP, Detect emotions, assign labels, understand text from images, detect news events, logos using Computer Vision	7	L1,L2,L3,L5
6	**Futuristic Marketing** IoTs Augmented Reality, Virtual Reality and XR for Marketing, Blockchain and smart contracts for marketing, NeuroMarketing, Wearable Tech, Personal Chatbots	8	L2,L3
	Total Hours	**45**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Artificial intelligence marketing and predicting consumer choice: an overview of tools and techniques	Struhl, S.	Kogan Page Publishers	Third	2017
2	AI for Marketing and Product Innovation: Powerful New Tools for Predicting Trends, Connecting with Customers, and Closing Sales.	Appel, A., Sthan unathan, S., Prad eep, A. K.	Wiley.	Third	2018
3	Artificial intelligence for marketing: practical applications	Sterne, J.	John Wiley & Sons	Fourth	2017..
4	Using Artificial Intelligence in Marketing: How to harness AI and maintain the competitive edge.	King, K.	Kogan Page Publishers	First	2019

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://www.iimcal.ac.in/	https://iimcal.talentsprint.com/ai-powered-marketing/index.html?utm_source=googlesearch&utm_medium=cpc&utm_campaign=iimc-aipm-googlesearch-india&utm_content=ai-in-marketing-by-iimc&gclid=CjwKCAjwyo36BRAXEiwA24CwGVQrXnOTpcARRsFtvt8b9VAPqwV7KGPFmPyx36i1Zafl_7Br1OJEEhoChC4QAvD_BwE/	M1,M2,M3,M4,M5,M6
2	https://www.coursera.org/	https://www.coursera.org/learn/uva-darden-market-analytics	M4,M5,M6
3	https://academy.hubspot.com/	https://academy.hubspot.com/courses/artificial-intelligence-and-machine-learning-in-marketing?__hstc=89107140.de4401799f3edce1fd42a1704a37ab4a.1598174195879.1598174195879.1598174195879.1&__hssc=89107140.1.1598336323938&__hsfp=3825083997&hsCtaTracking=e4d097a0-ed0c-4f82-8e93-e9016ea31749%7C00439f3d-17bf-4431-af12-50a507004fcd	M1,M2,M3,M4,M5,M6

T.E. Semester-VI
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="5">B.E (Information Technology)</td><td colspan="4">T.E.(SEM : VI)</td></tr>
<tr><td colspan="5">Course Name: Software Process Automation</td><td colspan="4">Course Code : OEC-IT 6012</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR /OR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="9">IA: In-Semester Assessment- Paper Duration – 1.5 Hours
ESE : End Semester Examination- Paper Duration - 3 Hours</td></tr>
<tr><td colspan="9">Prerequisite: Object Oriented Programming, Frontend Backend connectivity</td></tr>
</table>

Course Objective:
The objective of the course is to introduce to the students about the integration people involved in the software process with the development and tools required for automation of the project development.

Course Outcomes: Upon completion of the course students will be able to:

SN	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Understand the importance of process automation and models of software process	L1, L2
2	Analyze the security and configuration management	L1, L2, L3,L4
3	Understand and apply the build concepts using a build tool	L1, L2, L3,L4
4	Understand the testing concepts and apply them to the project	L1, L2, L3,L4
5	Identify the activities in agile project management and use a tool for the same	L1, L2, L3,L4
6	Understand and identify the various principles of quality assurance	L1, L2, L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to process Automation** Importance of process automation, types of models, prescriptive and descriptive models, Devops model, process modelling objectives and goals	6	L1, L2
2	**Automation of config management** overview of configuration management, Github and git tool	8	L1, L2, L3,L4
3	**Build automation** Overview of build management, Jenkins tool for build management	4	L1, L2, L3,L4
4	**Test automation** Overview of testing concepts, test cases , selenium tool	8	L1, L2, L3,L4
5	**Project management** Project management concepts, agile team, Atlasian jira project management tool	8	L1, L2, L3,L4
6	**Quality management** Quality concepts and metrics, CMMI, ISO, spice, six sigma, Total Quality management	11	L1, L2, L3,L4
	Total Hours	**45**	

