	(Lifective from academic session 2019-20)							
Name of	the Course: B.Sc. in Information Technology (Artificial Intellige	nce)						
	Image Processing and Image Processing Lab	iicc)						
	Code: BITAI Semester: V							
501,BITA								
Duration								
Teaching								
Tutorial:								
	: 4 hrs./week Continuous Assessment: 25							
Credit: 3		tion: 40						
	Practical Sessional external examination: 60							
Aim:								
Sl. No.								
1.	Review the fundamental concepts of a digital image processing system							
2.	Evaluate the techniques for image enhancement and image restoration.							
3.	Interpret image segmentation and representation techniques.							
3. 4.	Interpret Image compression standards.							
Objective:								
Sl. No.								
1.	To study the image fundamentals and mathematical transforms necessary for image							
1.	processing.	ssary 101 1	mage					
2.	To study the image enhancement techniques.							
3.	To study image restoration procedures. To study the image compres	sion proce	edures.					
<u> </u>	10 study mange restoration procedures: 10 study and mange compres	51011 p100						
Pre-Requi	site:							
Sl. No.								
1.	Mathematics							
2.	Digital Electronics, Signals and systems.							
Contents		Hrs./w	eek					
Chapter	Name of the Topic	Hours	Marks					
01	Introduction ,Background, Digital Image Representation, Fundamental	3	8					
	steps in Image Processing, Elements of Digital Image Processing -							
_	Image Acquisition, Storage, Processing, Communication, Display.							
02	Digital Image Formation [4L] A Simple Image Model, Geometric	3	10					
	Model- Basic Transformation (Translation, Scaling, Rotation),							
	Perspective Projection, Sampling & Quantization - Uniform & Non							
0.2	uniform	0	1.6					
03	Mathematical Preliminaries [9L] Neighbour of pixels, Connectivity,	8	16					
	Relations, Equivalence & Transitive Closure; Distance Measures, Arithmetic/Logic Operations, Fourier Transformation, Properties of							
	The Two Dimensional Fourier Transform, Discrete Fourier							
	Transform, Discrete Cosine & Sine Transform.							
	Transform, Diserce Coome & ome Transform.							
04	Spatial Domain Method, Frequency Domain Method, Contrast	8	16					
-	Enhancement -Linear & Nonlinear Stretching, Histogram Processing;	_	-					
	Smoothing - Image Averaging, Mean Filter, Low-pass Filtering;							

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	Image Sharpening. High-pass Filtering, Highboost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain - Low pass filtering, High pass filtering.		
05	Image Restoration [7L] Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation - Spatial Transformation, Gray Level Interpolation.	7	10
06	Image Segmentation [7L] Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection - Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding, Optimal Thresholding; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.	7	10
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination		
	Total:		

Practical:

Skills to be developed:

Intellectual skills:

- 1. Skill to Analyze images in the frequency domain using various transforms.
- 2. Skill to Interpret image segmentation and representation techniques

List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)

- 1. Display an image to illustrate change in image quality with decreasing gray levels-128, 64, 32, 16 and 8.
- 2. Write a code in Matlab to perform the following operations on an image:
 - a. Increase and decrease brightness of an image.

5. Read an image, convolve the image with the mask $1/9 \times 1 / 1$

- b. Manipulate contrast of an image.
- c. Determine negative of an image.
- 3. Read an image and perform histogram equalization of the input image and analyse the result.
- 4. Read a grayscale image and convert it to a binary image using hard thresholding. Make the threshold value a user defined parameter. Vary the threshold and observe the result.
- 1 1 1 1 1 1

And show that it performs averaging operation which results in blurring of the image. Also analyse the impact of increasing the size of the mask to 5x5, that is, mask is

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1/9 x	(11111)
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	11111

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(Effective from academic session 2019-20)

- 6. Read an image and then corrupt the image by salt-and-pepper noise and Gaussian noise. Then apply an averaging filter of size 3 X 3 and 5 x 5 to this corrupted image. Comment on the result obtained.
- 7. Read an image and then corrupt the image by salt-and-pepper noise. Now apply a 3 x 3 box filter, a 5 x 5 box filter and a median filter to the corrupted image and comment on the result obtained.
- 8. Write a matlab program that performs a two-dimensional Butterworth low-pass and high-pass filter of the given image for two different cut-off frequencies.
- 9. Read an input image to perform the following operations:
 - a. High-pass filtering in the frequency domain
 - b. Low-pass filtering in the frequency domain
 - c. Band-pass filter in the frequency domain
 - d. Band-stop filter in the frequency domain
- 10. Read an image and degrade the image using motion blur.

Assignments: Based on curriculum as covered by subject teacher.

Name of Aut	hor	Title of the	Book	Edition/IS	SN/ISBN	Name of th	ne
1101110 011101					, 102.1	Publisher	- -
Gonzalves, Dig		Digital Imag	ge Processing			Pearson	
Jahne		Digital Imag Processing,	ge			Springer Inc	dia
Reference B	ooks:						
Chanda&Maj	umder	Digital Imag & Analysis	ge Processing			PHI	
Jain		Fundamenta Image Proce	als of Digital essing			PHI	
Sonka,		Image Proce Analysis & Vision,				VIKAS	
List of oquin	mont/anr	paratus for la	horatory ov	porimonts			
Sl. No.	ment, app		iboratory ex	per inicites.			
1.		Computer					
2.			Matlab, Pyth	on			
3.		Boitware.	Maciab, 1 yen				
4.							
5.							
	er Examin	ation Scheme	e. Maxii	num Marks	-70.	Time allo	tted-3hrs.
Group	Unit		Questions			Questions	
-		(MCQ only correct ans	with the		,	•	
		No of question	Total Marks	No of guestion	To answer	Marks per question	Total Marks

