

SOFTWARE ENGINEERING [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – IV			
Subject Code	15CS42	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04			
Course objectives: This course will enable students to <ul style="list-style-type: none"> • Outline software engineering principles and activities involved in building large software programs. • Identify ethical and professional issues and explain why they are of concern to software engineers. • Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation. • Differentiate system models, use UML diagrams and apply design patterns. • Discuss the distinctions between validation testing and defect testing. • Recognize the importance of software maintenance and describe the intricacies involved in software evolution. • Apply estimation techniques, schedule project activities and compute pricing. • Identify software quality parameters and quantify software using measurements and metrics. • List software quality standards and outline the practices involved. • Recognize the need for agile software development, describe agile methods, apply agile practices and plan for agility. 			
Module 1			Teaching Hours
Introduction: Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies. Software Processes: Models: Waterfall Model (Sec 2.1.1), Incremental Model (Sec 2.1.2) and Spiral Model (Sec 2.1.3). Process activities. Requirements Engineering: Requirements Engineering Processes (Chap 4). Requirements Elicitation and Analysis (Sec 4.5). Functional and non-functional requirements (Sec 4.1). The software Requirements Document (Sec 4.2). Requirements Specification (Sec 4.3). Requirements validation (Sec 4.6). Requirements Management (Sec 4.7).			12 Hours
Module 2			
System Models: Context models (Sec 5.1). Interaction models (Sec 5.2). Structural models (Sec 5.3). Behavioral models (Sec 5.4). Model-driven engineering (Sec 5.5). Design and Implementation: Introduction to RUP (Sec 2.4), Design Principles (Chap 17). Object-Oriented design using the UML (Sec 7.1). Design patterns (Sec 7.2). Implementation issues (Sec 7.3). Open source development (Sec 7.4).			11 Hours
Module 3			
Software Testing: Development testing (Sec 8.1), Test-driven development (Sec 8.2), Release testing (Sec 8.3), User testing (Sec 8.4). Test Automation (Page no 42, 70,212, 231,444,695). Software Evolution: Evolution processes (Sec 9.1). Program evolution dynamics (Sec 9.2). Software maintenance (Sec 9.3). Legacy system management (Sec 9.4).			9 Hours

Module 4	
Project Planning: Software pricing (Sec 23.1). Plan-driven development (Sec 23.2). Project scheduling (Sec 23.3): Estimation techniques (Sec 23.5). Quality management: Software quality (Sec 24.1). Reviews and inspections (Sec 24.3). Software measurement and metrics (Sec 24.4). Software standards (Sec 24.2)	10 Hours
Module 5	
Agile Software Development: Coping with Change (Sec 2.3), The Agile Manifesto: Values and Principles. Agile methods: SCRUM (Ref "The SCRUM Primer, Ver 2.0") and Extreme Programming (Sec 3.3). Plan-driven and agile development (Sec 3.2). Agile project management (Sec 3.4), Scaling agile methods (Sec 3.5):	8 Hours
Course Outcomes: After studying this course, students will be able to:	
<ul style="list-style-type: none"> • Design a software system, component, or process to meet desired needs within realistic constraints. • Assess professional and ethical responsibility • Function on multi-disciplinary teams • Use the techniques, skills, and modern engineering tools necessary for engineering practice • Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems. 	
Graduate Attributes	
<ul style="list-style-type: none"> • Project Management and Finance • Conduct Investigations of Complex Problems • Modern Tool Usage • Ethics 	
Question paper pattern:	
<p>The question paper will have ten questions. There will be 2 questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.</p>	
Text Books:	
<ol style="list-style-type: none"> 1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012. (Listed topics only from Chapters 1,2,3,4, 5, 7, 8, 9, 23, and 24) 2. The SCRUM Primer, Ver 2.0, http://www.goodagile.com/scrumpriemer/scrumpriemer20.pdf 	
Reference Books:	
<ol style="list-style-type: none"> 1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill. 2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India 	
Web Reference for eBooks on Agile:	
<ol style="list-style-type: none"> 1. http://agilemanifesto.org/ 2. http://www.jamesshore.com/Agile-Book/ 	