Books and References:

	Title	Authors	Publisher	Edition	Year
1	The DevOps handbook	Gene Kim, Jez Humble, Ptrik Debois & John Willis	IT revolution Press	first Edition	2016
2	Selenium WebDriver 3 Practical Guide: End-to-end Automation Testing for Web and Mobile Browsers with Selenium WebDriver	Satya Avasarala	Packt Publishing Ltd,	Second Edition	2018

Online Resources:

S. No.	Website Name	/URL	Modules Covered
1	www.researchgate.com	https://www.researchgate.net/publication/258865356_Software_Process_Definition_and_Management	M6

T.E. Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.E. (Information Technology)							**T.E. SEM: VI**		
Course Name :Entrepreneurship Development and Management							**Course Code :** OEC IT-6013		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration – 1.5 Hour **ESE: End Semester Examination - Paper Duration - 3 Hours** **The weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)									
Prerequisite: entrepreneurial mindset									

Course Objective: The course intends to inculcate entrepreneurial skills into the students and groom the aspiring learner to establish and successfully run an enterprise.

Course Outcomes: Upon completion of the course students will be able to

Sr No	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Recognize an overview of basic entrepreneurship concepts	L1, L2
2	Design a business plan and understand importance of capital	L1, L2, L3, L4, L5, L6
3	Discuss the rules and legislation w.r.t. entrepreneurship	L1, L2
4	Identify sources for organizational assistance in this field	L1, L2
5	Use knowledge gained for effective management of business	L1, L2, L3
6	Recognize ways of achieving success in business	L1, L2

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Overview of Entrepreneurship** Definition, Importance, Roles and Functions, Evolution of term 'Entrepreneurship', Factors influencing Entrepreneurship, Characteristics of an Entrepreneur, of Types of Entrepreneur, Contribution of Government Agencies in Sourcing information for Entrepreneurship, Role of Entrepreneurship in the National Economy	5	L1, L2
2	**Business Plans and importance of capital to Entrepreneurship** Preliminary and Marketing Plans, Management and Personnel, Start-up Costs and Financing as well as Projected Financial Statements, Legal Section, Insurance, Suppliers and Risks, Assumptions and Conclusion, Capital and its Importance to the Entrepreneur Entrepreneurship And Business Development: Starting a New Business, Buying an Existing Business, New Product Development, Business Growth and the Entrepreneur Law and its Relevance to Business Operations	10	L1, L2, L3, L4, L5, L6
3	**Rules and Legislation** Applicability of Legislation, Industries Development (Regulations) Act, 1951, Factories Act, 1948, The Industrial Employment (Standing Orders) Act, 1946, West Bengal Shops and Establishment Act, 1963, Environment (Protection) Act, 1986, The sale of Goods Act, 1950, Industrial Dispute Act 1947	6	L1, L2
4	**Organization Assistance** Assistance to an entrepreneur, New Ventures, Industrial Park (Meaning, features, & examples), Special Economic Zone (Meaning, features & examples), Financial assistance by different agencies, MSME Act Small Scale Industries, Carry on Business (COB) license, Environmental Clearance, National Small Industries Corporation (NSIC), Government Stores Purchase scheme (e-tender process), Excise exemptions and concession, Exemption from income tax, Quality Standards with special reference to ISO, Financial assistance to MSME, Modernization assistance to small scale unit, The Small Industries Development Bank of India (SIDBI), The State Small Industries Development Corporation (SSIDC), Export oriented units, Shilpabandhu-M Incentives for entrepreneurs, Other agencies for industrial assistance, Directorate General of Supplies and Disposals(DGS & D), Khadi and Village Industries Commission (KVIC), Industrial Estate	11	L1, L2
5	**Effective Management of Business** Issues and problems faced by micro and small enterprises and effective management of M and S enterprises (risk management, credit availability, technology innovation, supply chain management, linkage with large industries), exercises, e-Marketing Women Entrepreneurship Development, Social entrepreneurship-role and need, EDP cell, role of sustainability and sustainable development for SMEs, case studies, exercises	8	L1, L2, L3
6	**Achieving success in small business** Stages of the small business life cycle, four types of firm-level growth strategies, Options – harvesting or closing small business Critical Success factors of small business	5	L1, L2
	Total Hours	**45**	

