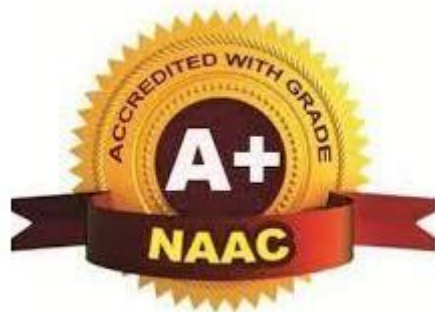




**TULSIRAMJI GAIKWAD-PATIL**  
**College of Engineering & Technology**

Mohgaon, Wardha Road, Nagpur - 441 108

**An Autonomous Institute**



**DEPARTMENT OF INFORMATION TECHNOLOGY**

**B.Tech. Information Technology**

**Final Year**

**Syllabus**

**From**

**Academic Year 2024-25**

## **Vision of Institute**

To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

## **Mission of Institute**

- To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.
- To provide facilities and services to meet the challenges of Industry and Society.
- To facilitate socially responsive research, innovation and entrepreneurship.
- To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices

## **Vision of the Department**

To contribute in the enhancement of capabilities of youth to face Information Technology challenges, by empowering them with innovative ideas.

## **Mission of the Department**

- To stimulate students to learn effectively and apply the knowledge in the field of Engineering and Technology.
- To undertake industry academic collaboration to enhance competency in graduates.
- To foster innovative ideas amongst students for becoming leaders.
- To create an environment of research culture.
- To impart social and ethical values for inculcating the culture of lifelong learning.

# Tulsiramji Gaikwad Patil College of Engineering & Technology, Nagpur

SCHEME OF INSTRUCTION & SYLLABI

Programme: Information Technology

Scheme of Instructions: Final Year B. Tech.in Information Technology

Semester – VII

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./Wk	Credits	EXAM SCHEME				
									CT1	CT2	TA/CA	ESE	TOTAL
1	PCC	BIT4701	Cryptography and Information Security	3	-	-	3	3	15	15	10	60	100
2	PCC	BIT4702	Artificial Intelligence & Machine Learning	3	-	-	3	3	15	15	10	60	100
3	PCC	BIT4703	Cryptography and Information Security Lab	-	-	2	2	1	-	-	25	25	50
4	PCC	BIT4704	Introduction to Machine Learning Lab	-	-	2	2	1	-	-	25	25	50
5	PROJ	BIT4705	Seminar based on Emerging Courses@	-	-	4	4	2	-	-	25	25	50
6	PEC	BIT4706-9*	Program Elective-V	3	-	-	3	3	15	15	10	60	100
7	PEC	BIT4710-13*	Program Elective-VI	3	-	-	3	3	15	15	10	60	100
8	OEC	B\$\$XX01-16#	Open Elective-III	4	-	-	4	4	15	15	10	60	100
9	OEC	B\$\$XX01-16#	Open Elective-IV	4	-	-	4	4	15	15	10	60	100
10	MCC	BAU4707	Behavioral and Interpersonal Skills	2	-	-	2	Audit	-	-	-	-	-
<b>Total</b>				<b>22</b>	<b>-</b>	<b>8</b>	<b>30</b>	<b>24</b>	<b>90</b>	<b>90</b>	<b>135</b>	<b>435</b>	<b>750</b>

@ There will be two presentations, based on seminar topic to be selected in consultation with guide preferably based on emerging trends.

L- Lecture    T-Tutorial    P-Practical    CT1- Class Test 1    CT2- Class Test 2    TA/CA- Teacher Assessment/Continuous Assessment    ESE- End Semester Examination (For Laboratory End Semester performance)

\* Indicates out of the four course codes each student has to select any one PEC from the list provided at the end of structure.


# Indicates out of the 16 course codes each student has to select any one OEC except BITXX03 & BITXX04 from the list provided at the end of structure.


Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	Project / Seminar / Industrial Training	MCC (Mandatory Courses)
Credits	--	--	--	08	06	08	02	Yes
Cumulative Sum	12	26	23	49	18	16	05	--

**PROGRESSIVE TOTAL CREDITS :124+24=148**

  
Head of Dept. (Information Technology)  
Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

  
Dean Academics  
Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

  
Vice Principal  
Tulsiramji Gaikwad Patil College of Engineering & Technology, Nagpur

  
Principal  
Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

# Tulsiramji Gaikwad Patil College of Engineering & Technology, Nagpur

SCHEME OF INSTRUCTION & SYLLABI

Programme: Information Technology

Scheme of Instructions: Final Year B. Tech.in Information Technology

Semester – VIII

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./Wk	Credits	EXAM SCHEME				
									CT1	CT2	TA/CA	ESE	TOTAL
1	PROJ	BIT4801	Project	-	-	22	22	11	-	-	75	75	150
2	PCC	BIT4802	Comprehensive Viva-voce	-	-	4	4	2	-	-	-	100	100
3	HSMC	BIT4803	Extra-Curricular Activities / Competitive Exam	-	-	-	-	2	-	-	100	-	100
4	MCC	BAU4808	Project based Science, Technology, Social, Design and Innovation	2	-	-	2	Audit	-	-	-	-	-
<b>Total</b>				<b>02</b>	<b>-</b>	<b>26</b>	<b>28</b>	<b>15</b>	<b>-</b>	<b>-</b>	<b>175</b>	<b>175</b>	<b>350</b>

L- Lecture      T-Tutorial      P-Practical      CT1- Class Test 1      CT2- Class Test 2      TA/CA- Teacher Assessment/Continuous Assessment


ESE- End Semester Examination (For Laboratory End Semester performance)


Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	Project / Seminar / Industrial Training	MCC (Mandatory Courses)
Credits	03	--	--	02	--	--	10	Yes
Cumulative Sum	15	25	23	51	18	16	15	--

**PROGRESSIVE TOTAL CREDITS :148+15 =163**

  
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Engineering & Technology, Nagpur

  
Dean Academics  
Tulsiramji Gaikwad-Patil  
College Of Engineering  
& Technology, Nagpur