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MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – V			
Subject Code	15CS51	IA Marks	20
Number of Lecture Hours/Week	4	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04			
Course objectives: This course will enable students to			
<ul style="list-style-type: none"> • Explain the principles of management, organization and entrepreneur. • Discuss on planning, staffing, ERP and their importance • Infer the importance of intellectual property rights and relate the institutional support 			
Module – 1			Teaching Hours
Introduction - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, brief overview of evolution of management theories,. Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection			10 Hours
Module – 2			
Directing and controlling- meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination- meaning and importance, Controlling- meaning, steps in controlling, methods of establishing control.			10 Hours
Module – 3			
Entrepreneur – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study.			10 Hours
Module – 4			
Preparation of project and ERP - meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report, Enterprise Resource Planning: Meaning and Importance- ERP and Functional areas of Management – Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation			10 Hours
Module – 5			
Micro and Small Enterprises: Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India industrial policy 2007 on micro and small enterprises, case study (Microsoft), Case study(Captain G R Gopinath),case study (N R Narayana Murthy & Infosys), Institutional support: MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency, Introduction to IPR.			10 Hours
Course outcomes: The students should be able to:			
<ul style="list-style-type: none"> • Define management, organization, entrepreneur, planning, staffing, ERP and outline 			

- their importance in entrepreneurship
- Utilize the resources available effectively through ERP
- Make use of IPRs and institutional support in entrepreneurship

Question paper pattern:

The question paper will have TEN questions.

There will be TWO questions from each module.

Each question will have questions covering all the topics under a module.

The students will have to answer FIVE full questions, selecting ONE full question from each module.

Text Books:

1. Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 4th / 6th Edition, 2010.
2. Dynamics of Entrepreneurial Development & Management -Vasant Desai Himalaya Publishing House.
3. Entrepreneurship Development -Small Business Enterprises -Poornima M Charantimath Pearson Education – 2006.
4. Management and Entrepreneurship - Kanishka Bedi- Oxford University Press-2017

Reference Books:

1. Management Fundamentals -Concepts, Application, Skill Development Robert Lusier – Thomson.
2. Entrepreneurship Development -S S Khanka -S Chand & Co.
3. Management -Stephen Robbins -Pearson Education /PHI -17th Edition, 2003

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15CS61
17CS61

CRYPTOGRAPHY, NETWORK SECURITY AND CYBER LAW [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – VI			
Subject Code	15CS61	IA Marks	20
Number of Lecture Hours/Week	4	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04			
Course objectives: This course will enable students to			
<ul style="list-style-type: none"> • Explain the concepts of Cyber security • Illustrate key management issues and solutions. • Familiarize with Cryptography and very essential algorithms • Introduce cyber Law and ethics to be followed. 			
Module – 1			Teaching Hours
Introduction - Cyber Attacks, Defence Strategies and Techniques, Guiding Principles, Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Comma Divisor, Useful Algebraic Structures, Chinese Remainder Theorem, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography – Product Ciphers, DES Construction.			10 Hours
Module – 2			Teaching Hours
Public Key Cryptography and RSA – RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack, Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange, Other Applications.			10 Hours
Module – 3			Teaching Hours
Key Management - Introduction, Digital Certificates, Public Key Infrastructure, Identity-based Encryption, Authentication-I - One way Authentication, Mutual Authentication, Dictionary Attacks, Authentication – II – Centralised Authentication, The Needham-Schroeder Protocol, Kerberos, Biometrics, IPsec-Security at the Network Layer – Security at Different layers: Pros and Cons, IPsec in Action, Internet Key Exchange (IKE) Protocol, Security Policy and IPSEC, Virtual Private Networks, Security at the Transport Layer - Introduction, SSL Handshake Protocol, SSL Record Layer Protocol, OpenSSL.			10 Hours
Module – 4			Teaching Hours
IEEE 802.11 Wireless LAN Security - Background, Authentication, Confidentiality and Integrity, Viruses, Worms, and Other Malware, Firewalls – Basics, Practical Issues, Intrusion Prevention and Detection - Introduction, Prevention Versus Detection, Types of Intrusion Detection Systems, DDoS Attacks Prevention/Detection, Web Service Security – Motivation, Technologies for Web Services, WS- Security, SAML, Other Standards.			10 Hours
Module – 5			Teaching Hours
IT act aim and objectives, Scope of the act, Major Concepts, Important provisions, Attribution, acknowledgement, and dispatch of electronic records, Secure electronic records and secure digital signatures, Regulation of certifying authorities: Appointment of Controller and Other officers, Digital Signature certificates, Duties of Subscribers, Penalties and adjudication, The cyber			10 Hours

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regulations appellate tribunal, Offences, Network service providers not to be liable in certain cases, Miscellaneous Provisions.

Course outcomes: The students should be able to:

- Discuss cryptography and its need to various applications
- Design and develop simple cryptography algorithms
- Understand cyber security and need cyber Law

Question paper pattern:

The question paper will have TEN questions.

There will be TWO questions from each module.

Each question will have questions covering all the topics under a module.

The students will have to answer FIVE full questions, selecting ONE full question from each module.