Books and Reference:

Sr	Title	Authors	Publisher	Edition	Year
1	Entrepreneurship Development and Management	Dr. A. K. Singh	Laxmi Pub. Ltd.	First	2009
2	Entrepreneur and Entrepreneurship	Mohd Asif Hasan			
3	Small Business and Entrepreneurship	S. Anil Kumar	I. K. International pvt. Ltd.	First	2008

Online Resources:

Sr	Website Name	URL	Modules Covered
1	www.nptel.ac.in	https://nptel.ac.in/courses/110/106/110106141/	M1-M6
2	www.coursera.org	https://www.coursera.org/specializations/wharton-entrepreneurship	M1-M6

T.E. Semester –VI
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.E.(Information Technology)							**T.E. (Sem** VI)		
Course Name : Indian Constitution							**Course Code:** MC-IT 601		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory**		**Practical/Oral**	**Term Work**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	**25**
1	-	-	1	-	-	-	-	25	

The weightage of marks for evaluation of Term work/ Report: Formative (40%), Timely completion of practical (40%) and Attendance/ Learning Attitude (20%)

Course Objective:

The objective of this course is to give knowledge of Indian Constitution to students in order to ensure that the rules and regulations under which Central & State Govt function. Students would also be acquainted with various provisions, articles, important autonomous Govt bodies, Judiciary and the rights of every citizen of India. An engineer must have general idea of Constitution of India.

Course Outcomes:

Upon completion of the course students will be able to:

SN	Course outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Learn the salient featuresand importance of Indian Constitution	L1, L2
2	Understand the fundamental rights and duties	L1, L2
3	Learn about election methods and powers of Government of the Union	L1, L2
4	Learn about election methods and powers of Government of the State	L1, L2
5	Understand Indian Judiciary system	L1, L2
6	Understand about various Govt bodies and establishments of India	L1, L2

Detailed Syllabus:

Module No.	Topics	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Constitution – Structure and Principles** Meaning and importance of Constitution , : Making of Indian Constitution – Sources , Salient features of Indian Constitution	2	L1, L2
2	**Fundamental Rights and Directive Principles** Fundamental Rights, Fundamental Duties, Directive Principles, Union List& State List, Concurrent List	2	L1, L2
3	**Government of the Union** President of India – Election and Powers, Prime Minister and Council of Ministers , Lok Sabha – Composition and Powers ,Rajya Sabha – Composition and Powers	3	L1, L2
4	**Government of the States** Governor – Powers Chief Minister and Council of Ministers Legislative Assembly – Composition and powers Legislative Council – Composition and powers Local Govt & Panchayati Raj	3	L1, L2
5	**The Judiciary** Features of judicial system in India, : Supreme Court –Structure and jurisdiction , High Court – Structure and jurisdiction	2	L1, L2
6	**Administrative organization and constitution** Federalism in India – Features, Local Government-Panchayats–Powers and functions; 73rd and 74th amendments, Election Commission – Organization and functions , Comptroller & Auditor General of India (CAG), Attorney General of India& Advocate General of State, Central Vigilance Commission (CVC), Citizen oriented measures – RTI and PIL – Provisions and significance, UPSC & State PSC	3	L1, L2
	Total Hours	**15**	

Books and References:

SN	Title	Authors	Publisher	Edition	Year
1	India's Constitution	M.V.Pylee	New Delhi; S. Chand Pub	16	2017
2	Indian Polity	M Laxmikanth	McGraw Hill Chennai	05	2017
3	The Constitutional Law of India	J.N. Pandey	Allahabad; Central Law Agency	55	2018
4	Introduction to the Constitution of India	Durga Das Basu	Gurgaon; LexisNexis	23	2018