  
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Technology, Nagpur


  
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Program: Information Technology  
**List of Electives offered by Information  
 Technology Department**


Semester-VII			
Course Code	Program Elective- V	Course Code	Program Elective- VI
BIT4706	Wireless Sensor Networks	BIT4710	High Performance Computer Architecture
BIT4707	Digital Forensics of IT	BIT4711	Digital Marketing
BIT4708	Block chain Technology	BIT4712	Software Testing and Quality Assurance
BIT4709	Management Information Systems (Language Processor)	BIT4713	Bioinformatics
	MOOCS Courses		MOOCS Courses


**List of Open Electives Offered**

Sr. No.	Name of Host Programme	Open Elective Course Code	Title of the Course
1.	Computer Science & Engineering	BCSXX01	Cyber Law and Ethics
2.	Computer Science & Engineering	BCSXX02	Blockchain Technology
3.	Information Technology	BITXX03	Cyber Security
4.	Information Technology	BITXX04	Artificial Intelligence
5.	Electronics and Communication Engineering	BECXX05	Internet of Things
6.	Electronics and Communication Engineering	BECXX06	Embedded Systems
7.	Civil Engineering	BCEXX07	Introduction to Art and Aesthetics
8.	Civil Engineering	BCEXX08	Metro Systems and Engineering
9.	Mechanical Engineering	BMEXX09	Nanotechnology and Surface Engineering
10.	Mechanical Engineering	BMEXX10	Automobile Engineering
11.	Electrical Engineering	BEEXX11	Power Plant Engineering
12.	Electrical Engineering	BEEXX12	Electrical Materials
13.	Aeronautical Engineering	BAEXX13	Avionics
14.	Aeronautical Engineering	BAEXX14	Unmanned Aerial Vehicles
15.	Biotechnology	BBTXX15	Biomaterials
16.	Biotechnology	BBTXX16	Food and Nutrition Technology

  
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 Dean Academics  
 Tulsiramji Gaikwad-Patil  
 College Of Engineering  
 and Technology, Nagpur

  
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**Fourth Year (Semester-VII) B. Tech. Information Technology**

**BIT4701: Cryptography and Information Security**

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	CT-I	15 Marks
Tutorial	-	CT-II	15 Marks
Total Credits	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 3Hrs	

**Course Objectives:**

1. Introduction to various areas of security.
2. To provide students with a comprehensive overview of the threats to computer security, technologies for security assurance, and engineering approaches to security solutions.
3. To provide authentication as a security overview to data.
4. To apply security concepts to networking.
5. To provide security to system and applying security practices.

**Course Contents**


<b>Unit I</b>	<b>Introduction</b> Introduction to information and network security, Attacks, services, mechanisms, security attacks, security services, a model for internet work security, encryption model, steganography, classical encryption techniques, modern techniques - simplified DES.
<b>Unit II</b>	<b>Confidentiality and Key Management</b> Confidentiality using conventional encryption: placement of encryption function, random number generation. Public key cryptography: principles, RSA algorithm, key management, diffie-heliman key exchange, Chinese remainder theorem, Euclidean algorithm, extended Euclidean algorithm.
<b>Unit III</b>	<b>Message Authentication and Hash Functions</b> Authentication requirements, functions, codes, security of hash function & MACs. Hash & Mac algorithms. Digital signatures & authentication protocols.
<b>Unit IV</b>	<b>Network Security</b> Network security: Proxy-Servers, Network intrusion detection. Transport security: Mechanisms of TLS, SSL, and Security in Wireless Communication. Recent trends in Information Security
<b>Unit V</b>	<b>Security Practices and System Security</b> Vernam Cipher (One Time Pad), Electronic Mail security, IP Security, Web Security, System Security: Intruders, Malicious Software, viruses, Firewalls.


**Text Books**


T.1	William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006
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T.2	Cryptography and networks security principles & practice by William Stalings (Pearson Education prentice Hall).
<b>Reference Books</b>	
R.1	C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd
R.2	Behrouz A.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
<b>Useful Links</b>	
1	<a href="https://www.geeksforgeeks.org/easy-key-management-in-cryptography/">https://www.geeksforgeeks.org/easy-key-management-in-cryptography/</a>
2	<a href="https://www.forcepoint.com/cyber-edu/network-security">https://www.forcepoint.com/cyber-edu/network-security</a>

	<b>Course Outcomes</b>	<b>CL</b>	<b>Class Sessions</b>
<b>BIT4701.1</b>	Define the fundamentals of Cryptography and standard algorithms to provide confidentiality, integrity and authenticity.	1	9
<b>BIT4701.2</b>	Understand symmetric and asymmetric key encryption systems	2	9
<b>BIT4701.3</b>	Analyze various message authentication codes and hash functions.	4	9
<b>BIT4701.4</b>	Identify, detect and prevent the attacks on system.	2	9
<b>BIT4701.5</b>	Formulate and implement various Security practices and System security standards.	6	9

  
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Tulsiramji Gaikwad-Patil College of  
Engineering & Technology, Nagpur

  
Dean Academics  
Tulsiramji Gaikwad-Patil  
College Of Engineering  
& Technology, Nagpur

  
Vice Principal  
Tulsiramji Gaikwad Patil  
College Of Engineering &  
Technology, Nagpur

  
Principal  
Tulsiramji Gaikwad-Pa  
College Of Engineering  
Technology, Nagpur





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**Fourth Year (Semester-VII) B. Tech. Autonomy**

**BIT4702: Artificial Intelligence and Machine Learning**

Teaching Scheme			Examination Scheme	
Theory	3 Hrs/week		CT-I	15 Marks
Tutorial	-		CT-II	15 Marks
Total Credits	3		CA	10 Marks
			ESE	60 Marks
		Total	100 Marks	
		Duration of ESE: 3Hrs		

**Course Objectives:**

- To Understand the various characteristics of a problem-solving agent.
- To Understand a basic concepts of Knowledge & Reasoning: Statistical Reasoning .
- To Understand the different models of learning and clustering problems.
- To understand the methods of solving real life problems using the machine learning techniques
- To learn the classification, clustering and regression-based machine learning algorithms .