Text Books:

1. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition (Chapters-1,3,4,5,6,7,8,9,10,11,12,13,14,15,19(19.1-19.5),21(21.1-21.2),22(22.1-22.4),25

Reference Books:

1. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-GrawHill, 3rd Edition, 2015
2. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition
3. Cyber Law simplified- Vivek Sood, Mc-GrawHill, 11th reprint, 2013
4. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindra kumar, Cengage learning

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15CS81
17CS81
18CS81

INTERNET OF THINGS TECHNOLOGY [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – VIII			
Subject Code	15CS81	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04			
Course Objectives: This course will enable students to			
<ul style="list-style-type: none"> Assess the genesis and impact of IoT applications, architectures in real world. Illustrate diverse methods of deploying smart objects and connect them to network. Compare different Application protocols for IoT. Infer the role of Data Analytics and Security in IoT. Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry. 			
Module – 1			Teaching Hours
What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.			10 Hours
Module – 2			
Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.			10 Hours
Module – 3			
IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT-Application Transport Methods.			10 Hours
Module – 4			
Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment			10 Hours
Module – 5			
IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture,			10 Hours

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Smart City Security Architecture, Smart City Use-Case Examples.	
Course Outcomes: After studying this course, students will be able to	
<ul style="list-style-type: none"> • Interpret the impact and challenges posed by IoT networks leading to new architectural models. • Compare and contrast the deployment of smart objects and the technologies to connect them to network. • Appraise the role of IoT protocols for efficient network communication. • Elaborate the need for Data Analytics and Security in IoT. • Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry. 	
Question paper pattern:	
<p>The question paper will have ten questions. There will be 2 questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.</p>	
Text Books:	
<ol style="list-style-type: none"> 1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743) 2. Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017 	
Reference Books:	
<ol style="list-style-type: none"> 1. Vijay Madiseti and ArshdeepBahga, "Internet of Things (A Hands -on- Approach)", 1st Edition, VPT, 2014. (ISBN: 978-8173719547) 2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224) 	

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SOFTWARE ENGINEERING [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2017 -2018) SEMESTER – IV			
Subject Code	17CS45	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04			
Module 1			Teaching Hours
Introduction: Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies. Software Processes: Models: Waterfall Model (Sec 2.1.1), Incremental Model (Sec 2.1.2) and Spiral Model (Sec 2.1.3). Process activities. Requirements Engineering: Requirements Engineering Processes (Chap 4). Requirements Elicitation and Analysis (Sec 4.5). Functional and non-functional requirements (Sec 4.1). The software Requirements Document (Sec 4.2). Requirements Specification (Sec 4.3). Requirements validation (Sec 4.6). Requirements Management (Sec 4.7).			12 Hours
Module 2			
System Models: Context models (Sec 5.1). Interaction models (Sec 5.2). Structural models (Sec 5.3). Behavioral models (Sec 5.4). Model-driven engineering (Sec 5.5). Design and Implementation: Introduction to RUP (Sec 2.4), Design Principles (Chap 17). Object-oriented design using the UML (Sec 7.1). Design patterns (Sec 7.2). Implementation issues (Sec 7.3). Open source development (Sec 7.4).			11 Hours
Module 3			
Software Testing: Development testing (Sec 8.1), Test-driven development (Sec 8.2), Release testing (Sec 8.3), User testing (Sec 8.4). Test Automation (Page no 42, 70,212, 231,444,695). Software Evolution: Evolution processes (Sec 9.1). Program evolution dynamics (Sec 9.2). Software maintenance (Sec 9.3). Legacy system management (Sec 9.4).			9 Hours
Module 4			
Project Planning: Software pricing (Sec 23.1). Plan-driven development (Sec 23.2). Project scheduling (Sec 23.3): Estimation techniques (Sec 23.5). Quality management: Software quality (Sec 24.1). Reviews and inspections (Sec 24.3). Software measurement and metrics (Sec 24.4). Software standards (Sec 24.2)			10 Hours
Module 5			
Agile Software Development: Coping with Change (Sec 2.3), The Agile Manifesto: Values and Principles. Agile methods: SCRUM (Ref "The SCRUM Primer, Ver 2.0") and Extreme Programming (Sec 3.3). Plan-driven and agile development (Sec 3.2). Agile project management (Sec 3.4), Scaling agile methods (Sec 3.5):			8 Hours
Course Outcomes: After studying this course, students will be able to:			
<ul style="list-style-type: none"> • Design a software system, component, or process to meet desired needs within realistic constraints. • Assess professional and ethical responsibility • Function on multi-disciplinary teams • Make use of techniques, skills, and modern engineering tools necessary for engineering 			

