



RSET

RAJAGIRI SCHOOL OF
ENGINEERING & TECHNOLOGY

COURSE HAND-OUT

B.TECH. - SEMESTER VIII

**DEPARTMENT OF COMPUTER SCIENCE
AND ENGINEERING**

RAJAGIRI SCHOOL OF ENGINEERING AND TECHNOLOGY (RSET)

VISION

TO EVOLVE INTO A PREMIER TECHNOLOGICAL AND RESEARCH INSTITUTION, MOULDING EMINENT PROFESSIONALS WITH CREATIVE MINDS, INNOVATIVE IDEAS AND SOUND PRACTICAL SKILL, AND TO SHAPE A FUTURE WHERE TECHNOLOGY WORKS FOR THE ENRICHMENT OF MANKIND

MISSION

TO IMPART STATE-OF-THE-ART KNOWLEDGE TO INDIVIDUALS IN VARIOUS TECHNOLOGICAL DISCIPLINES AND TO INCULCATE IN THEM A HIGH DEGREE OF SOCIAL CONSCIOUSNESS AND HUMAN VALUES, THEREBY ENABLING THEM TO FACE THE CHALLENGES OF LIFE WITH COURAGE AND CONVICTION

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CSE), RSET

VISION

TO BECOME A CENTRE OF EXCELLENCE IN COMPUTER SCIENCE & ENGINEERING, MOULDING PROFESSIONALS CATERING TO THE RESEARCH AND PROFESSIONAL NEEDS OF NATIONAL AND INTERNATIONAL ORGANIZATIONS.

MISSION

TO INSPIRE AND NURTURE STUDENTS, WITH UP-TO-DATE KNOWLEDGE IN COMPUTER SCIENCE & ENGINEERING, ETHICS, TEAM SPIRIT, LEADERSHIP ABILITIES, INNOVATION AND CREATIVITY TO COME OUT WITH SOLUTIONS MEETING THE SOCIETAL NEEDS.

B.TECH PROGRAMME

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- 1.** Graduates shall have up-to-date knowledge in Computer Science & Engineering along with interdisciplinary and broad knowledge on mathematics, science, management and allied engineering to become computer professionals, scientists and researchers.
- 2.** Graduates shall excel in analysing, designing and solving engineering problems and have life-long learning skills, to develop computer applications and systems, resulting in the betterment of the society.
- 3.** Graduates shall nurture team spirit, ethics, social values, skills on communication and leadership, enabling them to become leaders, entrepreneurs and social reformers.

PROGRAMME OUTCOMES (POs)

Graduates will be able to achieve

- a.** An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computer-based systems.
- b.** An ability to identify, analyse, formulate and solve technical problems by applying principles of computing and mathematics relevant to the problem.
- c.** An ability to define the computing requirements for a technical problem and to design, implement and evaluate a computer-based system, process or program to meet desired needs.
- d.** An ability to learn current techniques, skills and modern engineering tools necessary for computing practice.
- e.** An ability to carry out experiments, analyse results and to make necessary conclusions.
- f.** An ability to take up multidisciplinary projects and to carry out it as per industry standards.
- g.** An ability to take up research problems and apply computer science principles to solve them leading to publications.
- h.** An ability to understand and apply engineering solutions in a global and social context.
- i.** An ability to understand and practice professional, ethical, legal, and social responsibilities as a matured citizen.
- j.** An ability to communicate effectively, both written and oral, with a range of audiences.

- k. An ability to engage in life-long learning and to engage in continuing professional development.
- l. An ability to cultivate team spirit and to develop leadership skills thereby moulding future entrepreneurs.

INDEX

SCHEME: B.TECH. 8TH SEMESTER	6
CS402 Data Mining and Ware Housing	7
COURSE INFORMATION SHEET	7
CS404 Embedded Systems	14
COURSE INFORMATION SHEET	14
CS464 Artificial Intelligence	21
COURSE INFORMATION SHEET	21
CS468 Cloud Computing	25
COURSE INFORMATION SHEET	25
CS472 Principles of Information Security	29
COURSE INFORMATION SHEET	29
CS492 Project	34
COURSE INFORMATION SHEET	34

SCHEME: B.TECH. 8TH SEMESTER**(Computer Science & Engineering)**

Kerala Technological University Revised Scheme for B.Tech. Syllabus Revision 2015

Course Code	Course Name	L-T-P	Credits	Exam Slot
CS402	Data Mining and Ware Housing	3-0-0	3	A
CS404	Embedded Systems	3-0-0	3	B
	Elective 4	3-0-0	3	C
	Elective 5 (Non Departmental)	3-0-0	3	D
CS492	Project	0-1-4	6	S

Total Credits = 18 Hours: 30**Cumulative Credits= 180**

CS402 Data Mining and Ware Housing

COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE AND ENGINEERING	DEGREE: BTECH (MARCH - JUNE 2022)
COURSE: DATA MINING AND WAREHOUSING	SEMESTER: VIII CREDITS: 3
COURSE CODE: CS402 REGULATION: 2016	COURSE TYPE: CORE
COURSEAREA/DOMAIN: DATA SCIENCE	CONTACT HOURS: 3 hours/week.
CORRESPONDING LAB COURSE CODE (IF ANY):NIL	LAB COURSE NAME:NIL

SYLLABUS:

MODULE	DETAILS	HOURS
I	Data Mining:- Concepts and Applications, Data Mining Stages, Data Mining Models, Data Warehousing (DWH) and On-Line Analytical Processing (OLAP), Need for Data Warehousing, Challenges, Application of Data Mining Principles, OLTP Vs DWH, Applications of DWH	6
II	Data Preprocessing: Data Preprocessing Concepts, Data Cleaning, Data integration and transformation, Data Reduction, Discretization and concept hierarchy.	6
III	Classification Models: Introduction to Classification and Prediction, Issues regarding classification and prediction, Decision Tree- ID3, C4.5, Naive Bayes Classifier.	6
IV	Rule based classification- 1R. Neural Networks-Back propagation. Support Vector Machines, Lazy Learners-K Nearest Neighbor Classifier. Accuracy and error Measures- evaluation. Prediction:-Linear Regression and Non-Linear Regression.	6
V	Association Rules Mining: Concepts, Apriori and FP-Growth Algorithm. Cluster Analysis: Introduction, Concepts, Types of data in cluster analysis, Categorization of clustering methods. Partitioning method: K-Means and K-Medoid Clustering.	8
VI	Hierarchical Clustering method: BIRCH. Density-Based Clustering – DBSCAN and OPTICS. Advanced Data Mining Techniques: Introduction, Web Mining- Web Content Mining, Web Structure Mining, Web Usage Mining. Text Mining. Graph mining:-Apriori based approach for mining frequent subgraphs. Social Network Analysis:- characteristics of social networks. Link mining:- Tasks and challenges.	7
TOTAL HOURS		40

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Dunham M H, "Data Mining: Introductory and Advanced Topics", Pearson Education, New Delhi, 2003. 2015
T	Jaiwei Han and MichelineKamber, "Data Mining Concepts and Techniques", Elsevier, 2006
R	M SudeepElayidom, "Data Mining and Warehousing", 1st Edition, 2015, Cengage Learning India Pvt. Ltd.
R	MehmedKantardzic, "Data Mining Concepts, Methods and Algorithms", John Wiley and Sons, USA, 2003.
R	Pang-Ning Tan and Michael Steinbach, "Introduction to Data Mining", Addison Wesley, 2006

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
CS208	Database Management System	Basicknowledgeofdifferenttypesofdatabases	4

COURSE OBJECTIVES:

1	To introduce the concepts of data Mining and its applications
2	To understand investigation of data using practical data mining tool.
3	To introduce Association Rules Mining.
4	To introduce advanced Data Mining

COURSE OUTCOMES:

SI No	DESCRIPTION	Blooms' Taxonomy Level
CS402.1	Identify the key process of Data mining and Warehousing	LEVEL 1
CS402.2	Apply appropriate techniques to convert raw data into suitable format for practical data mining tasks	LEVEL 3

CS402.3	Analyze and compare various classification algorithms and apply in appropriate domain	LEVEL 4 LEVEL 5
CS402.4	Evaluate the performance of various classification methods using performance metrics	LEVEL 5
CS402.5	Make use of the concept of association rule mining in real world scenario	LEVEL 6
CS402.6	Select appropriate clustering and algorithms for various applications	LEVEL 1
CS402.7	Extend data mining methods to the new domains of data	LEVEL 6

CO-PO AND CO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS402.1	3	2	–	–	–	–	–	–	–	–	–	–	1	–	–
CS402.2	3	2	–	–	2	–	–	–	–	–	–	–	–	2	–
CS402.3	–	3	2	1	–	–	–	–	–	–	–	–	–	–	1
CS402.4	–	3	–	2	–	–	–	–	–	–	–	–	–	–	3
CS402.5	1	–	2	–	2	3	–	–	–	–	–	–	–	–	3
CS402.6	1	3	–	2	–	–	3	–	–	–	–	–	–	–	3
CS402.7	–	–	3	–	–	–	–	–	1	1	–	1	–	2	3
	2	2.6	2.33	1.66	2	3	3		1	1		1	1	2	2

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SLNO	DESCRIPTION	PROPOSED ACTIONS
1	Social Implications of Data Mining Techniques	Discussed in the class. Learning Material provided.
2	Data Mining Applications in Healthcare	Discussed in the class. Learning Material provided.

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/NPTEL ETC

JUSTIFICATIONS FOR CO-PO MAPPING

MAPPING	LOW/MEDIUM/HIGH	JUSTIFICATION
CS402.1 PO1	H	The students will be able to gain a thorough understanding of the concepts of Data mining and warehousing
CS402.1 PO2	M	The students will get an insight into concepts of Data mining and warehousing and they would be able to apply these practices in data science projects.
CS402.1 PSO1	L	With the knowledge of Data mining and warehousing ,the students will be able to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of OOP.
CS402.2 PO1	H	Applying appropriate techniques for data conversion, will enable the students to gain a thorough understanding of the concepts of Data mining and warehousing
CS402.2 PO2	M	The students will get an insight into various data conversion techniques and they would be able to apply these practices in real data science problems while applying appropriate techniques for data conversion,
CS402.2 PO5	M	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
CS402.2 PSO2	M	The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry, practicing the various data conversion techniques.
CS402.3 PO2	H	Analyzing and comparing various classification algorithms and applying in appropriate domain will make students to Identify, formulate, review research literature, and analyze complex engineering problems.
CS402.3 PO3	M	Designing solutions for complex engineering problems and design system components or processes that meet the specified needs will be done while applying various classification algorithms in appropriate

		domain.
CS402.3 PO4	L	Students use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions by comparing various classification algorithms and applying in appropriate domain.
CS402.3 PSO3	L	The students will be able to develop ability to apply the fundamentals of computer science in competitive research, by comparing various classification algorithms and applying them in appropriate domain.
CS402.4 PO2	H	Evaluation of various classification algorithms will make students to Identify, formulate, review research literature, and analyze complex engineering problems.
CS402.4 PO4	M	Students use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions by evaluating various classification algorithms.
CS402.4 PSO3	H	Efficient evaluation of classification methods , will enable the students to apply the fundamentals of computer science in competitive research and to develop an efficient data product or service.
CS402.5 PO1	L	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems like association rule mining in real world scenario.
CS402.5 PO3	M	The students will be able to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by implementing association rule mining in real world scenario.
CS402.5 PO5	M	Students will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to implement association rule mining in real world scenario.
CS402.5 PO6	H	Application of Association rule mining in real world scenario ,will enable the students to perform reasoning informed by the contextual knowledge.
CS402.5 PSO3	H	Application of Association rule mining in real world scenario methods , will enable the students to apply the fundamentals of computer science in competitive research and to develop an efficient data product or service.
CS402.6 PO1	L	Apply the knowledge of mathematics, science, engineering fundamentals, to select the various clustering algorithms for various applications.
CS402.6 PO2	H	Selection of various clustering algorithms will make students to Identify, formulate, review research literature, and analyze complex

