Jabalpur Engineering College, Jabalpur

(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) with Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)

w.e.f. July 2024

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
				Theory			Practical						
				End. Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work		L	T	P	
1	IT801M	PEC-III	Professional Elective Course-III	70	20	10	-	-	100	3	1	-	4
2	IT802M	OEC-IV	Open Elective Course-IV	70	20	10	-	-	100	3	1	-	4
3	IT803M	PI	Major Project / Internship	-	-	-	150	100	250	-	-	16	8
			Total	140	40	20	150	100	450	6	2	16	16

Note: 1. Departmental BOS will decide list of three optional subjects for PEC III as well as for OEC IV.

Professional Elective Course-III		
S.No.	Subject Code	Subject Name
1	IT801M A	Network Management
2	IT801M B	Natural Language Processing
3	IT801M C	Sensor Networks

Open Elective Course-IV		
S.No.	Subject Code	Subject Name
1	IT802M A	Internet of Things
2	IT802M B	Image Processing and GIS
3	IT802M C	Computer Vision

Note: 2. Students going for internship would have to opt MOOC/NPTEL subjects decided / listed by the HOD / Coordinator.

Professional Elective Course-III		
S.No.	Subject Code	Subject Name
1	IT801M D	NPTEL-1
2	IT801M E	NPTEL-2
3	IT801M F	NPTEL-3

Open Elective Course-IV		
S.No.	Subject Code	Subject Name
1	IT802M D	NPTEL-4
2	IT802M E	NPTEL-5
3	IT802M F	NPTEL-6

Note: 3. For Major Project / Internship, evaluation is based on work done, quality of report, presentation and performance in viva-voce through department project supervisor / Industry Project Coordinator.

1 hour lecture (L) = 1 credit	1 hour Tutorial (T) = 1 credit	2 hour Practical (P) = 1 credit

PEC: Professional Elective Course, OEC: Open Elective Course, PI: Project and Internship

Principal
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
COURSE CONTENT   w.e.f. July 2024

Subject Code	Subject Title	Maximum Marks allotted					Total Marks	Hours/week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem MST	Quiz Assignment	End Sem	Lab Work					
IT801M A	Network Management	70	20	10	-	-	100	3	1	-	4

Module I

Protocols and architecture, Protocols, Characteristics, Functions, Need for multiple protocols, Conceptual layers of multiple protocol software, Protocol layering principles, Multiplexing and Demultiplexing.

Module II

Internet Protocol , Virtual network , Internet architecture and philosophy , Purpose of the internet protocol Internet diagram , Routing in an internet , table driven IP internet , IP routing algorithm , Internet control message protocols (ICMP) , Internet protocol version 6 , Features , Format , Source routing , Options , address space assignment , User data gram protocol , Format of UDP messages , UDP encapsulation and protocol layering.

Module III

Introduction, layering, OSI Layering, TCP/IP Layering, Protocols & Standards, Internet standards, Internet administration, Internet Addresses, Internet protocol: introduction, IP header, IP routing, subnet addressing, subnet mask, special case of IP addresses, Comparative Study of IPV4 & IPV6, port numbers Address Resolution Protocol, ARP packet format, Proxy ARP, ARP command, ARP Example, Reverse Address Resolution Protocol (RARP): Introduction, RARP Packet format, RARP Examples, RARP server design
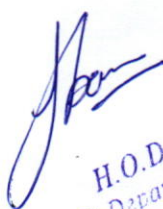
Module IV

Delivery and Routing of IP Packets, Routing Methods, Static versus Dynamic Routing, Routing table and Routing Module, Classless Addressing: CIDR. Internet Protocol (IP), Datagram, Fragmentation, Options, IP Package. Interior and Exterior Routing, Routing information protocol (RIP), Open shortest path first protocol (OSPF), BGP, GGP. Private Networks. Virtual Private Network (VPN), Network Address Translation (NAT).

Module V

Configuration management, Configuration management functions, Inventory managements, Network topology services, Order processing and provisioning, Charge management directory services. Fault management, Processes and procedure, Fault management functions, Performance management, Security management, accuracy management, Network capacity planning.

DEAN
Academic
JEC, Jabalpur (M.P.)