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<p>practice</p> <ul style="list-style-type: none"> • Comprehend software systems or parts of software systems.
<p>Question paper pattern:</p> <p>The question paper will have ten questions. There will be 2 questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.</p>
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012. (Listed topics only from Chapters 1,2,3,4, 5, 7, 8, 9, 23, and 24) 2. The SCRUM Primer, Ver 2.0, http://www.goodagile.com/scrumpriener/scrumpriener20.pdf
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill. 2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India
<p>Web Reference for eBooks on Agile:</p> <ol style="list-style-type: none"> 1. http://agilemanifesto.org/ 2. http://www.jamesshore.com/Agile-Book/


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MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017-2018)

SEMESTER – V

Subject Code	17CS51	IA Marks	40
Number of Lecture Hours/Week	4	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04			
Module – 1			Teaching Hours
Introduction - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, brief overview of evolution of management theories,. Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection			10 Hours
Module – 2			
Directing and controlling- meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination- meaning and importance, Controlling- meaning, steps in controlling, methods of establishing control.			10 Hours
Module – 3			
Entrepreneur – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study.			10 Hours
Module – 4			
Preparation of project and ERP - meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report, Enterprise Resource Planning: Meaning and Importance- ERP and Functional areas of Management – Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation			10 Hours
Module – 5			
Micro and Small Enterprises: Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India industrial policy 2007 on micro and small enterprises, case study (Microsoft), Case study(Captain G R Gopinath),case study (N R Narayana Murthy & Infosys), Institutional support: MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency, Introduction to IPR.			10 Hours
Course outcomes: The students should be able to:			
<ul style="list-style-type: none">• Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship• Utilize the resources available effectively through ERP• Make use of IPRs and institutional support in entrepreneurship			
Question paper pattern:			

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The question paper will have TEN questions.
There will be TWO questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer FIVE full questions, selecting ONE full question from each module.

Text Books:

1. Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 4th / 6th Edition, 2010.
2. Dynamics of Entrepreneurial Development & Management -Vasant Desai Himalaya Publishing House.
3. Entrepreneurship Development -Small Business Enterprises -Poornima M Charantimath Pearson Education – 2006.
4. Management and Entrepreneurship - Kanishka Bedi- Oxford University Press-2017

Reference Books:

1. Management Fundamentals -Concepts, Application, Skill Development Robert Lusier – Thomson.
2. Entrepreneurship Development -S S Khanka -S Chand & Co.
3. Management -Stephen Robbins -Pearson Education /PHI -17th Edition, 2003


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CRYPTOGRAPHY, NETWORK SECURITY AND CYBER LAW
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 - 2018)
SEMESTER – VI

Subject Code	17CS61	IA Marks	40
Number of Lecture Hours/Week	4	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS – 04

Module – 1	Teaching Hours
Introduction - Cyber Attacks, Defence Strategies and Techniques, Guiding Principles, Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Comma Divisor, Useful Algebraic Structures, Chinese Remainder Theorem, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography – Product Ciphers, DES Construction.	10 Hours
Module – 2	
Public Key Cryptography and RSA – RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack, Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange, Other Applications.	10 Hours
Module – 3	
Key Management - Introduction, Digital Certificates, Public Key Infrastructure, Identity-based Encryption, Authentication-I - One way Authentication, Mutual Authentication, Dictionary Attacks, Authentication – II – Centralised Authentication, The Needham-Schroeder Protocol, Kerberos, Biometrics, IPsec-Security at the Network Layer – Security at Different layers: Pros and Cons, IPsec in Action, Internet Key Exchange (IKE) Protocol, Security Policy and IPSEC, Virtual Private Networks, Security at the Transport Layer - Introduction, SSL Handshake Protocol, SSL Record Layer Protocol, OpenSSL.	10 Hours
Module – 4	
IEEE 802.11 Wireless LAN Security - Background, Authentication, Confidentiality and Integrity, Viruses, Worms, and Other Malware, Firewalls – Basics, Practical Issues, Intrusion Prevention and Detection - Introduction, Prevention Versus Detection, Types of Intrusion Detection Systems, DDoS Attacks Prevention/Detection, Web Service Security – Motivation, Technologies for Web Services, WS- Security, SAML, Other Standards.	10 Hours
Module – 5	
IT act aim and objectives, Scope of the act, Major Concepts, Important provisions, Attribution, acknowledgement, and dispatch of electronic records, Secure electronic records and secure digital signatures, Regulation of certifying authorities: Appointment of Controller and Other officers, Digital Signature certificates, Duties of Subscribers, Penalties and adjudication, The cyber regulations appellate tribunal, Offences, Network service providers not to be liable in certain cases, Miscellaneous Provisions.	10 Hours

Course outcomes: The students should be able to:

- Discuss the cryptography and its need to various applications
- Design and Develop simple cryptography algorithms


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- Understand the cyber security and need cyber Law

Question paper pattern:

The question paper will have TEN questions.