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		to be set		to be set			
Α	1,2,3,4,5,	10	10	5	3	15	
	6						70
В							
c	1,2,3,4,5,			5	3	45	
	6						

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:						
Group	Chapter	Marks of each	Question to be	Question to be		
		question	set	answered		
A	ALL	1	10	10		
В	ALL	5	5	3		
С	ALL	15	5	3		

Examination Scheme for Practical Sessional examination:					
Practical Internal Sessional Co	ntinuous	Evaluation			
Internal Examination:					
Continuous evaluation			40		
External Examination: Examin	er-	•			
Signed Lab Assignments	10				
On Spot Experiment	40				
Viva voce	10		60		

I NIJIMA AT	the Course P Co	. in Information Technology (Artificial Intellige	nco)				
	Machine Learning		ince)				
	Code: BITAI 502	Semester: V					
	1: 36 Hrs.	Maximum Marks: 100					
	g Scheme	Examination Scheme					
	3 hrs./week	End Semester Exam: 70					
	: 1 hrs./week	Attendance : 5					
Practical		Continuous Assessment: 25					
Credit: 4	1						
Aim:							
Sl. No.							
1.	_	atrast pros and cons of various machine learning techning to apply a particular machine learning approach.	iques and	to get			
2.	Analyse various i	machine learning approaches and paradigms					
Objective		-					
Sl. No.							
1.		d analyse various machine learning algorithms and tech ook focusing on recent advances.	niques w	ith a			
2.	Explore supe	Explore supervised and unsupervised learning paradigms of machine learning.					
3.	To explore D	eep learning technique and various feature extraction st	trategies.				
Pre-Requ Sl. No.	isite:						
1.							
	Statistics.,						
2.	Statistics., Mathematics						
		sic knowledge					
2. 3. Contents	Mathematics Programming Ba	-	Hrs./w				
2. 3. Contents Chapter	Mathematics Programming Base Name of the To	pic	Hours	Marks			
2. 3. Contents	Name of the To Supervised Learn Distance-based m BayesLinear mod Generalized Line	pic ing (Regression/Classification) Basic methods: nethods, Nearest-Neighbours, Decision Trees, Naive lels: Linear Regression, Logistic Regression, ar ModelsSupport Vector Machines, Nonlinearity and Beyond Binary Classification: Multi-class/Structured					
2. 3. Contents Chapter	Name of the To Supervised Learn Distance-based m BayesLinear mod Generalized Line Kernel Methods, Outputs, Ranking Unsupervised Learn means, Dimension	pic ing (Regression/Classification) Basic methods: nethods, Nearest-Neighbours, Decision Trees, Naive lels: Linear Regression, Logistic Regression, ar ModelsSupport Vector Machines, Nonlinearity and Beyond Binary Classification: Multi-class/Structured g. arning,Clustering: K-means/Kernel K- nality Reduction: PCA and kernel PCA,Matrix Matrix Completion,Generative Models (mixture	Hours	Marks			

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04	Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning.	7	10
05	Scalable Machine Learning (Online and Distributed Learning), A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference.	8	12
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:

Skills to be developed:

Intellectual skills:

- 1. Skill to mathematically analyse various machine learning approaches and paradigms
- 2. Skill to compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach

Assignments: : Assignment from theory

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Kevin Murphy	Machine Learning: A Probabilistic Perspective		MIT Press
Trevor Hastie, Robert Tibshirani, Jerome Friedman,	The Elements of Statistical Learning,		Springer
Reference Books:			
Christopher Bishop	Pattern Recognition and Machine Learning		Springer

End Semester Examination Scheme. Maxin		kimum Marks-70. Time allott		tted-3hrs.			
Group	Unit	Objective Questions (MCQ only with the correct answer)			Subjective	Questions	
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10	5	3	15	70
Вс	ALL ALL			5	3	45	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be

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given on top of the question paper.						
Examination Scheme for end semester examination:						
Group	Chapter	Marks of each	Question to be	Question to be		
		question	set	answered		
Α	ALL	1	10	10		
В	ALL	5	5	3		
С	ALL	15	5	3		