H.O.D.
I.T. Department
Jabalpur Engineering College
Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
COURSE CONTENT   w.e.f. July 2024

Reference Books:

1. Forouzan, TCP/IP Protocol Suite 4th edition, TMH

2. J.Richard Burkey, Network Management Concept and Practice, PHI

3. Stevens, TCP/IP Illustrated Volume-1, Pearson

4. Tittel: TCP/IP, Cenage Learning

5. Uyless Black, TCP/IP and related protocols, McGraw Hill.

6. Doughals E. Comer, Internetworking with TCP/IP Vol. I, Principles, Protocols, and   Architecture, Prentice Hall, India.
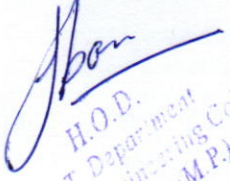
Course Outcomes:

CO1: To discuss protocol layering principle and various standard architectures.

CO2: To understand TCP/IP supportive various protocols.

CO3: To compare various routing methods.

CO4: To give overview of configuration management, performance management, accuracy and security management.

H.O.D.
I.T. Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
COURSE CONTENT
w.e.f. July 2024

Subject Code	Subject Title	Maximum Marks allotted						Hours/week			Total Credits
		Theory			Practical		Total Marks	L	T	P	
		End Sem	Mid Sem MST	Quiz Assign ment	End Sem	Lab Work					
IT801M B	Natural Language Processing	70	20	10	-	-	100	3	1	-	4

Module I

Introduction, Origins and challenges of NLP - Language Modeling: Grammar- based LM, Statistical LM - Regular Expressions, Finite-State Automata - English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

Module II

Word Level Analysis : Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff - Word Classes. Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging - Midden Markov and Maximum Entropy models,

Module III

Syntactic Analysis: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar - Dependency Grammar - Syntactic Parsing, Ambiguity,
.Dynamic Programming parsing - Shallow parsing - Probabilistic CFG, Probabilistic CYK, Probabilistic LexicaJired CFGs - Feature structures, Unification of feature structures.

Module IV

Semantics and Pragmatics Requirements for representation, First-Order Logic, Description Logics - Syntax-Driven Semantic analysis, Semantic attachments - Word Senses, Relations between Senses, Thematic Roles, selectional restrictions.- Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods - Word Similarity using Thesaurus and Distributional methods.

Module V

Application of NLP: intelligent work processors: Machine translation, user interfaces. Man-Machine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP.

Text Books:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: A Introduction to Natural Language Processing, Computational Linguistics andSpeech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processingwith Python, First Edition, OReiliy Media, 2009.

DEAN
Academic
JEC, Jabalpur (M.P.)

H.O.D.
I.T. Department
Jabalpur Engineering College
Jaba'pur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
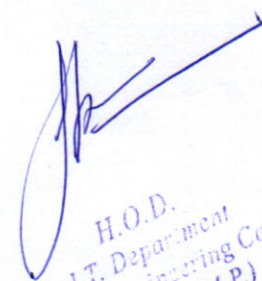## COURSE CONTENT   w.e.f. July 2024

Reference Books:

1. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook,Atlamie Publisher, 2015.
2. Richard M Reese, —Natural Language Processing with Java, OReiliy Media,2015.
3. Nitin Indurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary. —Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

Course Outcomes:

CO1: To familiarize with Origins and challenges of NLP, English Morphology and EditDistance.

CO2: To understand Word Level Analysis Markov models and Part-of-Speech Tagging.

CO3: To understand Context-Free Grammars Syntactic Parsing and CFG.

CO4: To get exposure to Semantics and Pragmatics in NLP.

CO5: To understand application of NLP like intelligent work processors: Machine translation.

H.O.D.
I.T. Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

COURSE CONTENT

w.e.f. July 2024

Subject Code	Subject Title	Maximum Marks allotted					Total Marks	Hours/week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem MST	Quiz Assign ment	End Sem	Lab Work					
IT801M C	Sensor Networks	70	20	10	-	-	100	3	1	-	4

Module I

Basics of Wireless Sensors and Applications, The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications

Module II

Data Retrieval in Sensor Networks, Classification of WSNs, MAC Layer, Routing Layer, High- Level Application Layer Support, Adapting to the Inherent Dynamic Nature of WSNs.

Module III

Sensor Network Platforms and Tools, Sensor Network Hardware, Sensor Network Programming Challenges, Node-Level Software Platforms.

Module IV

Operating System: TinyOS, Imperative Language: nesC, Dataflow Style Language: TinyGALS, Node-Level Simulators, ns-2 and its Sensor Network Extension, TOSSIM.

Module V

Sensor Network Databases : Challenges ,Query Interfaces, High level Database Organization,In- Network Aggregation, Data-centric Storage, Temporal Data.
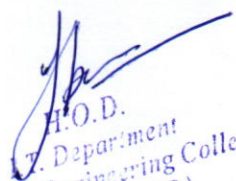
TEXT BOOKS:

1. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science Imprint, Morgan Kauffman Publishers, 2005, rp2009.