There will be TWO questions from each module.

Each question will have questions covering all the topics under a module.

The students will have to answer FIVE full questions, selecting ONE full question from each module.

Text Books:

1. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition (Chapters-1,3,4,5,6,7,8,9,10,11,12,13,14,15,19(19.1-19.5),21(21.1-21.2),22(22.1-22.4),25

Reference Books:

1. Cryptography and Network Security- Behrouz A Forouzan, DebdeepMukhopadhyay, Mc-GrawHill, 3rd Edition, 2015
2. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition
3. Cyber Law simplified- VivekSood, Mc-GrawHill, 11th reprint , 2013
4. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindrakumar, Cengage learning


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INFORMATION AND NETWORK SECURITY
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 - 2018)
SEMESTER – VII

Subject Code	17CS743	IA Marks	40
Number of Lecture Hours/Week	3	Exam Marks	60
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS – 03			
Module – 1			Teaching Hours
Introduction. How to Speak Crypto. Classic Crypto. Simple Substitution Cipher. Cryptanalysis of a Simple Substitution. Definition of Secure. Double Transposition Cipher. One-time Pad. Project VENONA. Codebook Cipher. Ciphers of the Election of 1876. Modern Crypto History. Taxonomy of Cryptography. Taxonomy of Cryptanalysis.			8 Hours
Module – 2.			
What is a Hash Function? The Birthday Problem. Non-cryptographic Hashes. Tiger Hash. HMAC. Uses of Hash Functions. Online Bids. Spam Reduction. Other Crypto-Related Topics. Secret Sharing. Key Escrow. Random Numbers. Texas Hold 'em Poker. Generating Random Bits. Information Hiding.			8 Hours
Module – 3			
Random number generation Providing freshness Fundamentals of entity authentication Passwords Dynamic password schemes Zero-knowledge mechanisms Further reading Cryptographic Protocols Protocol basics From objectives to a protocol Analysing a simple protocol Authentication and key establishment protocols			8 Hours
Module – 4			
Key management fundamentals Key lengths and lifetimes Key generation Key establishment Key storage Key usage Governing key management Public-Key Management Certification of public keys The certificate lifecycle Public-key management models Alternative approaches			8 Hours
Module – 5			
Cryptographic Applications Cryptography on the Internet Cryptography for wireless local area networks Cryptography for mobile telecommunications Cryptography for secure payment card transactions Cryptography for video broadcasting Cryptography for identity cards Cryptography for home users			8 Hours
Course outcomes: The students should be able to:			
<ul style="list-style-type: none"> • Analyze the Digital security lapses • Illustrate the need of key management 			
Question paper pattern:			
The question paper will have ten questions. There will be 2 questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.			
Text Books:			
<ol style="list-style-type: none"> 1. Information Security: Principles and Practice, 2nd Edition by Mark Stamp Wiley 2. Everyday Cryptography: Fundamental Principles and Applications Keith M. Martin Oxford Scholarship Online: December 2013 			

Reference Books:

1. Applied Cryptography Protocols, Algorithms, and Source Code in C by Bruce Schneier

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INTERNET OF THINGS TECHNOLOGY
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 - 2018)
SEMESTER – VIII

Subject Code	17CS81	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04			
Module – 1			Teaching Hours
What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.			10 Hours
Module – 2			
Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.			10 Hours
Module – 3			
IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.			10 Hours
Module – 4			
Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment			10 Hours
Module – 5			
IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.			10 Hours
Course Outcomes: After studying this course, students will be able to			
<ul style="list-style-type: none"> • Interpret the impact and challenges posed by IoT networks leading to new architectural models. • Compare and contrast the deployment of smart objects and the technologies to connect them to network. 			

- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

Question paper pattern:

The question paper will have ten questions.

There will be 2 questions from each module.

Each question will have questions covering all the topics under a module.