Online References:

S. No.	Website Name	URL	Modules Covered
1	India.gov.in.	https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf	All

T.E. Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.E. (Information Technology)					**T.E. SEM:VI**		
Course Name: Professional Skills VI(Cloud Technology -AWS)					**Course Code: HSD IT PS 601**		
Teaching scheme (Holistic Student Development - HSD) (Conducted in the beginning of Semester during first 3 Weeks					**Examination Scheme(Formative/Summative)**		
Modes of Teaching/Learning/Weightage					**Modes of continuous Assessment/Evaluation**		
Hours					**Presentation**	**Report**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**AC**	**AC**	**TW**
15	-	30	45	2	50	25	75
AC- Activity evaluation TW – Term Work Examination Weightage of Marks for continuous evaluation of Termwork /Report : Formative(40%)Timely completion of practical(40%),Attendance Learning Attitude (20%)							
Prerequisite: Internet Programming,Knowledge of any programming language							

Course Objective: The course intends to deliver the fundamentals of cloud computing and Amazon Web Services with the knowledge of virtualization, Lambda function, creating different applications using DynamoDB, interactive serverless web applications and functions .

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Discuss the fundamentals of cloud computing and and various services of AWS .	L1, L2, L3 L4
2	Explain and Create an EC2 instance and EBS volume types and create an EC2 Instance.	L1, L2, L3 L4
3	Understand the usage of EBS persistent storage and Amazon storage services S3	L1, L2, L3 L4
3	To write functions with the AWS Lambda Service that respond to events and integrate other AWS Services	L1, L2, L3 L4
4	To design, build, and deploy interactive serverless web applications using Amazon API Gateway to query Amazon DynamoDB data	L1, L2, L3 L4
5	To build and run applications and services and analyze the performance	L1, L2, L3 L4,L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Virtualization & cloud computing**	2	
	What is Cloud Computing,cloud computing service and Deployment Models, Need of Virtualization and cloud computing,Why AWS, Various cloud computing products offered by AWS		L1, L2, L3 ,L4
2	**Elastic Compute cloud**	3	
	Elastic Compute Cloud(EC2): Compute Basics, Instance types, EC2 instance types & Pricing Models, , Launching an AWS EC2 instance, Introduction to Elastic Block Store - EBS , EBS Snapshots , EBS Volume Types Instance Store Volumes,		L1, L2, L3 ,L4
3	**Elastic Load Balancer & Storage Service**	2	
	Introduction to Elastic Load Balancer ,Types of ELB ,autoscaling, Introduction to Simple Storage Service (S3) , Features of S3		L1, L2, L3 ,L4
4	**Serverless Computing with AWS Lambda**		
	What is serverless computing, need of Aws Lambda , working with AWS Lambda, Create API Gateway ,Building our API ,Link Lambda Function to API Gateway, Passing data to API gateway,Amazon Lex	3	L1, L2, L3 ,L4
5	**Amazon DynamoDB**	3	
	Introduction to Amazon DynamoDB, Features of DynamoDB,DynamoDB API,Creating and querying DynamoDB, Serverless Web Apps using Amazon DynamoDB .		L1, L2, ,L3,L4
6	**Access Management & Monitoring**	2	L1, L2, L3.L4 ,L5
	Understanding the IAM Policies, IAM User, IAM Policy and IAM Role, Introduction to CloudWatch, Auditing AWS environment with CloudTrail		
	Total Hours	15	

Practical Details:

Practical No.	Type of experiment	Practical/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	Basic Experiment	Launch an EC2 Instance.	2	L1, L, L3,L4
2		Launch EC2 Instance with multiple EBS Volumes Attached	2	L1, L2, L3,L5
3	Design Experiment	Create an AWS Lambda Function	2	L1, L2, L3,L4
4		Create DynamoDb table and working with Queries	2	L1, L2, L3,L4
5		Create AWS Lambda and API gateway to POST form data and insert in DynamoDb table	2	L1, L2, L3,L4
6		Serverless Web Apps using Amazon DynamoDB	4	L1, L2, L3,L4
7	Advance Experiment	Creating a Simple Bot with Lex	2	L1, L2, L3,L4
8		Serverless Architectures using Amazon CloudWatch Events and Scheduled Events with AWS Lambda	4	L1, L2, L3,L4
9		Using AWS Lambda with Amazon CloudWatch and SNS to Implement a Slack Chat Bot	4	L1, L2, L3,L4
10	Miniproject	Miniproject	6	L1, L2, L3,L4,L5,L6
		Total	30	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud	Mark Wilkins	Addison-Wesley Professional	1 st Edition	2019
2	Learning AWS	Aurobindo Sarkar, Amit Shah	Packt Publishing Ltd	1 st Edition	2015
3	Aws: 2019 Amazon Web Services Beginners User Guide. The Ultimate Tutorial	Julian Hun	Independently Published	1 st Edition	2019

Online References:

Sr. No.	Website Name	URL
1	https://aws.amazon.com/	https://amazon.qwiklabs.com/catalog?keywords=introduction%20to%20aws%20lambda&ransack=true
2	https://docs.aws.amazon.co/	https://docs.aws.amazon.com/dynamodb/?id=docs_gateway
3	ttps://www.edureka.co/	https://www.edureka.co/blog/amazon-dynamodb-tutorial
4	https://docs.aws.amazon.com/	https://docs.aws.amazon.com/

T.E. Semester –VI
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="7">B.E (Information Technology)</td><td colspan="3">T.E(SEM : VI)</td></tr>
<tr><td colspan="7">Course Name : Project Based Learning-IV</td><td colspan="3">Course Code : HSD-ITPBL601</td></tr>
<tr><td colspan="5">Teaching scheme (Holistic Student Development - HSD)
(Conducted in the beginning of Semester during first 3 Weeks</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5" rowspan="2">Hours</td><td colspan="2">Theory (100)</td><td>Presentation (25)</td><td>Report (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>AC</td><td>AC</td><td>TW</td></tr>
<tr><td>-</td><td>-</td><td>30</td><td>30</td><td>1</td><td>-</td><td>-</td><td>25</td><td>--</td><td>25</td></tr>
<tr><td colspan="10">The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)</td></tr>
<tr><td colspan="10">Prerequisite: Computer Fundamentals & knowledge of Programming Languages</td></tr>
</table>

Course Objectives: The course intends to deliver the fundamental knowledge of basic real time problems, study existing solutions, prepare literature survey, and apply basic computing & mathematics fundamentals and fundamental concepts of Programming such as C/C++ and Java to solve Basic real time problems.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	To identify & analyze the basic real time problems and prepare literature survey.	L1, L2, L3,L4
2	Identify & apply appropriate technologies & programming constructs to solve problems.	L1, L2, L3
3	Presenting & Documenting results obtained.	L1, L2, L3,L4

Suggested Project Listing:

Sr. No.	Project Title
1.	Separate banking software for persons with intellectual disabilities including the better access to avail the benefits of ATM services
2.	IOT in agriculture
3.	Games on Road Safety
4.	Google Ad Grants online marketing challenge
5.	IoT in healthcare
6.	Google Ad Grants online marketing challenge
7.	Design an intelligent algorithm leveraging big data/AI/machine learning techniques that can learn from user viewing behavior
8.	End to end mapping of network to arrive at the expected time of delivery
9.	Image analysis and compression
10.	Knowledge Enhancement Platform
11.	App development using IOT
12.	Game Development
13.	Sentiment Analysis using Social Media responses
14.	To design dynamic website using advanced web technologies
15.	Identifying accident prone area for roads

Note: Project topic can be selected as per the Domain and current Trends in the Technology.