REFERENCES:

1.Adhoc Wireless Networks: Architectures and Protocols, C.Siva Ram Murthy, B.S.Murthy, Pearson Education, 2004
2.Wireless Sensor Networks: Principles and Practice, Fei Hu, Xiaojun Cao, An Auerbach Book, CRC Press, Taylor & Francis Group, 2010
3.Wireless Ad hoc Mobile Wireless Networks: Principles, Protocols and Applications, Subir Kumar Sarkar et al., Auerbach Publications, Taylor & Francis Group, 2008.
4.Wireless Sensor Networks: Signal Processing and Communications Perspectives,Ananthram Swamietal. Wiley India, 2007, rp2009.

DEAN
Academic
JEC, Jabalpur (M.P.)

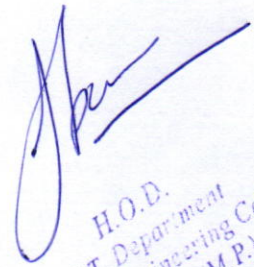H.O.D.
Department
Jabalpur Engineering College
Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
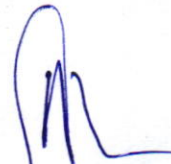**COURSE CONTENT**   **w.e.f. July 2024**

Course Outcomes:

CO1: To familiarize with Basics of Wireless Sensors, clustering and Applications.

CO2: To understand Data Retrieval in Sensor Networks and classification.

CO3: To Sensor Network Platforms and Tools .

CO4: To get exposure to query Operating systems and Dataflow Style Language.

CO5: To understand Sensor Network Databases.

H.O.D.
I.T. Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)

COURSE CONTENT   w.e.f. July 2024

Subject Code	Subject Title	Maximum Marks allotted					Total Marks	Hours/week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem MST	Quiz Assignment	End Sem	Lab Work					
IT802M A	Internet of Things	70	20	10	-	-	100	3	1	-	4

Module I
Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.

Module II
Machine-to-machine (M2M), SDN (software defined networking) and NFV(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.

Module III
Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control.

Module IV
Sensor Technology , Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, Wireless Sensor Network Technology.
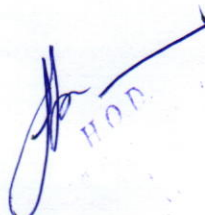
Module V
IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions, Raspberry Pi & arduino devices. IOT Case studies: smart city streetlights control & monitoring.

Reference Book:
1. Rajkamal,"Intemet of Things", Tata McGraw Hill publicationVijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)"1st Edition ,Universal Press
2. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication.
3. Charless Bell "MySQL for the Internet of things", Apress publications.
4. Francis dacosta "Rethinking the Internet of things:A scalable Approach toconnecting everything", lst edition, Apress publications 2013.
5. Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication.

DEAN
Academic
JEC, Jabalpur (M.P.)

H.O.D.

Course Outcomes:

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
COURSE CONTENT   **w.e.f. July 2024**
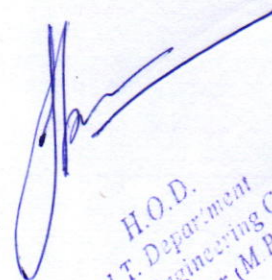
Course Outcomes:

CO1 :To familiarize with Internet of things and their applications.

CO2:To understand M2M, SDN and NFV along with cloud based IOT models.

CO3: To understand various design principles like SOAP, REST.

CO4: To get exposure to sensor technology.

CO5: To understand IOT design methodology and IOT case studies.

H.O.D.
I.T. Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
COURSE CONTENT   w.e.f. July 2024

Subject Code	Subject Title	Maximum Marks allotted					Total Marks	Hours/week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem MST	Quiz Assignment	End Sem	Lab Work					
IT802M B	Image Processing and GIS	70	20	10	-	-	100	3	1	-	4

Module -I

Introduction and Fundamentals Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.Image Enhancement in Spatial Domain :Introduction; Basic Gray Level Functions — Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations — Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening The Laplacian.