Course	: Pattern Recognition Code: BITAI 503A	Semester: V		
	on: 36 Hrs.	Maximum Marks: 100		
	ng Scheme	Examination Scheme		
	: 3 hrs./week	End Semester Exam: 70		
Tutoria		Attendance : 5		
Practica		Continuous Assessment: 25		
Credit:				
Aim:				
Sl. No.				
1.	Skills to Design and co	onstruct a pattern recognition system		
2.		jor approaches in statistical and syntactic pa	ttern recog	nition.
Objectiv	e:			
Sl. No.				
1.		indamental algorithms for pattern recognition		
2.	To instigate the var	rious classification and clustering techniques		
Pre-Req	uisite:			
Sl. No.	, , ,			
1.	Statistics.,			
2.	Mathematics	1 1		
3.	Programming Basic kr	nowledge	II /	1-
Chanta			Hrs./w	
Chapte	Name of the Topic		Hours	Marks
<u>r</u> 01	Basics of pattern reco	gnition	2	5
	-	ory: Classifiers, Discriminant functions,	8	6
በ2	1	ory . Classifiers, Discriminant functions,	U	ľ
02	Decision surfaces Nor	mal density and discriminant functions		
02		mal density and discriminant functions		
02	Decision surfaces ,Nor ,Discrete features	mal density and discriminant functions		
02	,Discrete features	mal density and discriminant functions methods Maximum-Likelihood	6	8
	,Discrete features Parameter estimation		6	8
	,Discrete features Parameter estimation	methods Maximum-Likelihood nixture models ,Expectation-maximization	6	8
03	,Discrete features Parameter estimation estimation ,Gaussian m	methods Maximum-Likelihood nixture models ,Expectation-maximization		
03	,Discrete features Parameter estimation estimation ,Gaussian method , Bayesian estimation Hidden Markov mode	methods Maximum-Likelihood nixture models ,Expectation-maximization mation	6	8
	,Discrete features Parameter estimation estimation ,Gaussian method , Bayesian estimation Hidden Markov moder Discrete hidden Markov	methods Maximum-Likelihood nixture models ,Expectation-maximization mation		
03	,Discrete features Parameter estimation estimation ,Gaussian method , Bayesian estimation Hidden Markov mode	methods Maximum-Likelihood nixture models ,Expectation-maximization mation		
03	,Discrete features Parameter estimation estimation ,Gaussian method , Bayesian estimation Hidden Markov model Discrete hidden Markov models	methods Maximum-Likelihood nixture models ,Expectation-maximization mation els for sequential pattern classification v models , Continuous density hidden	8	8
03	,Discrete features Parameter estimation estimation ,Gaussian method , Bayesian estimation Hidden Markov models Dimension reduction	methods Maximum-Likelihood nixture models ,Expectation-maximization mation els for sequential pattern classification v models , Continuous density hidden methods		
03	,Discrete features Parameter estimation estimation ,Gaussian method , Bayesian estimation Hidden Markov models Discrete hidden Markov Markov models Dimension reduction Fisher discriminant ana	methods Maximum-Likelihood nixture models ,Expectation-maximization mation els for sequential pattern classification v models , Continuous density hidden	8	8



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06	Non-parametric techniques for density estimation	2	6
07	Linear discriminant function based classifier Perceptron , Support vector machines	2	4
08	Non-metric methods for pattern classification Non-numeric data or nominal data, Decision trees	3	13
09	Unsupervised learning and clustering Criterion functions for clustering ,Algorithms for clustering: K- means, Hierarchical and other methods	2	14
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:

Skills to be developed:

- 1. Will be able Understand the concept of a pattern and the basic approach to the development of pattern recognition and machine intelligence algorithms.
- 2. Will be able to Understand and apply both supervised and unsupervised classification methods to detect and characterize patterns in real-world data.

Assignments: : Assignment from theory

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
R. O. Duda, P. E. Hart and D. G. Stork	Pattern Classification		
S. Theodoridis and K. Koutroumbas	Pattern Recognition		Academic Press
Reference Books:			
C. M. Bishop	Pattern Recognition and Machine Learning		Springer
End Semester Examin	nation Scheme. Max	imum Marks-70.	Time allotted-

3hrs.							
Group	Unit	Objective (MCQ only correct ans		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10	5	3	15	70
В	ALL					45	
c	ALL			5	3		

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Department of Information Technology (In-house) Syllabus for B.Sc. in Information Technology (Artificial Intelligence) (Effective from academic session 2019-20)

•	Only multiple choice type question (MCQ) with one correct answer are to be set in the objective
	part.

• Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Se given on top o	or erro questron pur	9011				
Examination Scheme for end semester examination:						
Group Chapter Marks of each Question to be Question to be						
		question	set	answered		
A	ALL	1	10	10		
В	ALL	5	5	3		

5

3

15

ALL

 \mathbf{C}

Nama	f the Course P Se	in Information Toohnology (Antificial Int	olligongo)	
	: Applied Cryptogra	c. in Information Technology (Artificial Interpreta-	emgence)	
Course		Semester: V		
503B	2040 211111			
Duratio	on: 36 Hrs.	Maximum Marks: 100		
Teachir	ng Scheme	Examination Scheme		
Theory	: 3 hrs./week	End Semester Exam: 70		
Tutoria	1: 0	Attendance: 5		
Practica	al: 0	Continuous Assessment: 25		
Credit:	3			
Aim:				
Sl. No.				
1.	Ability to Understa	and common attacks and how to prevent them.		
2.	Ability to Understa	and how security is defined and proven at the cryp	tographic leve	el.
Objectiv	re:			
Sl. No.				
1.	Gain the ability to (and management)	apply appropriate cryptographic techniques to a seproblem at hand.	ecurity engine	ering
2.	A strong grasp of t the fundamentals.	he basic concepts underlying classical and modern	n cryptography	y, and
Pre-Req	uisite:			
Sl. No.				
1.	Basic Networking	<u> </u>		
2.	Basic Programmin			
3.		tion, discrete mathematics		
Content	_		Hrs./w	
Chapte r	Name of the Top	1C	Hours	Marks
01	Basics of pattern	recognition	2	5
02		theory: Classifiers, Discriminant functions, Normal density and discriminant functions	8	6
03		an mixture models ,Expectation-maximization estimation	6	8
04		nodels for sequential pattern classification arkov models, Continuous density hidden	8	8
05	Dimension reduct	ion methods	3	6
J.J.	Difficusion reduct	AVII IIIVIIUUD		

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	Fisher discriminant analysis, Principal component analysis, Parzen-window method,. K-Nearest Neighbour method		
06	Non-parametric techniques for density estimation	2	6
07	Linear discriminant function based classifier Perceptron , Support vector machines	2	4
08	Non-metric methods for pattern classification Non-numeric data or nominal data, Decision trees	3	13
09	Unsupervised learning and clustering Criterion functions for clustering ,Algorithms for clustering: K- means, Hierarchical and other methods	2	14
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:

Skills to be developed:

Intellectual skills:

1. Able toUnderstand how security is defined and proven at the cryptographic level.

Assignments: : Assignment from theory

Name of A	uthor	Title of the	Book	Edition/ISSN/ISBN Name of the Publisher			1e
Kevin Murp	hy	Machine Lea Probabilistic	arning: A Perspective			MIT Press	
Trevor Hast	ie, Robert	The Elements of		Springer			
Tibshirani, J	Jerome	Statistical Lo	earning,				
Friedman,							
Reference	Books:						
Christopher	Bishop	Pattern Reco	•	d Springer			
Machine Learning							
End Semester Examination Scheme. Maximum Marks-70.				ks-70.	Time all	otted-	
3hrs.							
Group	Unit	Objective	Questions		Subjective	Questions	
P							
		(MCQ only v					
P		(MCQ only v	wer)				
		(MCQ only v correct answ No of	wer) Total	No of	To answer	Marks per	Total
		(MCQ only v correct answ No of question	wer)	question	To answer	Marks per question	Total Marks
•		(MCQ only v correct ansv No of question to be set	wer) Total	question to be set		question	
A	All	(MCQ only v correct answ No of question	wer) Total Marks	question	To answer	_	Marks
A	All	(MCQ only v correct ansv No of question to be set	wer) Total	question to be set	3	question 15	
A B	All	(MCQ only v correct ansv No of question to be set	wer) Total Marks	question to be set		question	Marks
A	All	(MCQ only v correct ansv No of question to be set	wer) Total Marks	question to be set	3	question 15	Marks
A B C	All All All	(MCQ only v correct ansv No of question to be set 10	wer) Total Marks	question to be set 5	3	question 15 45	Marks 70

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part.

• Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:					
Group	Chapter	Marks of each guestion	Question to be set	Question to be answered	
A	ALL	1	10	10	
В	ALL	5	5	3	
С	ALL	15	5	3	

	t: Clinical Informatio			
	Code: BITAI 503C	Semester: V		
	on: 36 Hrs.	Maximum Marks: 100		
	ng Scheme	Examination Scheme		
Theory	: 3 hrs./week	End Semester Exam: 70		
Tutoria	al: 0	Attendance : 5		
Practic	al: 0	Continuous Assessment: 25		
Credit:	3			
Aim:				
Sl. No.				
1.	Ability to Underst	and and appreciate the role and value of information	technologie	s in
		tionizing healthcare delivery, administration, education		
2.		ish the various types of healthcare information, inclu-	ding knowle	edge,
	data, sources, prod	cesses and standards;.		
Objectiv	70.			
Objectiv Sl. No.	V C.			
31. No. 1.	Identify major	1 11 1 0 2 11 2 1 1 1 1 1 0	miliority vyi	th
		r health intormatics annlications and develon hasic ta		
- .		r health informatics applications and develop basic far	iiiiiaiity wi	
	healthcare IT	products;		
	healthcare IT Analyze obstacles			
2.	healthcare IT Analyze obstacles	products; and success factors for implementation and integration		
	healthcare IT Analyze obstacles	products; and success factors for implementation and integration		
2.	healthcare IT Analyze obstacles information, comm	products; and success factors for implementation and integration		
2. Pre-Reg	healthcare IT Analyze obstacles information, comm	products; and success factors for implementation and integration		
	healthcare IT Analyze obstacles information, comm	products; and success factors for implementation and integration unication and decision technologies in healthcare;.		
2. Pre-Reg Sl. No. 1.	healthcare IT Analyze obstacles information, communication, commun	products; and success factors for implementation and integration nunication and decision technologies in healthcare;.		
2. Pre-Reg Sl. No. 1. 2.	healthcare IT Analyze obstacles information, communication, communication and the second seco	products; and success factors for implementation and integration nunication and decision technologies in healthcare;.	on of	
Pre-Reg Sl. No. 1. 2.	healthcare IT Analyze obstacles information, communication, communication puisite: Basic Data Analyte Basic Programmin	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge ng Knowledge	on of	eek
Pre-Reg Sl. No. 1. 2. Content Chapter	healthcare IT Analyze obstacles information, communicates puisite: Basic Data Analyte Basic Programming S Name of the Top	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge ng Knowledge	on of	
Pre-Reg Sl. No. 1. 2. Content Chapter	healthcare IT Analyze obstacles information, communication, communication, communication and the second sec	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge ng Knowledge ntechnology including hardware, software,	on of Hrs./we Hours	eek Marks
2. Pre-Reg	healthcare IT Analyze obstacles information, communication, communication, communication and the second sec	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge ng Knowledge	on of	eek Marks
Pre-Reg Sl. No. 1. 2. Content Chapter	healthcare IT Analyze obstacles information, communication, communication and the second seco	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge ng Knowledge ntechnology including hardware, software, tics of systems, Spreadsheets and presentations	on of Hrs./we Hours	eek
Pre-Reg Sl. No. 1. 2. Content Chapter	healthcare IT Analyze obstacles information, communication, communication and the second seco	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge ng Knowledge ntechnology including hardware, software,	on of Hrs./we Hours	eek Marks
Pre-Reg Sl. No. 1. 2. Content Chapter 01	healthcare IT Analyze obstacles information, communication, communication, communication, communication and the second se	products; and success factors for implementation and integration munication and decision technologies in healthcare;. tic knowledge mg Knowledge n technology including hardware, software, tics of systems, Spreadsheets and presentations Administrative Decision Making Support Systems	Hrs./we Hours	eek Marks
Pre-Reg Sl. No. 1. 2. Content Chapter 01	healthcare IT Analyze obstacles information, communication, communication, communication, communication and the second se	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge In technology including hardware, software, tics of systems, Spreadsheets and presentations Administrative Decision Making Support Systems Excision Making Support Systems , Healthcare	Hrs./we Hours 5	eek Marks 10
Pre-Reg Sl. No. 1. 2. Content Chapter 01	healthcare IT Analyze obstacles information, communication, communication, communication, communication and the second se	products; and success factors for implementation and integration munication and decision technologies in healthcare;. tic knowledge mg Knowledge n technology including hardware, software, tics of systems, Spreadsheets and presentations Administrative Decision Making Support Systems	Hrs./we Hours	eek Marks
Pre-Reg Sl. No. 1. 2. Content Chapter 01	healthcare IT Analyze obstacles information, communication, communication and the second seco	products; and success factors for implementation and integration munication and decision technologies in healthcare;. tic knowledge mg Knowledge ntechnology including hardware, software, tics of systems, Spreadsheets and presentations Administrative Decision Making Support Systems existion Making Support Systems , Healthcare in Systems and Departments	Hrs./we Hours 5	eek Marks 1
Pre-Reg Sl. No. 1. 2. Content Chapter 01	healthcare IT Analyze obstacles information, communication, communication, communication and the second sec	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge mg Knowledge n technology including hardware, software, tics of systems, Spreadsheets and presentations Administrative Decision Making Support Systems existion Making Support Systems , Healthcare in Systems and Departments lanning and Implementation of Healthcare	Hrs./we Hours 5 8	eek Marks
Pre-Reg Sl. No. 1. 2. Content Chapter 01	healthcare IT Analyze obstacles information, communication, communication and the second seco	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge mg Knowledge n technology including hardware, software, tics of systems, Spreadsheets and presentations Administrative Decision Making Support Systems existion Making Support Systems , Healthcare in Systems and Departments lanning and Implementation of Healthcare	Hrs./we Hours 5	eek Marks
Pre-Reg Sl. No. 1. 2. Content Chapter 01	healthcare IT Analyze obstacles information, communicates Basic Data Analyte Basic Programming SS Name of the Top Information characterist Databases, Clinical De Information Strategic Pinformation	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge mg Knowledge n technology including hardware, software, tics of systems, Spreadsheets and presentations Administrative Decision Making Support Systems existion Making Support Systems , Healthcare in Systems and Departments lanning and Implementation of Healthcare	Hrs./we Hours 5 8	eek Marks 1
Pre-Reg Sl. No. 1. 2. Content Chapter 01 02	healthcare IT Analyze obstacles information, comm puisite: Basic Data Analyte Basic Programming SS Name of the Top Information characterist Databases, Clinical Definity Information Strategic Paragramming Strategic Paragramming Networks	products; and success factors for implementation and integration munication and decision technologies in healthcare;. tic knowledge In technology including hardware, software, tics of systems, Spreadsheets and presentations Administrative Decision Making Support Systems Existion Making Support Systems , Healthcare in Systems and Departments Lanning and Implementation of Healthcare in Systems	Hrs./we Hours 5 8	eek Marks
Pre-Reg Sl. No. 1. 2. Content Chapter	healthcare IT Analyze obstacles information, communication, communication, communication and the second sec	products; and success factors for implementation and integration nunication and decision technologies in healthcare;. tic knowledge mg Knowledge n technology including hardware, software, tics of systems, Spreadsheets and presentations Administrative Decision Making Support Systems existion Making Support Systems , Healthcare in Systems and Departments lanning and Implementation of Healthcare	Hrs./we Hours 5 8	eek Marks 1