		engineering problems.
CS402.6 PO4	M	Students use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions by selecting appropriate clustering algorithms for various applications.
CS402.6 PO7	H	Selection of appropriate clustering algorithms for various applications will lead the student to understand the impact of the professional engineering solutions in societal and environmental contexts.
CS402.5 PSO3	H	Selection of appropriate clustering algorithms for various applications, will enable the students to apply the fundamentals of computer science in competitive research and to develop an efficient data product or service.
CS402.7 PO3	H	The students will be able to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by extending data mining methods to new domains of data..
CS402.7 PSO2	M	Extension of data mining methods to new domains of data will make students to Identify, formulate, review research literature, and analyze complex engineering problems.
CS402.7 PSO3	H	Extension of data mining methods to new domains of data, will enable the students to apply the fundamentals of computer science in competitive research and to develop an efficient data product or service.

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

SLNO	DESCRIPTION	PROPOSED ACTIONS	PO Mapping
1	Mining tools like weka	Assignment	PO5

WEB SOURCE REFERENCES:

1	http://en.wikipedia.org/wiki/Weka_%28machine_learning%29
2	http://www.siliconafrika.com/the-best-data-minning-tools-you-can-use-for-free-in-your-company/
3	www.weka.net.nz
4	https://www.coursera.org/learn/datasciencemathskills
5	https://onlinecourses.nptel.ac.in/noc18_cs14

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

<input type="checkbox"/> CHALK & TALK	<input type="checkbox"/> STUD. ASSIGNMENT	<input type="checkbox"/> WEB RESOURCES	<input type="checkbox"/> LCD/SMART BOARDS
<input type="checkbox"/> STUD. SEMINARS	<input type="checkbox"/> ADD-ON COURSES		

ASSESSMENT METHODOLOGIES-DIRECT

<input type="checkbox"/> ASSIGNMENTS	<input type="checkbox"/> STUD. SEMINARS	<input type="checkbox"/> TESTS/MODEL EXAMS	<input type="checkbox"/> UNIV. EXAMINATION
<input type="checkbox"/> STUD. LAB PRACTICES	<input type="checkbox"/> STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

<input type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

Prepared by
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CS404 Embedded Systems

COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE AND ENGINEERING	DEGREE: BTECH
COURSE: EMBEDDED SYSTEMS	SEMESTER: VIII CREDITS: 3
COURSE CODE: CS404 REGULATION: 2016	COURSE TYPE: CORE
COURSE AREA/DOMAIN: System Design	CONTACT HOURS: 4 hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY): N.A	LAB COURSE NAME: N.A

SYLLABUS:

UNIT	DETAILS	HOURS
I	Fundamentals of Embedded Systems- complex systems and microprocessors- Embedded system design process. Specifications- architecture design of embedded system design of hardware and software components- structural and behavioural description	6
II	Hardware Software Co-Design and Program Modelling –Fundamental Issues, Computational Models- Data Flow Graph, Control Data Flow Graph, State Machine. Sequential Model, Concurrent Model, Object oriented model, UML	9
III	Design and Development of Embedded Product – Firmware Design and Development – Design Approaches, Firmware Development Languages.	6
IV	Integration and Testing of Embedded Hardware and Firmware- Integration of Hardware and Firmware. Embedded System Development Environment – IDEs, Cross Compilers, Disassemblers, Decompilers, Simulators, Emulators and Debuggers.	6
V	RTOS based Design – Basic operating system services. Interrupt handling in RTOS environment. Design Principles. Task scheduling models. How to Choose an RTOS. Case Study – MicroC/OS-II.	9
VI	Networks – Distributed Embedded Architectures, Networks for embedded systems, Network based design, Internet enabled systems. Embedded Product Development Life Cycle – Description – Objectives -Phases – Approaches 1. Recent Trends in Embedded Computing.	6
TOTAL HOURS		42

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
R	J Staunstrup and Wayne Wolf, Hardware / Software Co-Design: Principles and Practice, Prentice Hall.
R	Jean J. Labrose, Micro C/OS II: The Real Time Kernel, 2e, CRC Press, 2002.

R	Raj Kamal, Embedded Systems: Architecture, Programming and Design, Third Edition, McGraw Hill Education (India), 2014.
R	Shibu K.V., Introduction to Embedded Systems, McGraw Hill Education (India), 2009.
R	Steve Heath, Embedded System Design, Second Edition, Elsevier.
R	Wayne Wolf, Computers as Components-Principles of Embedded Computer System Design, Morgan Kaufmann publishers, Third edition, 2012.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
	NIL		

COURSE OBJECTIVES:

1	To introduce the technologies behind embedded computing systems.
2	To introduce and discuss various software components involved in embedded system design and development.
3.	To expose students to the recent trends in embedded system design.