Module -II

Image Enhancement in Frequency Domain:Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters Gaussian Low-pass Filters; Sharpening Frequency Domain Filters Gaussian High-pass Filters; Homomorphic Filtering. Image Restoration:A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only- Spatial Filtering Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering Bandpass Filters; Minimum Mean-square Error Restoration.
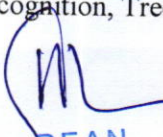
Module --III

Color Image Processing:Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms — Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

Module –IV

Registration:Introduction, Geometric Transformation Plane to Plane transformation, Mapping, StereoImaging— Algorithms to Establish Correspondence, Algorithms to Recover Depth .Segmentation: Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

Module –V

Feature Extraction Representation, Topological Attributes, Geometric Attributes, Description: Boundary-based Description, Region-based Description, Relationship. Object Recognition: Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
COURSE CONTENT   **w.e.f. July 2024**

Books:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Publishedby: Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley andSons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.
4. Digital Image Processing by A.K. Jain, 1995,-PHI

Course Outcomes:

CO1: To Introduce fundamentals of IP. applications and components of Image Processing System along

with Image Enhancement in Spatial Domain

CO2: Image Enhancement in Frequency Domain and Image Restoration process and models.

CO3: To understand Color Image Processing and Morphological Image Processing

CO4: To get exposure to Geometric Transformation, Segmentation

CO5: To understand Feature Extraction and Description, Object Recognition.

H.O.D.
I.T. Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
COURSE CONTENT
w.e.f. July 2024

Subject Code	Subject Title	Maximum Marks allotted					Total Marks	Hours/week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem MST	Quiz Assignment	End Sem	Lab Work					
IT802M C	Computer Vision	70	20	10	-	-	100	3	1	-	4

Module I

Introduction to Computer vision Human Vision : linage Formation and understanding, pixel- and color transform, classical filtering operations, histogram operations, thresholding techniques, edge detection, techniques, corner and interest point, Introduction to computer vision.

Module II

Feature Detection and Matching: Introduction to Feature Representation, colorhistogram analysis, color moments, texture analysis, Harris detector, Feature descriptors, SIFT, image Matching, Feature distance, euclidean distance feature and dimensionality reduction, principal component analysis.

Module III

Shape and Region Analysis: Binary shape analysis, connectedness, object labeling and counting, size filtering, skeletons and thinning, deforrnabte shape analysis, boundary tracking procedures, shape models and shape recognition, boundary length measures, boundary descriptors, chain codes, Fourier descriptors, region descriptors.

Module IV

Image Retrieval: Introduction to Classification and learning techniques, k nearest neighbour, support vector machines, use in Image Retrieval for applications. Accuracy Measurements (Precision, Recall, Sensitivity and Specificity) and Cross Validation Models. Introduction to 3D Vision and Motion.

Module V

Application and Research in Computer Vision: Object Detection, Photo album, Face detection, Face recognition, Eigen faces, Active appearance and 3D shape models of faces Application: Surveillance, foreground-background separation, particle filters, combining views from multiple cameras, human gait, analysis Application : In-vehicle vision system: locating road way road marking — identifying road signs - locating pedestrians.

Lab Work

Students will be given a few computer vision problems. They need to solve thegiven problems by applying the appropriate techniques studied in this subject.

DEAN
Academic
JEC, Jabalpur (M.P.)

H.O.D.
I.T. Department
Jabalpur Engineering College
Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) With Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Information Technology)
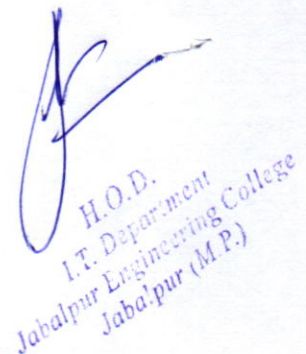## COURSE CONTENT   w.e.f. July 2024

Text Books:

1. E. R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press,2012,
2. R. Szeliski, "Computer Vision: Algorithms and Applications", Springer 201
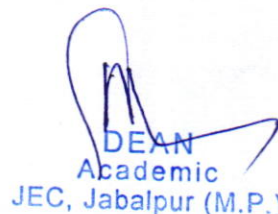
Reference Books:

1. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference",Cambridge University Press, 2012.
2. Mark Nixon and Alberto S. Aquado, "Feature Extraction & Image Processing forComputer Vision", Third Edition, Academic Press, 2012.
3. D. L. Baggio et al "Mastering OpenCV with Practical Computer VisionProjects", Packt Publishing, 2012.
4. Jan Erik Solem, "Programming Computer Vision with Python: Tools andalgorithms for analyzing images", O'Reilly Media, 2012.

Course Outcomes:

CO1: To introduce Computer vision similarity with Human Vision.

CO2: To understand Feature Detection and Matching.

CO3: To understand Shape and Region Analysis.

CO4: To get exposure to Image Retrieval.

CO5: To understand application and Research in Computer Vision.

H.O.D.
I.T. Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)