T.E. Semester –VI
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="5">B.E (Information Technology)</td><td colspan="3">T.E(SEM : VI)</td></tr>
<tr><td colspan="5">Course Name: Research Based Learning II</td><td colspan="3">Course Code:HSD-ITRBL601</td></tr>
<tr><td colspan="5">Teaching scheme (Holistic Student Development - HSD) (Conducted in the beginning of Semester during first 3 Weeks</td><td colspan="3">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="3">Assessment/Evaluation Scheme</td></tr>
<tr><td colspan="5">Hours</td><td>Presentation</td><td>Report</td><td>Term Work</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>AC</td><td>AC</td><td>TW</td></tr>
<tr><td>-</td><td>-</td><td>30</td><td>30</td><td>1</td><td>25</td><td>25</td><td>50</td></tr>
<tr><td colspan="8">AC- Activity Evaluation</td></tr>
<tr><td colspan="8">Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).</td></tr>
<tr><td colspan="8">Prerequisite:Subject knowledge, Domain knowledge</td></tr>
</table>

Course Objectives:

This course is focused to give basic aspects of Idea generation, Competitive programming, Research and development, including research methodologies, innovation.

Course Outcomes: Upon completion of the course students will be able to:

S.N.	Course Outcome	Cognitive level attainment as per revised Bloom Taxonomy
1	Student will be able to create new idea for problem solving related to industry or societal issues.	L1, L2, L3,L4
2	Students will be to develop the code for given problem definition in a competitive environment.	L1, L2, L3,L4
3	Students will be to publish research paper.	L1, L2, L3,L4,l5,L6
4	Student will be able to create new idea for problem solving related to industry or societal issues.	L1, L2, L3,L4,l5,L6

Detailed Syllabus:

Module No.	Topics	Cognitive level attainment as per revised Bloom Taxonomy
1	**Idea Generation**	L1, L2, L3,L4
	I. **Introduction to idea Generation**: Introduction to invention and innovation, managing creativity, Techniques for generating ideas, Steps for Idea generation to implementation. Transforming Idea into project with implementation II. Brainstorming session with peers for idea generation and assessment, Experience sharing by entrepreneurs or Hackathon Winners. (Idea must be such that it should be converted into project and further into Product if possible, it can be multidisciplinary projects also) **Idea competition and evaluation**	
2	**Competitive Programming**	L1, L2, L3,L4
	I. Introduction to competitive programming, benefits, Tips for good programming performance, logic development (Problem Solving strategies, loops) II. Mock Evaluation/Experience sharing by good coders **Coding competition and evaluation**	
3	**Research Publication**	L1, L2, L3,L4,l5,L6
	Forming interest groups with mentors, Topic Identification, Literature Survey, and Sketching of Idea/Design of Survey, Implementation, and Analysis of Results, Identifying journal /conference for publication conference paper, Publishing of research Paper/Survey paper. **Evaluation by faculty as per format**.	
4	**Management of Innovation and Technical Change**	L1, L2, L3,L4,l5,L6
	What is innovation, kinds of Innovation, Innovation as a core business process, Developing an innovation strategy, Sources of innovation, Creating new products and services **Idea competition and evaluation.**	

References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Research Methodology Methods and Techniques	C.R. Kothari	New Age International Limited,	2nd Edition	2004
2.	Entrepreneurship Development and Small Business Enterprise	Poornima M. Charantimath	Pearson Education India	5th Edition	2005
3.	Law Relating to Patents, Trade Marks, Copyright, Designs and Geographical Indications	B. L. Wadehra	Universal Law Publishing Co Ltd	Kindle	2004

Online References:

Sr. No.	Website Name	URL	Modules Covered
1.	https://www.statpac.com	https://www.statpac.com/online-software-manual/Basic-Research-Concepts.htm	M1
2.	https://www.slideshare.net	https://www.slideshare.net/25Mksp/management-technology-innovation-change	M2
3.	https://www.eng.ufl.edu	https://www.eng.ufl.edu/leadership/wp-content/uploads/sites/7/2015/02/Engineering-Entrepreneurship-Course-Overview.pdf	M4
4.	https://www.vesalius.edu	https://www.vesalius.edu/wp-content/uploads/2016/11/BUS213G-S15.pdf	M3