COURSE OUTCOMES:

Students will be able to

CS404.1	demonstrate the role of individual components involved in a typical embedded system. (LEVEL 3)
CS404.2	analyze the characteristics of different computing elements and select the most appropriate one for an embedded system.(LEVEL 4)
CS404.3	model the operation of a given embedded system. (LEVEL 4)
CS404.4	substantiate the role of different software modules in the development of an embedded system.(LEVEL 4)
CS404.5	develop simple tasks to run on an RTOS. (LEVEL 5)
CS404.6	examine the latest trends prevalent in embedded system design.(LEVEL 4)

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CS404.1	3	3	2	1	2	2	2	-	-	2	-	3	2	3	2
CS404.2	3	3	3	2	3	2	2	-	-	2	-	3	3	3	2
CS404.3	3	3	3	2	3	2	2	-	-	3	-	3	3	3	2
CS404.4	2	2	2	2	2	2	2	-	-	3	-	3	2	3	2
CS404.5	3	3	3	3	2	2	2	-	-	2	-	2	2	2	2

CS404.6	2	2	2	2	2	2	2	-	-	2	-	2	2	2	2
CS404(overall level)	2.66	2.66	2.5	2	2.3	2	2	-	-	2.3	-	2.6	2.33	2.66	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	LOW/MEDIUM/HIGH	Justification
C404.1-PO1	H	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
C404.1-PO2	H	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
C404.1-PO3	M	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
C404.1-PO4	L	This knowledge helps to identify the best embedded component.
C404.1-PO5	M	This knowledge helps in identifying the best tools needed to develop the embedded system
C404.1-PO6	M	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
C404.1-PO7	M	This knowledge helps as to do research in different embedded component effectively.
C404.1-PO10	M	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
C404.1-PO12	H	These concepts are fundamental to CS and can be used in research and other innovative ideas.
C404.1-PSO1	M	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
C404.1-PSO2	H	The knowledge of embedded system can be used to have products of industry standard
C404.1-PSO3	M	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
C404.2-PO1	H	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
C404.2-PO2	H	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
C404.2-PO3	H	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
C404.2-PO4	M	This knowledge helps to identify the best embedded component.
C404.2-PO5	H	This knowledge helps in identifying the best tools needed to develop the embedded system
C404.2-PO6	M	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
C404.2-PO7	M	This knowledge helps as to do research in different embedded

		component effectively.
C404.2-PO10	M	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
C404.2-PO12	H	These concepts are fundamental to CS and can be used in research and other innovative ideas.
C404.2-PS01	H	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
C404.2-PS02	H	The knowledge of embedded system can be used to have products of industry standard
C404.2-PS03	M	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
C404.3-PO1	H	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
C404.3-PO2	H	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
C404.3-PO3	H	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
C404.3-PO4	M	This knowledge helps to identify the best embedded component.
C404.3-PO5	H	This knowledge helps in identifying the best tools needed to develop the embedded system
C404.3-PO6	M	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
C404.3-PO7	M	This knowledge helps as to do research in different embedded component effectively.
C404.3-PO10	H	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
C404.3-PO12	H	These concepts are fundamental to CS and can be used in research and other innovative ideas.
C404.3-PS01	H	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
C404.3-PS02	H	The knowledge of embedded system can be used to have products of industry standard
C404.3-PS03	M	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
C404.4-PO1	M	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
C404.4-PO2	M	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
C404.4-PO3	M	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
C404.4-PO4	M	This knowledge helps to identify the best embedded component.
C404.4-PO5	M	This knowledge helps in identifying the best tools needed to develop the embedded system

C404.4-PO6	M	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
C404.4-PO7	M	This knowledge helps as to do research in different embedded component effectively.
C404.4-PO10	H	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
C404.4-PO12	H	These concepts are fundamental to CS and can be used in research and other innovative ideas.
C404.4-PSO1	M	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
C404.4-PSO2	H	The knowledge of embedded system can be used to have products of industry standard
C404.4-PSO3	M	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
C404.5-PO1	H	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
C404.5-PO2	H	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
C404.5-PO3	H	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
C404.5-PO4	H	This knowledge helps to identify the best embedded component.
C404.5-PO5	M	This knowledge helps in identifying the best tools needed to develop the embedded system
C404.5-PO6	M	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
C404.5-PO7	M	This knowledge helps as to do research in different embedded component effectively.
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C404.5-PSO1	M	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
C404.5-PSO2	M	The knowledge of embedded system can be used to have products of industry standard
C404.5-PSO3	M	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
C404.6-PO1	M	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
C404.6-PO2	M	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
C404.6-PO3	M	The knowledge in different embedded systems components help in

		designing solutions and analyzing its complexity.
C404.6-PO4	M	This knowledge helps to identify the best embedded component.
C404.6-PO5	M	This knowledge helps in identifying the best tools needed to develop the embedded system
C404.6-PO6	M	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
C404.6-PO7	M	This knowledge helps as to do research in different embedded component effectively.
C404.6-PO10	M	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
C404.6-PO12	M	These concepts are fundamental to CS and can be used in research and other innovative ideas.
C404.6-PSO1	M	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
C404.6-PSO2	M	The knowledge of embedded system can be used to have products of industry standard
C404.6-PSO3	M	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSIONAL REQUIREMENTS:

SNO	DESCRIPTION	PROPOSED ACTIONS
1	HARDWARE-SOFTWARE TRADEOFF	Learning materials provided

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

1	Programming using embedded C	workshop
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WEB SOURCE REFERENCES:

1	https://onlinecourses.nptel.ac.in/noc19_cs22/preview
2.	https://nptel.ac.in/noc/individual_course.php?id=noc18-cs12

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

<input checked="" type="checkbox"/> CHALK & TALK	<input checked="" type="checkbox"/> STUD. ASSIGNMENT	<input checked="" type="checkbox"/> WEB RESOURCES	
<input checked="" type="checkbox"/> LCD/SMART BOARDS	<input type="checkbox"/> STUD. SEMINARS	<input type="checkbox"/> ADD-ON COURSES	

ASSESSMENT METHODOLOGIES-DIRECT

m. ASSIGNMENTS	<input type="checkbox"/> STUD.	n. TESTS/MODEL	o. UNIV.
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	SEMINARS	EXAMS	EXAMINATION
STUD. LAB PRACTICES	p. STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

Prepared by**Approved by****Mr. Paul Augustine****Dr.Dhanya P.M.****Ms. Seema Safar****HOD, CSE**