The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743)
2. Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017

Reference Books:

1. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. (ISBN: 978-8173719547)
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)


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SOFTWARE ENGINEERING
(Effective from the academic year 2018 -2019)
SEMESTER – III

Course Code	18CS35	CIE Marks	40
Number of Contact Hours/Week	3:0:0	SEE Marks	60
Total Number of Contact Hours	40	Exam Hours	03
CREDITS –3			
Course Learning Objectives: This course (18CS35) will enable students to:			
<ul style="list-style-type: none"> • Outline software engineering principles and activities involved in building large software programs. Identify ethical and professional issues and explain why they are of concern to software engineers. • Explain the fundamentals of object oriented concepts • Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation. Differentiate system models, use UML diagrams and apply design patterns. • Discuss the distinctions between validation testing and defect testing. • Recognize the importance of software maintenance and describe the intricacies involved in software evolution. Apply estimation techniques, schedule project activities and compute pricing. • Identify software quality parameters and quantify software using measurements and metrics. List software quality standards and outline the practices involved. 			
Module 1			Contact Hours
<p>Introduction: Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies.</p> <p>Software Processes: Models: Waterfall Model (Sec 2.1.1), Incremental Model (Sec 2.1.2) and Spiral Model (Sec 2.1.3). Process activities.</p> <p>Requirements Engineering: Requirements Engineering Processes (Chap 4). Requirements Elicitation and Analysis (Sec 4.5). Functional and non-functional requirements (Sec 4.1). The software Requirements Document (Sec 4.2). Requirements Specification (Sec 4.3). Requirements validation (Sec 4.6). Requirements Management (Sec 4.7).</p> <p>RBT: L1, L2, L3</p>			08
Module 2			
<p>What is Object orientation? What is OO development? OO Themes; Evidence for usefulness of OO development; OO modelling history. Modelling as Design technique: Modelling; abstraction; The Three models. Introduction, Modelling Concepts and Class Modelling: What is Object orientation? What is OO development? OO Themes; Evidence for usefulness of OO development; OO modelling history. Modelling as Design technique: Modelling; abstraction; The Three models. Class Modelling: Object and Class Concept; Link and associations concepts; Generalization and Inheritance; A sample class model; Navigation of class models;</p> <p>Textbook 2: Ch 1,2,3.</p> <p>RBT: L1, L2 L3</p>			08
Module 3			
<p>System Models: Context models (Sec 5.1). Interaction models (Sec 5.2). Structural models (Sec 5.3). Behavioral models (Sec 5.4). Model-driven engineering (Sec 5.5).</p> <p>Design and Implementation: Introduction to RUP (Sec 2.4), Design Principles (Chap 7). Object-oriented design using the UML (Sec 7.1). Design patterns (Sec 7.2). Implementation issues (Sec 7.3). Open source development (Sec 7.4).</p> <p>RBT: L1, L2, L3</p>			08

Module 4	
Software Testing: Development testing (Sec 8.1), Test-driven development (Sec 8.2), Release testing (Sec 8.3), User testing (Sec 8.4). Test Automation (Page no 212). Software Evolution: Evolution processes (Sec 9.1). Program evolution dynamics (Sec 9.2). Software maintenance (Sec 9.3). Legacy system management (Sec 9.4). RBT: L1, L2, L3	08
Module 5	
Project Planning: Software pricing (Sec 23.1). Plan-driven development (Sec 23.2). Project scheduling (Sec 23.3): Estimation techniques (Sec 23.5). Quality management: Software quality (Sec 24.1). Reviews and inspections (Sec 24.3). Software measurement and metrics (Sec 24.4). Software standards (Sec 24.2) RBT: L1, L2, L3	08
Course Outcomes: The student will be able to :	
<ul style="list-style-type: none"> • Design a software system, component, or process to meet desired needs within realistic constraints. • Assess professional and ethical responsibility • Function on multi-disciplinary teams • Use the techniques, skills, and modern engineering tools necessary for engineering practice • Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems 	
Question Paper Pattern:	
<ul style="list-style-type: none"> • The question paper will have ten questions. • Each full Question consisting of 20 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module. 	
Textbooks:	
<ol style="list-style-type: none"> 1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012. (Listed topics only from Chapters 1,2,3,4, 5, 7, 8, 9, 23, and 24) 2. Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML, 2nd Edition, Pearson Education, 2005. 	
Reference Books:	
<ol style="list-style-type: none"> 1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill. 2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India 	