**Course Contents**


<b>Unit I</b>	<b>Introduction to Artificial Intelligence and Problem-Solving Agent:</b> Problems of AI, AI technique, Tic – Tac – Toe problem. Intelligent Agents, Agents & environment, structure of agents, learning agents. Defining the problem as state space search, production system, problem characteristics, and issues in the design of search programs.
<b>Unit II</b>	<b>Knowledge &amp; Reasoning:</b> Statistical Reasoning: Probability and Bays’ Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Fuzzy Logic. AI for knowledge representation, rule-based knowledge representation, procedural and declarative knowledge, Logic programming, Forward and backward reasoning.
<b>Unit III</b>	<b>Introduction to Machine Learning:</b> Exploring sub-discipline of AI: Machine Learning, Supervised learning, Unsupervised learning, Reinforcement learning, Classification problems, Regression problems, Clustering problems, Introduction to neural networks and deep learning.
<b>Unit IV</b>	<b>Supervised and Unsupervised:</b> Convolution neural network (CNN) -Layers in CNN - CNN architectures. Recurrent Neural Network -Applications: Classification Algorithms: back propagation, neural network - k-nearest neighbor rule. Support vector machine: multicategory generalizations – Regression Decision trees
<b>Unit V</b>	<b>Component Analysis and Clustering Algorithms:</b> Principal component analysis - Linear discriminate analysis - Independent component analysis. K-means clustering - fuzzy k-means clustering, Cross-Validation and Resampling Methods, K-Fold Cross Validation, Bootstrapping.

<b>Text Books</b>	
T.1	S. Russell and P. Norvig, “Artificial Intelligence: A Modern Approach”, Prentice Hall, Third Edition, 2015.
T.2	Nils J. Nilsson, “Artificial Intelligence: A New Synthesis”, 1st Edition, Morgan
T.3	Ethem Alpaydin, “Introduction to Machine Learning”, 3rd Edition, MIT Press, 2014.
<b>Reference Books</b>	
R.1	Artificial Intelligence: A Modern Approach. Stuart Russell, Peter Norvig; Prentice Hall
R.2	R. O. Duda, E. Hart, and D.G. Stork, “Pattern Classification”, Second Edition, John Wiley & Sons, Singapore, 2012.
<b>Useful Links</b>	
1	<a href="https://nptel.ac.in/courses/106102220">https://nptel.ac.in/courses/106102220</a>
2	<a href="https://nptel.ac.in/courses/106106198/">https://nptel.ac.in/courses/106106198/</a>

CO	Course Outcomes	CL	Class Sessions
BIT4702.1	<b>Demonstrate</b> basic knowledge representation, problem solving, and learning methods of artificial Intelligence.	3	9
BIT4702.2	<b>Describe</b> basic Knowledge and reasoning and representation in artificial intelligence.	2	9
BIT4702.3	<b>Analyze</b> the concepts of machine learning and also know the concept of deep learning.	4	9
BIT4702.4	<b>Illustrate</b> the machine learning concepts as well as classification techniques.	3	9
BIT4702.5	<b>Construct</b> machine learning algorithms that is clustering, validation and apply it on real life problems.	6	9



  
 Head of Dept. (Information Technology)  
 Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

  
 Dean Academics  
 Tulsiramji Gaikwad-Patil  
 College Of Engineering  
 and Technology, Nagpur

  
 Vice Principal  
 Tulsiramji Gaikwad Patil  
 College Of Engineering &  
 Technology, Nagpur

  
 Principal  
 Tulsiramji Gaikwad-Pa  
 College Of Engineering  
 Technology, Nagpur



	<p style="text-align: center;"><b>Tulsiramji Gaikwad -Patil College of Engineering and Technology</b>  Wardha Road, Nagpur-441108  <b>NAAC Accredited with A+ Grade</b>  (An Autonomous Institute Affiliated to RTM Nagpur University, Nagpur)</p>	
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**Third Year (Semester-VII) B.Tech. Information Technology**


**BIT4703: Cryptography and Information Security Lab**

<b>Teaching Scheme</b>			<b>Examination Scheme</b>	
<b>Practical</b>	<b>2Hrs/week</b>		CA	25Marks
<b>Total Credits</b>	<b>1</b>		ESE	25Marks
			Total	50Marks


Sr. No	List of Practical	CO
1	To Perform encryption and decryption using Caesar cipher Algorithm.	CO1
2	Write a program to execute encryption and decryption using Play Fair Cipher.	CO1
3	Write a program to perform encryption and decryption using Rail Fence Technique. (Row Transposition Techniques)	CO2
4	Write a program to perform encryption and decryption using Columnar Transposition Techniques	CO2
5	Write a program to implement extended Euclidean Algorithm in cryptography.	CO3
6	Implement a Secure System by Applying RSA Cryptography Algorithms.	CO3
7	Execute a program to implement Diffie–Hellman Key Exchange.	CO4
8	Execute a program for Message Authentication Code (MAC) using Virtual	CO4
9	Execute a program to implement Digital Signature in cryptography	CO5
10	Execute a program to implement Vernam Cipher and Perfect Secrecy.	CO5

Text Books	
1	Break the Code: Cryptography for Beginners (Dover Kids Activity Books)
2	Cryptography Made Simple (Information Security and Cryptography) 1st ed. 2016 Edition
Reference Books	
1	Cryptography and Network Security: Principles and Practice" by William Stallings
2	Understanding Cryptography: A Textbook for Students and Practitioners" by Christof Paar and Jan Pelzl
Useful Links	
1	IIT Virtual Labs <a href="https://cse29-iiith.vlabs.ac.in/">https://cse29-iiith.vlabs.ac.in/</a>
2	<a href="https://www.springer.com/series/4752">https://www.springer.com/series/4752</a>

	Course Outcomes	CL	Lab Sessions
<b>BIT4703.1</b>	<b>Understand</b> the concepts of Caser cipher and Playfair cipher.	2	4
<b>BIT4703.2</b>	<b>Remember</b> the concepts for transposition techniques.	1	4
<b>BIT4703.3</b>	<b>Execute</b> cryptographic knowledge for securing systems in cryptography.	3	4
<b>BIT4703.4</b>	<b>Apply</b> fragmented understanding of cryptographic concepts.	3	4
<b>BIT4703.5</b>	<b>Design</b> cryptographic technique to secure communication channels.	6	4