CS464 Artificial Intelligence

COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE & ENGINEERING	DEGREE: B TECH
COURSE: ARTIFICIAL INTELLIGENCE	SEMESTER: 8 CREDITS: 3
COURSE CODE: CS464 REGULATION: 2016	COURSE TYPE: ELECTIVE
COURSE AREA/DOMAIN: MACHINE LEARNING	CONTACT HOURS: 3
CORRESPONDING LAB COURSE CODE (IF ANY): NA	LAB COURSE NAME:

SYLLABUS:

UNIT	DETAILS	HOURS
I	Introduction: What is AI, The foundations of AI, History and applications, Production systems. Structures and strategies for state space search. Informed and Uninformed searches.	5
II	Search Methods: data driven and goal driven search. Depth first and breadth first search, DFS with iterative deepening. Heuristic search-best first search, A * algorithm.AO* algorithm, Constraint Satisfaction. Crypt Arithmetic Problems	8
III	AI representational schemes- Semantic nets, conceptual dependency, scripts, frames, introduction to agent based problem solving, Machine learning-symbol based-a frame work for symbol based learning.	6
IV	Advanced Search: Heuristics in Games, Design of good heuristic-an example. Min-Max Search Procedure, Alpha Beta pruning,	6
V	Learning Concepts: Version space search. Back propagation learning. Social and emergent models of learning-genetic algorithm, classifier systems and genetic programming.	9
VI	Expert Systems: rule based expert systems. Natural language processing-natural language understanding problem, deconstructing language. Syntax stochastic tools for language analysis, natural language applications	9
TOTAL HOURS		43

TEXT/REFERENCE BOOKS:

T/ R	BOOK TITLE/AUTHORS/PUBLICATION
T1	E Rich, K Knight, Artificial Intelligence, 3/e, Tata McGraw Hil, 2009.

T2	George.F.Luger, Artificial Intelligence- Structures and Strategies for Complex Problem Solving, 4/e, Pearson Education. 2002.
R1	D. Poole and A. Mackworth. Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010
R2	Dan W Patterson, Introduction to Artificial Intelligence, Pearson,2009
R3	Deepak Khemeni, A First course in Artificial Intelligence,Tata McGraw Hill,2013
R4	Maja J. Mataric, Robotics Primer,MIT press,2007
R5	Patrick Henry Winston, Artificial intelligence, Addison wessley,1992
R6	Stefan Edelkamp, Stefan Schroedl, Heuristic Search: Theory and Applications, Morgan Kaufman, 2011.
R7	Stuart Jonathan Russell, Peter Norvig, Artificial intelligence, A modern approach,3rd edition, pearson,2010

COURSE OBJECTIVES:

1	To introduce basic principles that drive complex real world intelligence applications.
2	To introduce and discuss the basic concepts of AI Techniques and Learning
3	

COURSE OUTCOMES:

SNO	DESCRIPTION	Bloom's Taxonomy Level
469.1	The Student will be able to identify the scope and limits of the artificial intelligence (AI) field	Identify(Level 1)
469.2	The Student will be able to assess the applicability, strengths, and weaknesses of the basic knowledge representation	Assess(Level 6)
469.3	The Student will be able to interpret the role of knowledge representation, problem solving, and learning	Interpret(Level 2)
469.4	The Student will be able to explain various search algorithms (uninformed, informed, and heuristic) for problem solving	explain(Level 2)
469.5	The Student will be able to comprehend the fundamentals of Natural Language Processing	comprehend(Level 2)

CO-PO AND CO-PSO MAPPING

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PS	PSO3
	1	2	3	4	5	6	7	8	9	10	11	12	1	O2	
CS464.1	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CS464.2	2	-	2	2	-	2	-	-	-	-	-	-	2	-	-
CS464.3	2	-	2	2	-	2	-	-	-	-	-	-	2	-	-
CS464.4	2	2	2	-	-	-	-	-	-	-	-	-	2	-	-
CS464.5	-	2	2	2	-	2	-	-	-	-	-	-	2	-	-

LOW/MEDIUM/HIGH→1/2/3

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	LOW/MEDIUM/ HIGH	Justification
CS464.1-PO1	H	By knowing the scope and limits of AI Students can identify the solvable and unsolvable problems..
CS464.1-PO2	H	With suitable state space representation complex engineering problems can be solved easily.
CS464.1-PO3	H	By knowing the scope and limits of AI students can develop creative solutions for problems.
CS464.1-PSO1	H	Students can identify, analyze and design complex engineering problems by knowing the basic concepts of AI.
CS464.2/3-PO1	M	Students can apply knowledge of mathematics and engineering fundamentals to strengthen AI knowledge representations.
CS464.2/3-PO3	M	Good knowledge representation helps to design/develop solutions in better ways.
CS464.2/3-PO4	M	Different properties of knowledge representation help for better analysis and interpretation of data hence to provide valid conclusions.
CS464.2/3-PO6	M	Knowledge representations like semantic nets, conceptual dependency helps to asses societal, health, safety etc in systematic way.
CS464.2/3-PSO1	M	Good knowledge representation helps to make good solution to complex problems.
CS464.4-PO1	M	To implement search algorithm mathematical knowledge is needed
CS464.4-PO2	M	To reach substantiated conclusions to different problems ,students should have an idea about different search techniques.
CS464.4-PO3	M	Idea about heuristic type searching is required to develop optimal solutions.
CS464.4-PSO1	M	Idea about different search algorithms helps to design good solution for complex engineering problems.
CS464.5-PO2	M	Natural language understanding required for problem analysis.
CS464.5-PO3	M	Natural language understanding required to design solutions to problems.
CS464.5-PO4	M	I conduct investigation on problems idea about NLP is needed.
CS464.6-PO6	M	To apply reasoning informed by the contextual knowledge to asses societal needs student should have an idea about language processing.
CS464.5-PSO1	M	Natural Language understanding is required to anlyse and design solutions.