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MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY (Effective from the academic year 2018 -2019) SEMESTER – V			
Course Code	18CS51	CIE Marks	40
Number of Contact Hours/Week	2:2:0	SEE Marks	60
Total Number of Contact Hours	40	Exam Hours	03
CREDITS – 03			
Course Learning Objectives: This course (18CS51) will enable students to:			
<ul style="list-style-type: none"> • Explain the principles of management, organization and entrepreneur. • Discuss on planning, staffing, ERP and their importance • Infer the importance of intellectual property rights and relate the institutional support 			
Module – 1			Contact Hours
Introduction - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, brief overview of evolution of management theories., Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection RBT: L1, L2			08
Module – 2			
Directing and controlling- meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination- meaning and importance, Controlling- meaning, steps in controlling, methods of establishing control. RBT: L1, L2			08
Module – 3			
Entrepreneur – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study. RBT: L1, L2			08
Module – 4			
Preparation of project and ERP - meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report, Enterprise Resource Planning: Meaning and Importance- ERP and Functional areas of Management – Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation RBT: L1, L2			08
Module – 5			
Micro and Small Enterprises: Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India industrial policy 2007 on micro and small enterprises, case study (Microsoft), Case study(Captain G R Gopinath),case study (N R Narayana Murthy & Infosys), Institutional support: MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency, Introduction to IPR.			08


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RBT: L1, L2	
Course outcomes: The students should be able to:	
<ul style="list-style-type: none"> • Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship • Utilize the resources available effectively through ERP • Make use of IPRs and institutional support in entrepreneurship 	
Question Paper Pattern:	
<ul style="list-style-type: none"> • The question paper will have ten questions. • Each full Question consisting of 20 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module. 	
Textbooks:	
<ol style="list-style-type: none"> 1. Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 4th / 6th Edition, 2010. 2. Dynamics of Entrepreneurial Development & Management -Vasant Desai Himalaya Publishing House. 3. Entrepreneurship Development -Small Business Enterprises -Poornima M Charantimath Pearson Education – 2006. 4. Management and Entrepreneurship - Kanishka Bedi- Oxford University Press-2017 	
Reference Books:	
<ol style="list-style-type: none"> 1. Management Fundamentals -Concepts, Application, Skill Development Robert Lusier – Thomson. 2. Entrepreneurship Development -S S Khanka -S Chand & Co. 3. Management -Stephen Robbins -Pearson Education /PHI -17th Edition, 2003 	


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CRYPTOGRAPHY (Effective from the academic year 2018 -2019) SEMESTER – VII			
Course Code	18CS744	CIE Marks	40
Number of Contact Hours/Week	3:0:0	SEE Marks	60
Total Number of Contact Hours	40	Exam Hours	03
CREDITS –3			
Course Learning Objectives: This course (18CS744) will enable students to:			
<ul style="list-style-type: none"> • Define cryptography and its principles • Explain Cryptography algorithms • Illustrate Public and Private key cryptography • Explain Key management, distribution and certification • Explain authentication protocols • Tell about IPSec 			
Module – 1			Contact Hours
Classical Encryption Techniques Symmetric Cipher Model, Cryptography, Cryptanalysis and Brute-Force Attack, Substitution Techniques, Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Cipher, One Time Pad. Block Ciphers and the data encryption standard: Traditional block Cipher structure, stream Ciphers and block Ciphers, Motivation for the feistel Cipher structure, the feistel Cipher, The data encryption standard, DES encryption, DES decryption, A DES example, results, the avalanche effect, the strength of DES, the use of 56-Bit Keys, the nature of the DES algorithm, timing attacks, Block cipher design principles, number of rounds, design of function F, key schedule algorithm Textbook 1: Ch. 2.1,2.2, Ch. 3 RBT: L1, L2			08
Module – 2			
Public-Key Cryptography and RSA: Principles of public-key cryptosystems. Public-key cryptosystems. Applications for public-key cryptosystems, requirements for public-key cryptosystems. public-key cryptanalysis. The RSA algorithm, description of the algorithm, computational aspects, the security of RSA. Other Public-Key Cryptosystems: Diffie-hellman key exchange, The algorithm, key exchange protocols, man in the middle attack, Elgamal Cryptographic systems Textbook 1: Ch. 9, Ch. 10.1,10.2 RBT: L1, L2			08
Module – 3			
Elliptic curve arithmetic, abelian groups, elliptic curves over real numbers, elliptic curves over Z_p , elliptic curves over $GF(2^m)$, Elliptic curve cryptography, Analog of Diffie-hellman key exchange, Elliptic curve encryption/ decryption, security of Elliptic curve cryptography, Pseudorandom number generation based on an asymmetric cipher, PRNG based on RSA. Key Management and Distribution: Symmetric key distribution using Symmetric encryption, A key distribution scenario, Hierarchical key control, session key lifetime, a transparent key control scheme, Decentralized key control, controlling key usage, Symmetric key distribution using asymmetric encryption, simple secret key distribution, secret key distribution with confidentiality and authentication, A hybrid scheme, distribution of public keys, public announcement of public keys, publicly available directory, public key			08