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Department of Information Technology (In-house) Syllabus for B.Sc. in Information Technology (Artificial Intelligence) (Effective from academic session 2019-20)

06	Human factors in Healthcare Information Systems Communication Technology	2	10
07	Imaging Technology Standards for Electronic Health Records, Protection and security of healthcare information and systems	2	9
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester	4	30
	Examination		
	Total:	40	100

Practical:

Skills to be developed:

skills:

1. Able to acquire hands-on experience in analyzing a problem arising from practice and implementing a solution using a health informatics approach

Assignments: : Assignment from theory

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the
			Publisher
Cecily	Clinical Information		
Morrison, Matthew R.	Systems in Critical Care		
Jones, Julie Bracken			

End Semester Examination Scheme. Maxin			num Marks-	·70.	Time allot	tted-3hrs.		
Group	Unit	Objective (Questions	Subjective Questions				
		(MCQ only w	ith the					
		correct answ	ver)					
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks	
A	ALL	10	10	5	3	15	70	
В	All							
С	All			5	3	45		

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:					
Group	Chapter	Marks of each	Question to be	Question to be	
		question	set	answered	
A	ALL	1	10	10	
В	ALL	5	5	3	
С	ALL	15	5	3	

		. in Information Technology (Artificial Intelligen	ice)	
Subject	: Soft Computing			
Course 504A	Code: BITAI	Semester: V		
Duratio	on: 36 Hrs.	Maximum Marks: 100		
Teachin	ng Scheme	Examination Scheme		
Theory	:3 hrs./week	End Semester Exam: 70		
Tutoria	l: 0	Attendance : 5		
Practica	al: 0	Continuous Assessment: 25		
Credit:	3			
Aim:				
Sl. No.				
1.	Algorithm (GA).	s of Fuzzy logic (FL), Artificial Neural Networks (A		
2.	Ability to apply So	oft Computing techniques to solve a number of real	life probl	ems.
3.	Provide exposure computing.	to theory as well as practical systems and softwar	e used in	soft
Objectiv	e:			
Sl. No.			1 11111	
1.	designing approp	computing concepts and techniques and foster the riate technique for a given scenario.		s in
2.	To implement sof	t computing based solutions for real-world proble	ns.	
3.	_	knowledge of non-traditional technologies and func etworks, fuzzy sets, fuzzy logic, genetic algorithms.	damentals	s of
Pre-Req	uisite:			
Sl. No.				
1.	Understanding of	basic mathematical logic.		
Content	<u> </u> s		Hrs./w	eek
Chapte r	Name of the Top	ic	Hours	Marks
01	and fuzzy logic sys	duction to soft computing; introduction to fuzzy sets stems; introduction to biological and artificial neural on to Genetic Algorithm.	4	10
02	and Fuzzy relations classical sets, Fuzz cardinality, operati Membership functi	zy logic systems: Classical Sets and Fuzzy Sets s: Operations on Classical sets, properties of y set operations, properties of fuzzy sets, ons, and properties of fuzzy relations. ons: Features of membership functions, boundaries, different fuzzification methods.	18	30