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

S. NO	DESCRIPTION	PROPOSED ACTIONS	PO MAPPING
1	Planning and learning methods	Reading assignment	2,3,4

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

S. NO	TOPIC	PO MAPPING
1	Design of agents and intelligent Agents	3,4,5

WEB SOURCE REFERENCES:

1	http://code.google.com/p/aima-python/
2	http://www.aispace.org/mainTools.shtml
3	http://www.wiziq.com/tutorials/artificial-intelligence

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

<input checked="" type="checkbox"/> CHALK & TALK	<input checked="" type="checkbox"/> STUD. ASSIGNMENT	<input checked="" type="checkbox"/> WEB RESOURCES	
<input type="checkbox"/> LCD/SMART BOARDS	<input type="checkbox"/> STUD. SEMINARS	<input type="checkbox"/> ADD-ON COURSES	

ASSESSMENT METHODOLOGIES-DIRECT

<input checked="" type="checkbox"/> ASSIGNMENTS	<input type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input checked="" type="checkbox"/> UNIV. EXAMINATION
<input checked="" type="checkbox"/> STUD. LAB PRACTICES	<input type="checkbox"/> STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (ONCE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

Prepared by

Ms Maria vijoy

Approved by

**Dr SMINU IZUDHEEN
(HOD)**

CS468 Cloud Computing

COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE & ENGINEERING	DEGREE: B TECH
COURSE: CLOUD COMPUTING	SEMESTER: 8 CREDITS: 3
COURSE CODE: CS468 REGULATION: 2016	COURSE TYPE: ELECTIVE
COURSE AREA/DOMAIN: CLOUD COMPUTING	CONTACT HOURS: 3
CORRESPONDING LAB COURSE CODE (IF ANY): NA	LAB COURSE NAME: NA

SYLLABUS:

UNIT	DETAILS	HOURS
I	INTRODUCTION TO VIRTUALIZATION Virtual Machines and Virtualization Middleware – Data Center Virtualization for Cloud Computing – Implementation Levels of Virtualization – Virtualization Structures/Tools and Mechanisms– Virtualization of CPU – Memory – I/O Devices	7
II	INTRODUCTION TO CLOUD COMPUTING System Models for Distributed and Cloud Computing – Software Environments for Distributed Systems and Clouds – Cloud Computing and Service Models – Public – Private – Hybrid Clouds – Infrastructure-as-a-Service (IaaS) – Platform-as-a-Service (PaaS) - Software-as-a-Service (SaaS)-Different Service Providers	8
III	CLOUD ARCHITECTURE AND RESOURCE MANAGEMENT Architectural Design of Compute and Storage Clouds – Public Cloud Platforms: GAE – AWS – Azure-Emerging Cloud Software Environments – Eucalyptus-Nimbus – Open Stack – Extended Cloud Computing Services – Resource Provisioning and Platform Deployment – Virtual Machine Creation and Management.	8
IV	CLOUD PROGRAMMING Parallel Computing and Programming Paradigms – Map Reduce –Twister – Iterative Map Reduce – Hadoop Library from Apache –Pig Latin High Level Languages- Mapping Applications to Parallel and Distributed Systems – Programming the Google App Engine – Google File System (GFS) – Big Table – Google’s NOSQL System	7
V	SECURITY IN THE CLOUD Security Overview – Cloud Security Challenges – Security -as-a-Service – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security –Application Security – Virtual Machine Security.	6
VI	USING CLOUD SERVICES : Email Communications – Collaborating on To-Do Lists –Contact Lists – Cloud Computing for the Community- Collaborating on Calendars – Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Project Management -Word Processing – Databases	6
TOTAL HOURS		42

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	Kai Hwang , Geoffrey C Fox, Jack J Dongarra : Distributed and Cloud Computing - From Parallel Processing to the Internet of Things , Morgan Kaufmann Publishers - 2012.
R1	Alex Amies, Harm Sluiman, Qiang Guo Tong and Guo Ning Liu: Developing and Hosting Applications on the cloud, IBM Press, 2012.
R2	George Reese: Cloud Application Architectures: Building Applications and Infrastructure in the Cloud (Theory in Practice), O'Reilly Publications, 2009.
R3	Haley Beard: Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing - applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008
R4	James E. Smith and Ravi Nair: Virtual Machines: Versatile Platforms for Systems and Processes, Morgan Kaufmann, ELSEVIER Publication, 2006.
R5	John W Rittinghouse and James F Ransome : Cloud Computing: Implementation - Management - and Security, CRC Press, 2010.
R6	Michael Miller: Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Pearson Education, 2009.
R7	Richard N. Katz: The Tower and The Cloud, Higher Education in the Age of Cloud Computing, 2008.
R8	Toby Velte, Anthony Velte and Robert Elsenpeter: Cloud Computing - A Practical Approach, TMH, 2009.

COURSE OBJECTIVES:

1	To impart the fundamentals of virtualization techniques.
2	To introduce concepts and security issues of cloud paradigm.
3	To introduce cloud computing based programming techniques and cloud services.

COURSE OUTCOMES:

SNO	DESCRIPTION	Bloom's Taxonomy Level
468.1	The students will be able to identify the significance of implementing virtualization techniques.	Identify (Level 2)
468.2	The students will able to interpret the various cloud computing models and services.	Interpret (Level 3)
468.3	The students will able to compare the various public cloud platforms and software environments.	Compare (Level 2)
468.4	The students will able to apply appropriate cloud programming methods to solve big data problems.	Apply (Level 3)
468.5	The students will able to appreciate the need of security mechanisms in cloud.	Appreciate (Level 4)
468.6	The students will be able to illustrate the use of various cloud services available online.	Illustrate (Level 2)

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2	PSO3
CS468.1	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CS468.2	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CS468.3	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CS468.4	-	2	2	-	-	-	-	-	-	-	-	-	2	2	-
CS468.5	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CS468.6	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CS468	1	2	2	-	-	-	-	-	-	-	-	-	2	2	-