  
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 Tulsiramji Gaikwad-Patil College of  
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 Dean Academics  
 Tulsiramji Gaikwad-Patil  
 College Of Engineering  
 & Technology, Nagpur

  
 Vice Principal  
 Tulsiramji Gaikwad Patil  
 College Of Engineering &  
 Technology, Nagpur

  
 Principal  
 Tulsiramji Gaikwad-Pa  
 College Of Engineering  
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	<b>Third Year (Semester-VII)B.Tech. Information Technology</b>		
<b>BIT4704: Introduction Machine Learning Lab</b>			
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Practical</b>	<b>2Hrs/week</b>	CA	25Marks
<b>Total Credits</b>	<b>1</b>	ESE	25Marks
		Total	50Marks


Sr. No	List of Practical	CO
1	Implement linear regression using python	CO1
2	Implement and demonstrate the Candidate-Elimination algorithm	CO1
3	To study the Representation of Decision Tree Learning	CO2
4	Implement Deep Q- Learning (Deep Q-Network) in Reinforcement Learning (RL) using Python	CO2
5	Implement Naive Bayes Theorem to Classify the English Text using python	CO3
6	Implement an algorithm to demonstrate Back Propagation Algorithm in python	CO3
7	Implement K-Means Clustering using python	CO4
8	Demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API 8. Apply EM algorithm to cluster a set	CO4
9	Implement and demonstrate the FIND-S algorithm in python	CO5
10	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points.	CO5


<b>Text Books</b>	
1	Nils J. Nilsson, “Artificial Intelligence: A New Synthesis”, 1st Edition, Morgan
2	Ethem Alpaydin, “Introduction to Machine Learning”, 3rd Edition, MIT Press, 2014.
<b>Reference Books</b>	
1	Artificial Intelligence: A Modern Approach. Stuart Russell, Peter Norvig; Prentice Hall
2	R. O. Duda, E. Hart, and D.G. Stork, “Pattern Classification”, Second Edition, John Wiley & Sons, Singapore, 2012.

	<b>Course Outcomes</b>	<b>CL</b>	<b>Lab Sessions</b>
<b>BIT4704.1</b>	Understand the mathematical and statistical prospective of machine learning algorithms through python programming	2	4
<b>BIT4704.2</b>	Apply structured thinking to unstructured problems	3	4
<b>BIT4704.3</b>	Design and evaluate the unsupervised models through python in built functions.	6	4
<b>BIT4704.4</b>	Design and apply various reinforcement algorithms to solve real time complex problems	6	4
<b>BIT4704.5</b>	Develop an appreciation for what is involved in learning from data	6	4

  
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 Tulsiramji Gaikwad-Patil College of

  
 Dean Academics  
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 College Of Engineering  
 and Technology, Nagpur

  
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 Tulsiramji Gaikwad Patil  
 College Of Engineering &  
 Technology, Nagpur

  
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**Fourth Year (Semester-VII) B. Tech. Information Technology**

**BIT4706: Wireless Sensor Network**

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	CT-I	15 Marks
Tutorial	-	CT-II	15 Marks
Total Credits	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 3Hrs	

**Course Objectives:**

1.	To understand the fundamentals of wireless sensor networks and its application to critical real time scenario.
2.	To study the various protocols at various layers and its differences with traditional protocols
3.	To understand the issues pertaining to sensor networks and the challenges involved in managing a sensor network.
4.	To create a model in wireless computing.
5.	To have knowledge on applications wireless networks in real time projects.

**Course Contents**

<b>Unit I</b>	<b>Introduction:</b> - Introduction to wireless sensor networks, Challenges, Comparison with ad hoc network, Node architecture, Zigbee and Bluetooth, Service interfaces, Gateway.
<b>Unit II</b>	<b>Mobile and wearable sensing</b> - Overview of smartphone/wearable sensors, Accelerometer, gyroscope, magnetometer, Smartphone orientation and heading detection, monitoring and fitness tracking Wearables
<b>Unit III</b>	<b>Multi-gigabit wireless networks</b> -Millimeter wave networking, Directionality and beam forming, Mobility and signal blockage, Millimeter wave networking - Directionality and beam forming - Mobility and signal blockage, IEEE 802.11ad MAC.
<b>Unit IV</b>	<b>Routing Protocols</b> - Data dissemination and gathering, Routing challenges and design issues in WSN, Routing strategies, Geographical routing.
<b>Unit V</b>	<b>QoS and Energy Management</b> - Smart Surveillance Video Stream Processing at the Edge for Real-Time -Smart Transportation Applications-Intelligent Traffic Lights Management.

**Text Books**


T.1	Theodore S. Rappaport, "Wireless Communications: Principles and Practice", Prentice Hall, 2010.
T.2	Matthew Gast, "802.11ac: A Survival Guide", O'Reilly Media, 2013.


Reference Books	
R.1	William Stallings, "Wireless Communications and Networks ", Pearson Education, 2004
R.2	Feng Zhao and Leonides Guibas, "Wireless sensor networks ", Elsevier publication, 2004.
Useful Links	
1	<a href="https://nptel.ac.in/courses/108106370">https://nptel.ac.in/courses/108106370</a>
2	<a href="https://onlinecourses.nptel.ac.in/noc24_ee10/preview">https://onlinecourses.nptel.ac.in/noc24_ee10/preview</a>

CO	Course Outcomes	CL	Class Sessions
BIT4706.1	Understand WSN network	2	9
BIT4706.2	Analyze of various critical parameters in deploying a WSN	4	9
BIT4706.3	Evaluate different types of mobile telecommunication systems	5	9
BIT4706.4	Construct the Ad hoc networks concepts and its routing protocols.	6	9
BIT4706.5	Summarize use of mobile operating systems in developing mobile applications.	6	9

  
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**Fourth Year (Semester-VII) B.Tech. Information Technology**

**BIT4707: Digital Forensics of IT**

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	CT-I	15 Marks
Tutorial	-	CT-II	15 Marks
Total Credits	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 3Hrs	

**Course Objectives:**


1.	To understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
2.	To understand how to examine digital evidences such as the data acquisition, identification analysis.
3.	To understand concepts of data acquisition
4.	Identify, and evaluate forensics tools in current scenario
5.	To understand digital evidence for storing data.