Department of Information Technology (In-house) Syllabus for B.Sc. in Information Technology (Artificial Intelligence) (Effective from academic session 2019-20)

	Total:	40	100
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Sub Total:	36	70
05	Other Soft Computing techniques: Simulated Annealing, Tabu search, Ant colony optimization (ACO), Particle Swarm Optimization (PSO).	4	10
04	Genetic Algorithms: Simple GA, crossover and mutation, Multi- objective Genetic Algorithm (MOGA). Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition.	4	10
03	Logic: Classical predicate logic, Fuzzy Logic, Approximate reasoning and Fuzzy Implication Fuzzy Rule based Systems: Linguistic Hedges, Fuzzy Rule based system – Aggregation of fuzzy Rules, Fuzzy Inference System- Mamdani Fuzzy Models – Sugeno Fuzzy Models. Applications of Fuzzy Logic: How Fuzzy Logic is applied in Home Appliances, General Fuzzy Logic controllers, Basic Medical Diagnostic systems and Weather forecasting. Neural Network Introduction to Neural Networks: Advent of Modern Neuroscience, Classical AI and Neural Networks, Biological Neurons and Artificial neural network; model of artificial neuron. Learning Methods: Hebbian, competitive, Boltzman etc., Neural Network models: Perceptron, Adaline and Madaline networks; single layer network; Back-propagation and multi layer networks. Competitive learning networks: Kohonen self organizing networks, Hebbian learning; Hopfield Networks. Neuo-Fuzzy modelling: Applications of Neural Networks: Pattern Recognition and classification.	6	10
	Fuzzy to Crisp conversions: Lambda Cuts for fuzzy sets, fuzzy Relations, Defuzzification methods. Classical Logic and Fuzzy		

Practical:

Skills to be developed:

1. Able to apply Soft Computing techniques to solve a number of real life problems.

Assignments: : Assignment from theory

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the
			Publisher
Timothy J. Ross, John	Fuzzy logic with		
Wiley and Sons	engineering applications		
S. Rajasekaran and	Neural Networks, Fuzzy		PHI
G.A.V.Pai	Logic and Genetic		
	Algorithms		
S N Sivanandam, S.	Principles of Soft		
Sumathi, John	Computing		
Reference Books:			

Department of Information Technology (In-house) Syllabus for B.Sc. in Information Technology (Artificial Intelligence) (Effective from academic session 2019-20)

George J. k	Klir and Bo	Fuzzy Sets a	and Fuzzy			Prentice Ha	.11
Yuan		Logic: Theory and					
		Application	S				
Simon Hay	kin	Neural Netv	vorks: A			Prentice Ha	11.
		Comprehens	sive				
		Foundation					
End Seme	ster Examii	nation Schen	ne. Max	kimum Mar	ks-70.	Time all	otted-
3hrs.							
Group	Unit	Objective (MCQ only correct ans			Subjective	Questions	
Group	Unit	(MCQ only	with the	No of question to be set	Subjective To answer	Marks per question	Total Marks
Group A	Unit	(MCQ only correct ans No of question	with the wer) Total	question		Marks per	
-		(MCQ only correct ans No of question to be set	with the wer) Total	question to be set	To answer	Marks per question	

• Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.

5

3

45

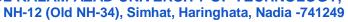
• Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:					
Group	Chapter	Marks of each	Question to be	Question to be	
		question	set	answered	
A	ALL	1	10	10	
В	ALL	5	5	3	
С	ALL	15	5	3	

c

All

		e. in Information Technology (Artificial Intellig	gence)	
	: Network & Wirele			
Course 504B	Code: BITAI	Semester: V		
	n: 36 Hrs.	Maximum Marks: 100		
-	g Scheme	Examination Scheme		
Theory:		End Semester Exam: 70		
Tutoria		Attendance: 5		
Practica		Continuous Assessment: 25		
Credit:				
Aim:		L		
Sl. No.				
1.	Ability to Understa	and how security is defined and proven at the cryptogr	aphic leve	el.
Objective	 e:			
Sl. No.				
1.		rasp of the basic concepts underlying classical and mondamentals.	odern cryp	tography,
2.	Understand	d how security is defined and proven at the cryptograp	ohic level.	
Pre-Requ	uisite:			
Sl. No.				
1.	Fundamentals of N	fetworking		
2.	Basic Programming	g Language		
Contents	5		Hrs./w	eek
Chapte r	Name of the Top	ic	Hours	Marks
01	Foundations of No	etwork Security	2	3
	Principles of Netw	ork Security, Network Security Terminologies,		
		and Data Availability, Components of Network		
	Security, Network	• •		
02	Advanced TCP/II		3	4
		Subnet Masks, Variable Length Subnet		
		adcast and Multiple Concepts ,The Three way		
	Handshake, The Pro	ocess of DHCP and APIPA,Internet Protocol version		
03	Packet Structure	and Analysis	3	7
	Canture and Identit	fy IP Datagrams, Capture and Identify ICMP		
		and Identify TCP Headers, Capture and Identify		
		ket Fragmentation, The Three way Handshake		
04	Routing and Acce	ss Control Lists	3	7