LOW/MEDIUM/HIGH→1/2/3

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	LOW/MEDIUM/ HIGH	Justification
CS468.1-PO2	M	Using basic concepts of computer engineering students can identify the concept of virtualization
CS468.2-PO1	L	Students can understand the various cloud computing models
CS468.3-PO2	M	Can compare and understand the various public cloud platforms available and also their corresponding software environment
CS468.4-PO2	M	Can analyze Big Data problems for developing potential solutions
CS468.4-PO3	M	Solutions can be developed for complex Big Data problems.
CS468.5-PO2	M	Appraise, correlate and conclude the need for Cloud Security mechanisms
CS468.6-PO2	M	Students can use the knowledge gained to work on various cloud applications

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

S. NO	DESCRIPTION	PROPOSED ACTIONS	PO MAPPING
1	Hands on workshop on Hadoop	Workshop	1,3,5
2	Cloud Implementation	Workshop	1,3,5

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

S. NO	TOPIC	PO MAPPING
1	Performance of Cloud	1,2,3
2	Cloud for HPC and HTC	1,3,5

WEB SOURCE REFERENCES:

1	https://csrc.nist.gov/publications/detail/sp/800-145/final
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2	https://docs.aws.amazon.com/index.html?nc2=h_ql_doc#lang/en_us
3	https://docs.microsoft.com/en-in/azure/
4	https://cloud.google.com/docs/

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

<input checked="" type="checkbox"/> CHALK & TALK	<input checked="" type="checkbox"/> STUD. ASSIGNMENT	<input checked="" type="checkbox"/> WEB RESOURCES	
<input type="checkbox"/> LCD/SMART BOARDS	<input type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> ADD-ON COURSES	

ASSESSMENT METHODOLOGIES-DIRECT

<input checked="" type="checkbox"/> ASSIGNMENTS	<input type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input checked="" type="checkbox"/> UNIV. EXAMINATION
<input type="checkbox"/> STUD. LAB PRACTICES	<input type="checkbox"/> STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (ONCE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

Prepared by**ANU MARIA JOYKUTTY****Approved by****SMINU IZUDHEEN
HOD, DCS**

CS472 Principles of Information Security

COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE & ENGINEERING	DEGREE: BTECH
COURSE: PRINCIPLES OF INFORMATION SECURITY	SEMESTER: VIII CREDITS: 3
COURSE CODE: CS472	COURSE TYPE: ELECTIVE
COURSE AREA/DOMAIN: SECURITY	CONTACT HOURS: 3-0-0(L-T-P) hours/Week.
CORRESPONDING LAB COURSE CODE: NIL	LAB COURSE NAME: NIL

SYLLABUS:

UNIT	DETAILS	HOURS
I	Introduction: Overview of computer security, Security concepts, Need of Security- Threats- Deliberate software attacks, Deviation in quality of service, Attacks- malicious code, brute force, Timing attack, sniffers. Access Control Mechanisms - Access Control, Access control matrix, Access control in OS-Discretionary and Mandatory access control, Role-based access control, case study SELinux	7
II	Security policies and models: confidentiality policies, Bell- LaPadula model, Integrity policies, Biba model, Clark-Wilson models, Chinese wall model, waterfall model	7
III	Software vulnerabilities: Buffer and stack overflow, Crosssite scripting(XSS), and vulnerabilities, SQL injection and vulnerabilities, Phishing.	6
IV	Malware: Viruses, Worms and Trojans. Topological worms. Internet propagation models for worms.	6
V	Security in current domains: Wireless LAN security – WEP details. wireless LAN vulnerabilities – frame spoofing. Cellphone security - GSM and UMTS security. Mobile malware - bluetooth security issues.	8
VI	Secure Electronic transactions: Framework, strength and weakness, Security in current applications: Online banking, Credit Card Payment Systems. Web Services security: XML, SOAP, SAML, RFID	8
TOTAL HOURS		42

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
	<p>Text Books:</p> <ol style="list-style-type: none"> 1. Bernard Menezes, Network security and Cryptography, Cengage Learning India, 2010. 2. M Bishop, Computer Security: Art and Science, Pearson Education, 2003.
	<p>References:</p> <ol style="list-style-type: none"> 1. E Whiteman and J Mattord, Principles of information security 4th edn, Cengage Learning 2. V K Pachghare, Cryptography and information security, PHI 3. Behrousz A Forouzan, D Mukhopadhyay, Cryptography and network Security, McGraw Hill 4. W Mao, Modern Cryptography: Theory & Practice, Pearson Education, 2004. 5. C P. Fleeger and S L Fleeger, Security in Computing, 3/e, Pearson Education, 2003.

COURSE PRE-REQUISITES: NIL**COURSE OBJECTIVES:**

<ul style="list-style-type: none"> • To introduce fundamental concepts of security. • To introduce and discuss the relevance of security in operating system, web services etc. • To introduce fundamental concepts of secure electronic transactions.

COURSE OUTCOMES:

CS472.1	appreciate the common threats faced today
CS472.2	interpret the foundational theory behind information security
CS472.3	design a secure system
CS472.4	identify the potential vulnerabilities in software
CS472.5	appreciate the relevance of security in various domains
CS472.6	develop secure web services and perform secure e-transactions

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CS472.1	1			1									2		
CS472.2		3		2									2		
CS472.3			3										2		2
CS472.4	1			3									2		
CS472.5	1			1									2		
CS472.6			3		2								2		2
CS472 (overall level)	1	3	3	2	2								2		2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	LOW/MEDIUM /HIGH	Justification
CS472.1-PO1	L	Students will be able to use engineering knowledge to identify and appreciate the common threats faced today.
CS472.1-PO4	L	Students will be able to research based knowledge to identify threats in the information system.
CS472.1-PSO1	M	Students gain knowledge on identifying threats in a computer system.
CS472.2-PO2	H	Students gain the capability to identify, formulate and review the theory behind information security.
CS472.2-PO4	M	Students can conduct investigations to analyze and understand the theory behind information security.
CS472.2-PSO1	M	Students gain knowledge on foundational theory behind computer science systems security.
CS472.3-PO3	H	Students gain enough knowledge on designing a secure system.
CS472.3-PSO1	M	Students attain the capability to design a computer science specific skill of designing a secure system.
CS472.3-PSO3	M	Students are made able to design innovative and secure systems.
CS472.4-PO1	L	Students are able to use engineering knowledge to identify potential vulnerabilities in software.
CS472.4-PO4	H	Students are able to conduct investigations in software to identify vulnerabilities in them.
CS472.4-PSO1	M	Students are able to identify vulnerabilities in computer science specific software systems.