**Course Contents**


<b>Unit I</b>	<b>Computer forensics fundamentals:</b> Benefits of forensics, computer crimes, computer forensics evidence and courts, legal concerns and private issues, brief History of computer Forensics, Understanding case laws.
<b>Unit II</b>	<b>Understanding Computing Investigations:</b> Procedure for corporate High-Tech investigations, understanding data recovery work station and software, conducting and investigations, Shortcut Files, Windows Executables.
<b>Unit III</b>	<b>Data acquisition-</b> understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools.
<b>Unit IV</b>	<b>Current Computer Forensics Tools:</b> Software, hardware tools, validating and testing forensic software, addressing data-hiding techniques, performing remote acquisitions, E-Mail investigations- investigating email crime and violations, understanding E-Mail servers, specialized E-Mail forensics tool.
<b>Unit V</b>	<b>Digital Evidence:</b> Processing crimes and incident scenes, securing a computer incident or crime, seizing digital evidence at scene, storing digital evidence, obtaining digital hash, reviewing case.

<b>Text Books</b>	
T.1	Warren G. Kruse II and Jay G. Heiser, "Computer Forensics: Incident Response Essentials", Addison Wesley, 2002.
T.2	Nelson, B, Phillips, A, Enfinger, F, Stuart, C., "Guide to Computer Forensics and Investigations, 2nd ed., Thomson Course Technology, 2006, ISBN: 0-619-21706-5.
<b>Reference Books</b>	
R.1	Cory Altheide, Harlan Carvey, Digital Forensics with Open Source Tools, Syngress imprint of Elsevier
R.2	Bill Nelson, Amelia Phillips, Christopher Steuart, "Guide to Computer Forensics and Investigations", Fourth Edition, Course Technology.
<b>Useful Links</b>	
1	<a href="https://www.geeksforgeeks.org/digital-forensics-in-information-security/">https://www.geeksforgeeks.org/digital-forensics-in-information-security/</a>
2	<a href="https://www.simplilearn.com/what-is-digital-forensics-article">https://www.simplilearn.com/what-is-digital-forensics-article</a>

	<b>Course Outcomes</b>	<b>CL</b>	<b>Class Sessions</b>
<b>BIT4707.1</b>	<b>Describe</b> the origins of forensic science.	2	9
<b>BIT4707.2</b>	<b>Illustrate</b> how to conduct a digital forensics investigation.	3	9
<b>BIT4707.3</b>	<b>Evaluate</b> for digital forensic investigations.	5	9
<b>BIT4707.4</b>	<b>Examine</b> recovery of digital evidence from various digital devices using a variety of software utilities	4	9
<b>BIT4707.5</b>	<b>Assemble</b> knowledge for well-trained as next-generation computer crime investigators.	6	9

  
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 Tulsiramji Gaikwad-Patil College of  
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 Tulsiramji Gaikwad-Patil  
 College Of Engineering  
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**Fourth Year (Semester-VII) B. Tech. Information Technology**

**BIT4708: Block chain Technology**

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	CT-I	15 Marks
Tutorial	-	CT-II	15 Marks
Total Credits	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 3Hrs	

**Course Objectives:**

1. Student shall be able to understand the Basic Cryptographic primitives used in Blockchain.
2. Student shall be able to understand the technologies borrowed in Blockchain.
3. Student shall be able to understand the Abstract Models For Block chain.
4. Student shall be able to understand the Ethereum.
5. Student shall be able to understand the Blockchain application development.

**Course Contents**

<b>Unit I</b>	<p><b>Introduction:</b> Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems. Why Nakamoto Came up with Blockchain based cryptocurrency? Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc.</p> <p><b>Basic distributed computing:</b> Atomic Broadcast, Consensus, Byzantine Models of fault tolerance.</p>
<b>Unit II</b>	<p><b>Technologies Borrowed in Block chain:</b> hash pointers, Consensus, Byzantine Models of fault tolerance, digital cash etc. Bitcoin block chain - Wallet - Blocks - Merkle Tree – hardness of mining, transaction verifiability, anonymity, forks, double spending, mathematical analysis of properties of Bitcoin. Challenges and solutions.</p>
<b>Unit III</b>	<p><b>Abstract Models for Block chain:</b> GARAY model, RLA Model, Proof of Work (PoW) as random oracle, formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains, Hybrid models (PoW + PoS), Bitcoin scripting language and their use.</p>
<b>Unit IV</b>	<p><b>Ethereum:</b> Ethereum Virtual Machine, Wallets for Ethereum, Solidity-Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts. Some attacks on smart contracts.</p>

<b>Unit V</b>	<b>Blockchain application development:</b> Hyperledger Fabric-Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, writing smart contract using Ethereum, Overview of Ripple and Corda.
<b>Text Books</b>	
T.1	Block chain: Blue print for a New Economy by Melanie Swan, O' Reilly, 2015
T.2	Blockchain Technology: Crypto currency and Applications, S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University Press, 2019.
<b>Reference Books</b>	
R.1	Research perspectives and challenges for Bitcoin and cryptocurrency Joseph Bonneuaetal, So KIEEE Symposium on security and Privacy 2015.
R.2	The bitcoin backbone protocol-analysis and applications J.A. Garay et al, EUROCRYPT LNCS VOL 9057,( VOL II), pp281-310 2015
<b>Useful Links</b>	
1	<a href="https://nptel.ac.in/courses/108106370">https://nptel.ac.in/courses/108106370</a>
2	<a href="https://onlinecourses.nptel.ac.in/noc24_ee10/preview">https://onlinecourses.nptel.ac.in/noc24_ee10/preview</a>