г	(Effective from academic session 2019-20)		1
	Arp Process , Cisco Routing Modes , Routing Process , Routing Tables, Access Control Lists ,Implement Access Control Lists, Limitations , DNS and Its Role .		
05	Securing Windows Windows NT 4.0 Fundamental Security, Windows NT Resource Security, Windows 2000 Infrastructure, Windows 2000 Authentication, Windows 2000 User and Group Security, Windows 2000 Resource Security, Windows 2000 Network Security.	3	7
06	Securing Linux Key Concepts, Linux Administration and Security, Key Linux Network Files, Key Linux Network Process, Key Linux Network Commands, Hardening Linux, Network File System and Linux, Network Information Service and Linux.	4	7
07	Security on the Internet and World Wide Web Components of Internet, Weak Points of Internet, Techniques of Web Hacking, Methods of Attacking Users. Attack Techniques Network Reconnaissance, Mapping and sweeping the Network, Scanning the Network, Viruses, Worms and Trojan Horses, Gaining Control on Systems, Record Keystrokes, Crack Encrypted Passwords, Reveal Hidden Passwords, Gain Unauthorised Access, Hide evidence of Attack, Perform a Denial of Service attack	5	7
08	Network Defense Fundamentals Concepts, & Key Issues, Identify Defensive Technologies, Objectives of Access Control, Identify Impact of Defense, Concepts of Network Auditing Designing and Configuring Fire wall Systems Firewall Components, Creating a FW Policy, Rule Sets and Packet Filters, Proxy Server, Bastion Host and Honey pot, FW Implementation Practices, Installing and Configuring FW, Monitor FW, Installing and configuring ISA Server 2000, Monitor ISA Server, IP Chains Concepts, Implementing FW Technologies.	5	7
09	Configuring VPNs VPN Fundamentals ,IP Security Protocol, VPN Design and	4	7

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Department of Information Technology (In-house) Syllabus for B.Sc. in Information Technology (Artificial Intelligence) (Effective from academic session 2019-20)

	Architecture, VPN Security , Configuring a VPN .	1	
	Cryptography Fundamentals		
	Cryptography rundamentais		
	What is Cryptography?, History of Encryption, Symmetric versus Asymmetric, Combined Solutions, Private Key versus Public Key,		
	Data Encryption Standard (DES), Advanced Encryption Standard		
	(AES), RSA, Diffie-Hellman, MD4, MD5, SHA-1		
	(125), 161, 51110 110111111, 112, 122, 2111		
10	Digital Signatures	2	7
	Definition and Characteristics, How Digital Signatures function,		
	Message Digest Functions, Digital Signatures with Message Digest, E-		
	Signature Law and Legal Issues, Key Length (56, 112, and 128 bit),		
	RSA and DSS Signature Standards		
	Secure EMail Implementation		
	Secure use of Netscape Messenger, Secure use of Microsoft Outlook		
	,Secure use of Microsoft Outlook Express ,PGP		
	Implementation, Sending Signed E-Mail Messages, E-Mail encryption		
	and Decryption Methods.		
11	Secure and resilient data aggregation	2	7
	Key pre-distribution and management, Encryption and authentication,		
	Security in group communication, Trust establishment and		
	management, Denial-of-service attacks, Energy-aware security		
	mechanisms		
	Internet Security		
	Denial-of-Service Attacks, Internet Worms, IP Traceback, BGP		
	security.		
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester	4	30
	Examination	40	400
	Total:	40	100

Practical:

Skills to be developed:

1. Able to apply techniques to solve a number of real life problems.

Assignments: : Assignment from theory

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the
			Publisher
Tyler Wrightson		ISBN: 9780071760942	McGraw-Hill
	Wireless Network		
	Security A Beginner's		
	Guide		
	duide		

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End Sem	ester Exam	 ination Schem	ne. Max	 ximum Marl	ks-70.	Time all	otted-
3hrs.							
Group	Unit	Objective (MCQ only v			Subjective	Questions	
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10	5	3	15	70
B c	All All			5	3	45	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:						
Group	Chapter	Marks of each	Question to be	Question to be		
		question	set	answered		
A	ALL	1	10	10		
В	ALL	5	5	3		
С	ALL	15	5	3		

	the Course: B.Sc Biomedical Inform	e. in Information Technology (Artificial Intellige	ence)		
Course 504C	Code: BITAI	Semester: V			
Duration	: 36 Hrs.	Maximum Marks: 100			
Teaching		Examination Scheme			
Theory:	'	End Semester Exam: 70			
Tutorial:		Attendance : 5			
Practical	: 0	Continuous Assessment: 25			
Credit: 3					
Aim:					
Sl. No.					
1.	Apply informatic	s in bio-medical field			
Objective	<u> </u>				
Sl. No.					
1.	To develop in-dep	pth understanding of Medical Informatics (MI).			
Pre-Requi	site:				
Sl. No.		1 191			
1.	Basic programming skills				
2.	Good understand	ing of information technology (hardware, software, net			
Contents	T		Hrs./week		
Chapter 01	Name of the Top Introduction	oic	Hours 12	Marks 20	
	What is Medical Medical Information of Medical Information	Informatics? What Medical Informatics is not Why tics? The Goals of Medical Informatics Taxonomy of tics, Why computers in healthcare? A Brief History matics, The Organization (or lack of same) of a Design Considerations for the Clinical User, lical Informatics			
02	Health Informat	cion Systems in Clinical Settings	6	20	
	Hospital Information Systems, Clinic Information Systems, Laboratory Information Systems, Radiology Information Systems, Pharmacy Information Systems.				
03	Systems in Publi	ic Health	9	20	
		nce, Disease State Monitoring and Rostering ealth Indicators, Statistical Reporting			
04	eHealth		9	10	