CS472.5-PO1	L	Students are able to apply engineering knowledge to determine the relevance of security.
CS472.5-PO4	L	Students are able to conduct investigations to problems so as to identify the relevance of security in them.
CS472.5-PSO1	M	Students are able to apply their knowledge in identifying the relevance of security in computer science.
CS472.6-PO3	H	Students will be able to design and develop secure web services.
CS472.6-PO5	M	Students will be able to use modern tools to develop secure web services and transactions.
CS472.6-PSO1	M	Students will be able to apply computer science knowledge to develop services and transactions that are secure.
CS472.6-PSO3	M	Students can develop innovative products using their knowledge in security.

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SNO	TOPICS	PROPOSED ACTIONS	PO MAPPING
1	Hybrid models of security	Reading assignment	PO1,PSO1

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

SNO	TOPICS	PROPOSED ACTIONS	PO MAPPING
1	Concepts of Block chain technology	Reading assignment	PO5,PSO1

WEB SOURCE REFERENCES:

1	https://nptel.ac.in/courses/106106129/28
2	https://nptel.ac.in/courses/106106141/
3	https://nptel.ac.in/courses/106106157/

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

CHALK & TALK✓	STUD. ASSIGNMENT✓	WEB RESOURCES✓
LCD/SMART BOARDS✓	STUD. SEMINARS✓	ADD-ON COURSES✓

ASSESSMENT METHODOLOGIES-DIRECT

ASSIGNMENTS✓	STUD. SEMINARS✓	TESTS/MODEL EXAMS✓	UNIV. EXAMINATION✓
STUD. LAB PRACTICES	STUD. VIVA	MINI/MAJOR PROJECTS	CERTIFICATIONS
ADD-ON COURSES	OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE) ✓	STUDENT FEEDBACK ON FACULTY (ONCE) ✓
ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	OTHERS

Prepared by**Ms. Jisha Mary Jose (Faculty)
(HOD)****Approved by****Dr. Sminu Izudheen**

CS492 Project

COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE & ENGINEERING	DEGREE: BTECH
COURSE: MAIN PROJECT	SEMESTER: VIII CREDITS: 6
COURSE CODE : CS492 REGULATION: 2016	COURSE TYPE: CORE
COURSE AREA/DOMAIN: Software Design	CONTACT HOURS: 18 hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY):	LAB COURSE NAME:

SYLLABUS:

UNIT	DETAILS	HOURS
	<p>In depth study of the topic assigned in the light of the preliminary report prepared in the seventh semester</p> <p>Review and finalization of the approach to the problem relating to the assigned topic</p> <p>Preparing a detailed action plan for conducting the investigation, including team work</p> <p>Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed</p> <p>Final development of product/process, testing, results, conclusions and future directions</p> <p>Preparing a paper for Conference presentation/Publication in Journals, if possible</p> <p>Preparing a report in the standard format for being evaluated by the dept. assessment board</p> <p>Final project presentation and viva voce by the assessment board including external expert</p>	
TOTAL HOURS		18

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
	Seven latest international journal papers having high impact factor. MOOC Courses from Course ERA, NPTEL etc.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
NIL			

COURSE OBJECTIVES:

1	To apply engineering knowledge in practical problem solving
2	To foster innovation in design of products, processes or systems
3	To develop creative thinking in finding viable solutions to engineering problems

COURSE OUTCOMES:

SNO	DESCRIPTION
1	The students will be able to think innovatively on the development of components, products, processes or technologies in the engineering field
2	The students will be able to apply knowledge gained in solving real life engineering problems

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CS492.1	1	2		2	2				1				2		
CS492.2			2	1										1	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	LOW/MEDIUM/HIGH	Justification
CS451.1 - P02	L	Students do a literature survey while preparing for the seminar and project
CS451.1 - P04	M	They reach valid conclusions after the literature survey
CS451.1- P010	M	Seminar presentations help them to develop public speaking skills
CS451.2- P04	H	They do a detailed research in their area of interest which help them to analyse and synthesis data .
CS451.2- P05	M	They understand the limitations of the existing techniques and can use the engineering techniques to arrive at valid conclusions
CS451.2- P010	H	Writing seminar report help them to develop technical report writing skills.
CS451.2- PSO1	M	By comparing different techniques they can identify ,analyse and design complex engineering problems .

WEB SOURCE REFERENCES:

1	ieee.org
2	dl.acm.org
3	Elsevier
4	Springer

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

<input checked="" type="checkbox"/> CHALK & TALK	STUD. ASSIGNMENT	<input checked="" type="checkbox"/> WEB RESOURCES	
<input type="checkbox"/> LCD/SMART BOARDS	<input checked="" type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> ADD-ON COURSES	

ASSESSMENT METHODOLOGIES-DIRECT

<input type="checkbox"/> ASSIGNMENTS	q. STUD. SEMINARS	<input type="checkbox"/> TESTS/MODEL EXAMS	<input type="checkbox"/> UNIV. EXAMINATION
<input checked="" type="checkbox"/> STUD. LAB PRACTICES	r. STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input checked="" type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
<input checked="" type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

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Approved by
(HOD)