CO	Course Outcomes	CL	Class Sessions
BIT4708.1	<b>Analyze</b> the clustering applications like Market segmentation and social network analysis	4	9
BIT4708.2	<b>Distinguish</b> between clustering and classification problems.	4	9
BIT4708.3	<b>Evaluate</b> data reduction and data pre- processing techniques for clustering	5	9
BIT4708.4	<b>Appraise</b> feature extraction methods and identify the suitable method for a given problem	5	9
BIT4708.5	<b>Design</b> the Blockchain application development	6	9

  
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**Fourth Year (Semester-VII) B. Tech. Information Technology**

**BIT4709: Management Information Systems**

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	CT-I	15 Marks
Tutorial	-	CT-II	15 Marks
Total Credits	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 3Hrs	

**Course Objectives:**

1. Information Systems (IS) enables new approaches to improve efficiency and efficacy of business models.
2. This course will equip the students with understanding of role, advantages and components of an Information System.
3. The objective of the course is to help students integrate their learning from functional areas, decision making process in an organization. role of Information Systems to have a vintage point in this competitive world.
4. Understand role of Information Systems to have a vintage point in this competitive world.
5. Introduction to online platforms.

**Course Contents**

<b>Unit I</b>	<b>Basic Concepts of Information System:</b> Role of data and information, Organization structures, Business Process, Systems Approach and introduction to Information Systems.
<b>Unit II</b>	<b>Types of IS:</b> Resources and components of Information System, integration and automation of business functions and developing business models. Role and advantages of Transaction Processing System, Management Information System, Expert Systems and Artificial Intelligence, Executive Support Systems and Strategic Information Systems
<b>Unit III</b>	<b>Architecture &amp; Design of IS:</b> Architecture, development and maintenance of Information Systems, Centralized and Decentralized Information Systems, Factors of success and failure, value and risk of IS.
<b>Unit IV</b>	<b>Decision Making Process:</b> Programmed and non-programmed decisions, Decision Support Systems, Models and approaches to DSS
<b>Unit V</b>	<b>Introduction to Enterprise Management technologies:</b> Business Process Reengineering, Total Quality Management and Enterprise Management System viz. ERP, SCM, CRM and Ecommerce.

**Text Books**


T.1	Management Information Systems, Effy OZ, Thomson Learning/Vikas Publications
T.2	Management Information Systems, James A. O'Brein, Tata McGraw-Hill

## Reference Books

R.1	Management Information System, W.S Jawadekar, Tata Mc Graw Hill Publication.
R.2	MIS: Management Perspective, D.P. Goyal, Macmillan Business Books.
<b>Useful Links</b>	
1	<a href="https://www.tutorialspoint.com/management_information_system/management_information_system.htm">https://www.tutorialspoint.com/management_information_system/management_information_system.htm</a>
2	<a href="https://www.javatpoint.com/mis-management-information-systems">https://www.javatpoint.com/mis-management-information-systems</a>

	<b>Course Outcomes</b>	<b>CL</b>	<b>Class Sessions</b>
<b>BIT4709.1</b>	<b>Understand</b> the importance of MIS, structure and types of MIS.	2	9
<b>BIT4709.2</b>	<b>Implement</b> learn business applications of Information Systems.	3	9
<b>BIT4709.3</b>	<b>Analyze</b> about the Management of Information Systems.	4	9
<b>BIT4709.4</b>	<b>Evaluate</b> learn how to build Information Systems.	5	9
<b>BIT4709.5</b>	<b>Design</b> Enterprise Management System	6	9

  
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**Fourth Year (Semester-VII) B. Tech. Information Technology**

**BIT4710: High Performance Computer Architecture**

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	CT-I	15 Marks
Tutorial	-	CT-II	15 Marks
Total Credits	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 3Hrs	

**Course Objectives:**

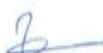
1. Knowledge of the techniques for supporting the parallelism in computer systems.
2. Ability to implement parallel applications.
3. Understand the basics of level of parallelism
4. To gain knowledge of memory hierarchies.
5. Understand the basics of scalable architecture.


**Course Contents**


<b>Unit I</b>	Theory of Parallelism: Parallel Computer Models, The State of Computing, Multiprocessors and Multicomputers, Multisector and SIMD Computers, PRAM and VLSI Models, Architectural Development Tracks, Principles of Scalable Performance: Performance Metrics and Measures, Speedup and Performance Laws.
<b>Unit II</b>	Pipelining, Basic concepts, instruction and arithmetic pipelines, and hazards in a pipeline: structural, data and control hazards, overview of hazard resolution technique, Dynamic instruction scheduling, branch prediction techniques, Exception handling, Pipeline optimization techniques, Compiler techniques for improving performance.
<b>Unit III</b>	Instruction Level Parallelism: Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Reducing Branch Costs with Prediction, Overcoming Data Hazards with Dynamic Scheduling, Dynamic Scheduling: Algorithm, Data level and Thread Level Parallelism.
<b>Unit IV</b>	Memory Hierarchies: Basic concept of hierarchical memory organization, Hierarchical memory technology, main memory, Inclusion, Coherence and locality properties, Cache memory design and implementation, Techniques for reducing cache misses, Virtual memory organization, mapping and management techniques, memory replacement policies, RAID.
<b>Unit V</b>	Parallel and Scalable Architecture: Multiprocessors and Multicomputer: Multiprocessor System Interconnect, Cache Coherence and Synchronization Mechanism, multisector and SIMD Computers: Vector Processing Principles, multisector-Multiprocessor, Compound Vector Processing.