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Department of Information Technology (In-house) Syllabus for B.Sc. in Information Technology (Artificial Intelligence) (Effective from academic session 2019-20)

Connectivity" Creating a Virtual Healthcare Delivery System ,Information for the Physician , Information for the Patient		
Sub Total:	36	70
Internal Assessment Examination & Preparation of Semester Examination	4	30
Total:	40	100

Practical:

Skills to be developed:

1. Able to apply informatics to solve a bio-medical problems.

Assignments: : Assignment from theory

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Edward H. Shortliffe	Biomedical Informatics		

End Semester Examination Scheme. Maxin			mum Marks	s-70.	Time allo	tted-3hrs.	
Group	Unit	Objective (MCQ only v			Subjective	Questions	
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10	5	3	15	70
B c	All All			5	3	45	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:					
Group	Chapter	Marks of each	Question to be	Question to be	
		question	set	answered	
A	ALL	1	10	10	
В	ALL	5	5	3	
С	ALL	15	5	3	

Practical:		
List of Practical: Based on theory		
Assignments: Based on theory		
List of Books		

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S:	•				•			
uthor	Title of the	Book		Edition/	ISSN/ISBN			1e
C-1 1	Cnooch and Language				_			
						Pean	rson Ed	ucation
James H Martin Processi								
Books:								
ipment/ap	paratus for l	<u>abora</u>	tory e	xperimen	ts:			
	computer							
			7.7	. 37	1 70	700	,	1
ster Examin	iation Schem	ıe.	Max	amum Ma	rks-70.	T	ıme all	ottea-
Unit	Ohicativa	Oncot	ions		Cubication	· 0···c	ations	
Unit					Subjective	- Que	SUONS	
			e					
			<u> </u>	No of	To answer	Mar	ke nor	Total
					10 allswei		-	Marks
	-	Mark				que	301011	Marks
ALL	10							
		10						70
ALL				5	3	15		
					3			
	oice type quest	ion (M	CQ) wi	th one corre	ect answer are to	be se	t in the	objective
	1			1 1				1 11
				ın the order	' in answering ol	bjectiv	e questi	ons should
				nation				
on scheme					Ouastion to	hρ	Ones	tion to bo
	Chapter				~		Question to be answered	
	ALL		ucstill	14				C1 CU
			<u> </u>					
					_		J	
ion Scheme	for Practice	NACC	31()M9+	examinari	1011:			
					1011;			
Internal Se	ssional Cont				1011;			
Internal Ses Examination	ssional Cont 1:				ion:			40
Internal Ses Examination s evaluation	ssional Cont	inuou						40
Internal Section Section Internal Section Sect	ssional Cont 1: n: Examine	inuou	s Eval		1011:			40
Internal Ses Examination s evaluation	ssional Cont 1: n: Examine	inuou			ion:			40
	ster Examination Unit ALL ALL y multiple chet. ecific instruction on top of the control of the	ster Examination Scheme Unit Objective (MCQ only v. correct ansv. No of question to be set ALL ALL y multiple choice type quest t. ecific instruction to the stude given on top of the question to make the company of the property of the question to the stude given on top of the question to the stude of the property of the propert	ster Examination Scheme. Unit Objective Quest (MCQ only with the correct answer) No of question to be set ALL ALL y multiple choice type question (Mark to be set) Chapter Chapter Mall ALL ALL ALL ALL ALL ALL ALL A	ster Examination Scheme. Discrepance Speech and Language Processing	title of the Book fsky and artin Speech and Language Processing Books: Ster Examination Scheme. Ster Examination Scheme. Maximum Ma Unit Objective Questions (MCQ only with the correct answer) No of question Marks question to be set ALL ALL y multiple choice type question (MCQ) with one correct correct instruction to the students to maintain the order given on top of the question paper. Chapter Maximum Ma Dividual Scheme of Total of the paper of the question (MCQ) with one correct the paper of the question paper. Chapter Marks of each question ALL ALL ALL ALL ALL 5 ALL 15 ALL 15	ster Examination Scheme. Unit Objective Questions (MCQ) only with the correct answer) No of question to be set ALL 1 ALL 5 ALL 1 1 ALL 5 ALL 1 1 1 ALL 5 ALL 15 5 5 3 ALL 15 5 5 4 ALL 15 5 5 4 ALL 15 5 5 4 ALL 15 5 5 3 ALL 15 5 5 3 ALL 10 ALL 5 5 5 5 4 ALL 5 5 5 5 5 5 5 5 5	tipment/apparatus for laboratory experiments: Computer	Title of the Book Speech and Language Processing Speech and Language Pearson Edit Speech

Department of Information Technology (In-house)
Syllabus for B.Sc. in Information Technology (Artificial Intelligence)
(Effective from academic session 2019-20)

Name of the Course: B.Sc. in In	formation Technology (AI)
Subject: Industrial Training a	nd Internship
Course Code: BITAI 581	Semester: V
Duration: 12Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 0	End Semester Exam: 100
Tutorial: 0	Attendance: 0
Practical: 2 hrs./week	Continuous Assessment: 0
Credit: 1	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60
Contents	
Students will do projects on app	olication areas of latest technologies and current topics of societal relevance.

Name of the Course: B.Sc. in In	formation Technology (AI)
Subject: Major Project I	
Course Code: BITAI 582	Semester: V
Duration: 24Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 0	End Semester Exam: 100
Tutorial: 0	Attendance: 0
Practical: 4 hrs./week	Continuous Assessment: 0
Credit: 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60
Contents	

Students will do projects on application areas of latest technologies and current topics of societal relevance.