authority, public keys certificates. Textbook 1: Ch. 10.3-10.5, Ch.14.1 to 14.3 RBT: L1, L2	
Module – 4	
X-509 certificates. Certificates, X-509 version 3, public key infrastructure . User Authentication: Remote user Authentication principles, Mutual Authentication, one way Authentication, remote user Authentication using Symmetric encryption, Mutual Authentication, one way Authentication, Kerberos, Motivation , Kerberos version 4, Kerberos version 5, Remote user Authentication using Asymmetric encryption, Mutual Authentication, one way Authentication. Electronic Mail Security: Pretty good privacy, notation, operational; description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services, Domain keys identified mail, internet mail architecture, E-Mail threats, DKIM strategy, DKIM functional flow. Textbook 1: Ch. 14.4, Ch. 15.1 to 15.4, Ch.19 RBT: L1, L2	08
Module – 5	
IP Security: IP Security overview, applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes, IP Security policy, Security associations, Security associations database, Security policy database, IP traffic processing, Encapsulating Security payload, ESP format, encryption and authentication algorithms, Padding, Anti replay service Transport and tunnel modes, combining security associations, authentication plus confidentiality, basic combinations of security associations, internet key exchange, key determinations protocol, header and payload formats, cryptographic suits. Textbook 1: Ch. 20.1 to 20.3 RBT: L1, L2	08
Course outcomes: The students should be able to:	
<ul style="list-style-type: none"> • Define cryptography and its principles • Explain Cryptography algorithms • Illustrate Public and Private key cryptography • Explain Key management, distribution and certification • Explain authentication protocols • Tell about IPsec 	
Question paper pattern:	
<ul style="list-style-type: none"> • The question paper will have ten questions. • There will be 2 questions from each module. • Each question will have questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module. 	
Text Books:	
1. William Stallings: Cryptography and Network Security, Pearson 6 th edition.	
Reference Books:	
1. V K Pachghare: Cryptography and Information Security, PHI 2 nd Edition.	

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INTERNET OF THINGS (Effective from the academic year 2018 -2019) SEMESTER – VIII			
Course Code	18CS81	CIE Marks	40
Number of Contact Hours/Week	3:0:0	SEE Marks	60
Total Number of Contact Hours	40	Exam Hours	03
CREDITS –3			
Course Learning Objectives: This course (18CS81) will enable students to:			
<ul style="list-style-type: none"> Assess the genesis and impact of IoT applications, architectures in real world. Illustrate diverse methods of deploying smart objects and connect them to network. Compare different Application protocols for IoT. Infer the role of Data Analytics and Security in IoT. Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry. 			
Module 1			Contact Hours
What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack. Textbook 1: Ch.1, 2 RBT: L1, L2, L3			08
Module 2			
Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies. Textbook 1: Ch.3, 4 RBT: L1, L2, L3			08
Module 3			
IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods. Textbook 1: Ch.5, 6 RBT: L1, L2, L3			08
Module 4			
Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment Textbook 1: Ch.7, 8 RBT: L1, L2, L3			08
Module 5			
IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT			08

<p>Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.</p> <p>Textbook 1: Ch.12</p> <p>Textbook 2: Ch.7.1 to 7.4, Ch.8.1 to 8.4, 8.6</p> <p>RBT: L1, L2, L3</p>	
<p>Course Outcomes: The student will be able to :</p> <ul style="list-style-type: none"> • Interpret the impact and challenges posed by IoT networks leading to new architectural models. • Compare and contrast the deployment of smart objects and the technologies to connect them to network. • Appraise the role of IoT protocols for efficient network communication. • Elaborate the need for Data Analytics and Security in IoT. • Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry. 	
<p>Question Paper Pattern:</p> <ul style="list-style-type: none"> • The question paper will have ten questions. • Each full Question consisting of 20 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module. 	
<p>Textbooks:</p> <ol style="list-style-type: none"> 1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743) 2. Srinivasa K. G., "Internet of Things", CENGAGE Learning India, 2017 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. (ISBN: 978-8173719547) 2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224) 	
<p>Mandatory Note:</p> <p>Distribution of CIE Marks is as follows (Total 40 Marks):</p> <ul style="list-style-type: none"> • 20 Marks through IA Tests • 20 Marks through practical assessment <p>Maintain a copy of the report for verification during LIC visit.</p>	
<p>Possible list of practicals:</p> <ol style="list-style-type: none"> 1. Transmit a string using UART 2. Point-to-Point communication of two Motes over the radio frequency. 3. Multi-point to single point communication of Motes over the radio frequency. LAN (Sub-netting). 4. I2C protocol study 5. Reading Temperature and Relative Humidity value from the sensor 	


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