<b>Text Books</b>	
T.1	John. Hennessy & David A . Patterson, “Computer Architecture A quantitative approach”, 5 <sup>th</sup> Edition, Morgan Kaufmann Publications.
T.2	Kai Hwang and A. Briggs , “Computer Architecture and parallel Processing ”, International Edition McGraw-Hill.
<b>Reference Books</b>	
R.1	Kai Hwang and Naresh Jotwani, “Advanced Computer Architecture: Parallelism, Scalability and Programmability” 2 <sup>nd</sup> Edition, TMH Publications
R.2	David A. Kular and Jasvinder Pal Singh,“ Parallel Computer Architecture”, Morgan Kaufmann Publications.
<b>Useful Links</b>	
1	<a href="https://archive.nptel.ac.in/courses/106/105/106105033/">https://archive.nptel.ac.in/courses/106/105/106105033/</a>
2	<a href="https://phoenixnap.com/kb/hpc-architecture">https://phoenixnap.com/kb/hpc-architecture</a>

	<b>Course Outcomes</b>	<b>CL</b>	<b>Class Sessions</b>
BIT4710.1	<b>Understand</b> the basic knowledge of computer architecture.	2	9
BIT4710.2	<b>Understand</b> architecture of computer.	2	9
BIT4710.3	<b>Designing</b> of pipelining concepts.	6	9
BIT4710.4	<b>Evaluate</b> memory hierarchies.	5	9
BIT4710.5	<b>Design</b> of Parallel and scalable architecture	6	9

  
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**Fourth Year (Semester-VII) B. Tech. Information Technology**

**BIT4711: Digital Marketing**

Teaching Scheme			Examination Scheme	
Theory	3 Hrs/week		CT-I	15 Marks
Tutorial	-		CT-II	15 Marks
Total Credits	3		CA	10 Marks
		ESE	60 Marks	
		Total	100 Marks	
		Duration of ESE: 3Hrs		

**Course Objectives:**

- Helps to identify core concepts of marketing and the role of marketing in society.
- Ability to collect process and analyze consumer and market data to make informed decisions.
- To understand pricing decisions. It focuses on the importance of digital marketing and its applications.
- Digital marketing objectives should be SMART i.e. Specific, Measurable, Achievable, Relevant and Time Related.
- To understand Search Engine Optimization tools and techniques. To gain knowledge on Social Media Marketing and Web Analytics.

**Course Contents**


<b>Unit I</b>	<b>Introduction to Digital Marketing</b> - Digital marketing: Introduction to digital marketing, Difference between traditional marketing& digital, Definition, Need of DM, Scope of DM, Concept and approaches to DM, Examples of good practices in DM.
<b>Unit II</b>	<b>Marketing Automation:</b> Definition, Advantages, Marketing Automation Software's: CRM, Sales force, Analytics; <b>Search Engine Optimization (SEO):</b> What is SEO?, SEO Importance and Its Growth in recent years, Ecosystem of a search Engine , kinds of traffic, Keyword Research & Analysis (Free and Paid tool & Extension), Recent Google Updates & How Google Algorithms works <b>On Page Optimization (OPO) , Off-Page Optimization.</b>
<b>Unit III</b>	<b>Digital Marketing Mix:</b> Online Advertising, Lead Generation, Social Media Marketing, Content and Copywriting. <b>Influencer Marketing:</b> Influencer, Payment to Influencer, difference between influencer marketing and celebrity endorsements
<b>Unit IV</b>	<b>Social Media Optimization (SMO) – SMO:</b> Introduction to social Media Marketing, Advanced Facebook Marketing, visual identity of Facebook page, Optimization of Instagram profile, Word Press blog creation, Twitter marketing, LinkedIn Marketing, Creating campaign on LinkedIn, Google plus marketing, social media Analytical Tools, Web Analytics level, Creating business accounts on YouTube.

<b>Unit V</b>	Structure, Key terminologies in Google AdWords, How to Create an AdWords account, Different Types of AdWords and its Campaign & Ads creation process, Ad approval process, Keyword Match types , Keyword targeting & selection (Keyword planner), Display Planner , Different types of extensions , Creating location extensions, Creating call extensions, Create Review extensions, Bidding techniques – Manual / Auto , Demographic Targeting / Bidding, CPC-based, CPA based & CPM-based accounts., Google Analytics Individual Qualification (GAIQ).
<b>Text Books</b>	
T.1	Digital Marketing: Seema Gupta-Mcgraw hill.
T.2	Social Media Marketing: Tracy L. Tuten (2021).
<b>Reference Books</b>	
R.1	Understanding DIGITAL Marketing, Marketing strategies for engaging the digital generation Damian Ryan & Calvin Jones.
R.2	Dave Evans., Susan Bratton, (2010). Social Media Marketing: The Next Generation of Business Engagement. Wiley
<b>Useful Links</b>	
1	<a href="https://josephscollege.ac.in/">https://josephscollege.ac.in/</a>
2	<a href="https://www.rccmindore.com/">https://www.rccmindore.com/</a>

	<b>Course Outcomes</b>	<b>CL</b>	<b>Class Sessions</b>
<b>BIT4711.1</b>	<b>Define</b> Digital Marketing, Email marketing and Content marketing.	1	9
<b>BIT4711.2</b>	<b>Describe</b> Search Engine Optimization tools and techniques.	2	9
<b>BIT4711.3</b>	<b>Understand</b> YouTube Advertising & Conversions.	2	9
<b>BIT4711.4</b>	<b>Evaluate</b> Social Media Marketing and Web Analytics.	5	9
<b>BIT4711.5</b>	<b>Design</b> of Google AdWords.	6	9

  
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& Technology, Nagpur

  
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& Technology, Nagpur

  
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College Of Engineering &  
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**Final Year (Semester-VIII) B Tech**

**BIT4712: Software testing and Quality Assurance**

Teaching Scheme			Examination Scheme	
Theory	3 Hrs/week		CT-I	15 Marks
Tutorial	-		CT-II	15 Marks
Total Credits	3		CA	10 Marks
		ESE	60 Marks	
		Total	100 Marks	
		Duration of ESE: 3Hrs		

**Course Objectives:**

1. To introduce students to the basic concepts Software Testing.
2. To introduce a student to Testing Methodologies.
3. To introduce tools for testing and use it.
4. To introduce concept of Quality Assurance, Quality Factors.
5. To introduce Quality management of software and Quality improvements.