Semester –VI

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.E. (Information Technology)						**T.E. SEM: VI**	
Course Name: Summer Internship						**Course Code:** SI-IT601	
Teaching scheme (Contact Hrs. during Semester Break/ End of Semester(Between 21st and 25th Week)					**Assessment/Evaluation Scheme**		
					Presentation	**Report**	Non -Grant Term work based on the presentation and Report
Theory	**AC**	**Practical**	**Contact Hours**	**Credits**	**AC**	**AC**	
-	-	-	160 * - 240*	4 *- 6*	-	-	50
AC- Activity evaluation **TW –** Term Work Examination **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).							
Prerequisite: Fundamental knowledge of Information Technology related tools							
* Students may go upto 240 hrs. to aquire maximum 6 credits. Students should collectively acquire total contact hrs in above activities in a span of 1 year (5th and 6th Semester). Student will submit a report to earn Termwork marks in internship at the end of 6th Semester. Following activities should be considered for Summer Internship:- 1)Participitation in inhouse internship at the end of 5th and 6th semester of 2 week each. 2)Other activity which also will be considered are: Participation in Hackathon, Development of new Product/ Business Plan / Registration of start-up, Participation in IPR workshop/Leadership talks/Idea/ Design / Innovation/Technical Expos, Internship with Industry / Govt. / NGO/ PSU/MSME/Online Internship, Long Term Goals under Rural Internship.							

Course Objectives:

To get industry like exposure in the college laboratories by carrying out projects using subject studied till 6th semester.
Also design innovative techniques / methods to develop the products.
To gain knowledge of marketing and publicizing products developed.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	To apply subjects knowledge in the college laboratories for carrying out projects	L1, L2,L3
2	Able to developed innovative techniques / methods to develop the products	L1, L2,L3
3	Able to do marketing and publicity of products developed	L1, L2,L3

Detailed Syllabus:

Module No.	Topics	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Program Specific Internship**	L1, L2, L3
	Training and certification on emerging technologies in domains offered by Department of Computer Engineering Applying classroom and laboratory knowledge to design , develop and deploy the products	
2	**Inter disciplinary Internship**	L1, L2, L3
	• To explore and understand issues and challenges in the other disciplines (EXTC, ELEX, MECH and CIVIL) • Design , develop and deploy cost effective products using multidisciplinary approach	
3	**Industry Specific Internship**	L1, L2, L3
	• To explore and understand issues and challenges in industry • Developing solutions for industry specific problems • Design , develop and deploy products for startup and SMEs	
4	**Interpersonal Internship**	L1, L2, L3
	• To develop interpersonal skills such as leadership, marketing ,publicity and corporate ethics and communication • To get competence in problem solving , presentation , negotiation skills	
5	**Social Internship**	L1, L2, L3
	• Identify and study different real life issues in the society • Identify societal problems and provide engineering solutions to solve these problems	
6	**Academic Internship**	
	• Study report preparation, preparation of presentations, copy table book preparation , business proposal and IPR • Capture aspirations & expectations through interviews of students. • Ways to connect research in technical institutes with industry. • Taking inputs from self, local stakeholders and global stake holders which will help to develop process with comparative and competitive study.	L1, L2, L3

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	The Ultimate Guide to Internships: 100 Steps to Get a Great Internship and Thrive in It (Ultimate Guides)	Eric Woodard	Allworth	I	2015

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://www.letsintern.com/	https://www.letsintern.com/internships/summer-internships	M1-M6
2	https://codegnan.com	https://codegnan.com/blog/benefits-of-internships-and-importance	M1-M6
3	https://www.honorsociety.org	https://www.honorsociety.org/articles?category=internships	M1-M6