**Course Contents**

<b>Unit I</b>	<b>PRELIMINARIES OF SOFTWARE TESTING; Overview</b> of testing- Need for software testing – Testing principles – STLC models-Testing in STLC models: Unit Testing, Integration Testing, System Testing, Acceptance Testing. Testing of software attributes: Smoke test, functional testing, usability testing, security, compliance testing.
<b>Unit II</b>	<b>TESTING METHODOLOGIES</b> Test Design techniques: Black Box testing- White Box testing –Software testing strategies-Unit testing- Integration Testing-validation testing – System testing-test planning.
<b>Unit III</b>	<b>TOOLS FOR TESTING</b> Test tool classification- Tools for management and control- Tools for specification- Tools for static and dynamic testing- Tools for non- functional tests. Manual testing versus automated testing- automated testing tools
<b>Unit IV</b>	<b>OVERVIEW OF QUALITY ASSURANCE</b> Definition of software quality and quality assurance- Quality assurance versus Quality control- Quality factors- Quality components – Quality plans- Software quality metrics Costs of software quality- Quality Management Framework
<b>Unit V</b>	<b>QUALITY MANAGEMENT</b> Requirements for SQA- Software QA versus Traditional QA- Defect prevention and process improvement- Software inspection- Comparison of Quality Assurance techniques and activities- Quality improvement methods- Management and its role in SQA - Quality management in IT

<b>Text Books</b>	
T.1	Andreas Spillner, Tilo Linz , Hans Schaefer “Software Testing Foundations - A Study Guide for the Certified Tester Exam” , Foundation Level ISTQB compliant, 4th Edition, Santa Barbara, CA :Rocky Nook, Inc, 2014
T.2	Anne Mette Jonassen Hass, “Guide to Advanced Software Testing”, Artech House Publishers, 2008.
<b>Reference Books</b>	
R.1	G. Gordon Schulmeyer, “Handbook of Software Quality Assurance”, Fourth Edition, Artech House Publishers, 2007.
R.2	Daniel Galin, “Software Quality Assurance: From Theory To Implementation”, Pearson Education, 2008.
<b>Useful Links</b>	
1	<a href="https://coastaltech.com/systems/">https://coastaltech.com/systems/</a>
2	<a href="https://www.javatpoint.com/software-testing-tutorial">https://www.javatpoint.com/software-testing-tutorial</a>

<b>CO</b>	<b>Course Outcomes</b>	<b>CL</b>	<b>Class Sessions</b>
<b>BIT4712.1</b>	<b>Describe</b> the criteria for test cases, test metrics and measurements	2	9
<b>BIT4712.2</b>	<b>Design</b> the test cases for different applications.	2	9
<b>BIT4712.3</b>	<b>Apply</b> the appropriate test management and test automation techniques	3	9
<b>BIT4712.4</b>	<b>Analyze</b> different approaches to quality assurance	4	9
<b>BIT4712.5</b>	<b>Summarize</b> the quality management techniques based on commercial standards	5	9

  
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**Final Year (Semester-VII) B. Tech. Information Technology**

**BIT4713: Bioinformatics**

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	CT-I	15 Marks
Tutorial	-	CT-II	15 Marks
Total Credits	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 3Hrs	

**Course Objectives:**

1. Understand the basics of bioinformatics.
2. Select the proper algorithm for data retrieval tools
3. Use of multiple sequence alignment for various process in data informatics.
4. To evaluate the process of computational genetics.
5. Analyze applications of bioinformatics for human diseases.

**Course Contents**

<b>Unit I</b>	<b>Introduction to Bioinformatics:</b> Field of bioinformatics and its applications. Biological databases and tools: Nucleotide sequence databases, Protein sequence Databases, structural and functional databases, Patent databases
<b>Unit II</b>	<b>Data Retrieval Tools and Alignments:</b> Entrez, Ensembl-Biomart. Sequence comparisons & alignment concepts, Global Alignments Needleman-Wunsch Algorithm Local Alignments - Smith- Waterman Algorithm. Pairwise Sequence alignment: Pairwise alignment, Dynamic programming. Scoring Matrices, Gaps. BLAST and its types
<b>Unit III</b>	<b>Multiple sequence alignment:</b> Dynamic and heuristic methods, Relevance to inferences about evolution, introduction to molecular phylogeny. Phylogenetic analysis: Introduction, Types of Phylogenetic Trees, Methods and Applications, Bootstrap.
<b>Unit IV</b>	<b>Computational Genetics:</b> Epigenetics and its role in transcription regulation, development, and diseases. Genomic variations and its associations: Linking genes, variations and diseases: Introduction to biomarkers and personalized medicine.
<b>Unit V</b>	<b>Bioinformatics for human diseases:</b> Genome-wide association studies of human diseases, Genome editing tools and applications to human diseases, applications of bioinformatics in identification of human diseases

<b>Text Books</b>	
T.1	Bioinformatics - A Practical Guide to the Analysis of Genes and Proteins by Andreas Baxevanis, Francis Ouellette, Wiley-Interscience, 2005.
T.2	Introduction to Bioinformatics by T. K. Attawood & D.J. Parry-smith, 8th reprint. Pearson education, 2004
<b>Reference Books</b>	
R.1	Jonathan Pevsner. Bioinformatics and Functional Genomics, 2nd Edition
R.2	Introduction to Bioinformatics by Arthur M. Lesk
<b>Useful Links</b>	
1	<a href="http://www.ncbi.nlm.nih.gov/genbank/">http://www.ncbi.nlm.nih.gov/genbank/</a>
2	<a href="https://www.ebi.ac.uk/embl/">https://www.ebi.ac.uk/embl/</a>

	<b>Course Outcomes</b>	<b>CL</b>	<b>Class Sessions</b>
<b>BIT4713.1</b>	<b>Select</b> the appropriate data for the analysis.	5	9
<b>BIT4713.2</b>	<b>Illustrate</b> the similarity and use the databases.	4	9
<b>BIT4713.3</b>	<b>Analyze</b> the conserved domains by studying sequence alignments	4	9
<b>BIT4713.4</b>	<b>Assess</b> the relationships using phylogenetic trees and analyze the conserved domains	5	9
<b>BIT4713.5</b>	<b>Analyze</b> and visualize the macromolecular structures	4	9

  
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