Walchand College of Engineering

(Government Aided Autonomous Institute)

Vishrambag, Sangli. 416415

Credit System for

S.Y. M.Tech. (Computer Science and Engineering)

Sem-I and II 2023-24

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HOD

DEAN ACADEMICS

Walchand College of Engineering

(Government Aided Autonomous Institute)

Credit System for S.Y. M.Tech. (Computer Science and Engineering) Sem-I AY 2023-24

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	MSE/LA1	ISE/LA2	ESE	Remark
Professional Elective (Theory)													
01	PE	REFER LIST	Elective 5	3				3	3	30	20	50	
Professional Core (Lab)													
02	PR	6CO645	Dissertation Phase 1			6		6	3		100		
03	PR	6CO646	Dissertation Phase 2			6		6	3		100		
04	PR	6CO647	Dissertation Phase 3			8		8	4			100	POE
AICTE Mandatory Course (Theory)													
05	MC	6IC602	Constitution of India	2				2	0	30	20	50	
			Total	5	0	20	0	25	13				

Notes:

For Theory courses: There shall be MSE, ISE and ESE. The ESE is a separate head of passing.

For Lab courses: There shall be continuous assessment (LA1, LA2, ESE). The ESE is a separate head of passing. The Y in the PoE indicates external component for ESE.

For further details, refer to Academic and Examination rules and regulations.

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DEAN ACADEMICS

Walchand College of Engineering

(Government Aided Autonomous Institute)

Elective Course List for S.Y. M.Tech. (Computer Science and Engineering) Sem-I AY 2023-24

Sr.No.	Track	Course Code	Course Name
Elective 5 (Theory)			
01	Artificial Intelligence	6CO611	Deep Learning
02	IP &CV	6CO612	Computer Vision
03	Advanced Computing	6CO613	High Performance Computing

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DEAN ACADEMICS

Walchand College of Engineering

(Government Aided Autonomous Institute)

Credit System for S.Y. M.Tech. (Computer Science and Engineering) Sem-II AY 2023-24

Sr.No.	Category	Course Code	Course Name	L	T	P	I	Hrs	Cr	MSE/LA1	ISE/LA2	ESE	Remark
Professional Core (Lab)													
01	PR	6CO691	Dissertation Phase 4			10		10	5		100		
02	PR	6CO692	Dissertation Phase 5			10		10	5		100		
03	PR	6CO693	Dissertation Phase 6			12		12	6			100	POE
04	PR	6CO694	Internship				1	1	1	30	30	40	
Open Elective (Theory)													
05	MC	6IC601	Value Education	2				2	0	30	20	50	
			Total	2	0	32	1	35	17				

Notes:

For Theory courses: There shall be MSE, ISE and ESE. The ESE is a separate head of passing.
For Lab courses: There shall be continuous assessment (LA1, LA2, ESE). The ESE is a separate head of passing. The Y in the PoE indicates external component for ESE.
For further details, refer to Academic and Examination rules and regulations.

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DEAN ACADEMICS

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M.Tech., Sem I
Course Code	6CO611
Course Name	Deep Learning
Desired Requisites:	Working knowledge of Linear Algebra, Statistics and Probability Theory

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To explain the fundamentals of neural networks, recurrent neural networks (RNN), long short term memory cells and convolutional neural networks (CNN).
2	To demonstrate various learning models for practical application.
3	To discuss optimization approach and distribution techniques for Deep Learnin model
4	
5	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Illustrate fundamentals of deep learning using foundation of mathematics terminology	Understanding
CO2	Compare various deep learning models by hyper tuning various parameters	Analyze
CO3	Demonstrate various case studies of deep learning.	Apply
CO4	Design and deploy deep learning models on various frameworks and platform.	Create

Module	**Module Contents**	**Hours**
I	**Introduction to Deep Learning** Neural network fundamentals: General Introduction to Deep Learning, Perceptron algorithm, Back propagation and Multi-layer Networks. Image fundamentals: Pixels, Image coordinate, scaling and aspect ratios	5

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II	**Parameterized Learning and Optimization Methods** parameterized Learning: Introduction to linear classification, Four components of parameterized learning, role of loss function. Optimization Methods: Optimization Methods: Gradient descent, stochastic gradient descent (SGD) and extensions to SGD, regularization	5
III	**Convolutional Neural Networks (CNN)** Understanding Convolutions: Convolutions versus Cross-correlation, The "Big Matrix" and "Tiny Matrix" Analogy, Kernels, A Hand Computation Example of Convolution The Role of Convolutions in Deep Learning. CNN Building blocks: Layer Types, Convolutional Layers, Activation Layers, Pooling Layers, Fully-connected Layers, Batch Normalization, Dropout, ShallowNEt, LeNet, MiniVGGNET	5
IV	**Deep learning-based object detection** Fundamentals of Object detection, Family of R-CNN, Single shot detectors (SSD), You only look once (YOLO)	4
V	**Sequence Models** Recurrent Neural Networks, Vanishing gradients, Gated Recurrent Units (GRU), Long-short-term-memories (LSTMs) .	5
VI	**Optimization techniques & Distributed Training for DL model** Fundamentals of optimization techniques, Optimize TensorFlow Models For Deployment with TensorRT, Custom and Distributed Training.	4

	Text Books
1	Ian Goodfellow, Yoshua Bengio and Aaron Courville Deep Learning, MIT Press, 2016
2	Aurelien Geron, " Hands-On Machine Learning with Scikit-Learn & TensorFlow",

	O'REILLY, Dec 2017
	References
1	Neural Networks: A Systematic Introduction, Raúl Rojas, 1996
2	Pattern Recognition and Machine Learning, Christopher Bishop, 2007
3	Prof. Mitesh M. Khapra, "Deep Learning", course on NPTEL, July 2018
4	Andrew Ng, "Deep Learning Specialization", Coursera online course
	Useful Links
1	https://nptel.ac.in/courses/106/106/106106184/
2	https://www.coursera.org/specializations/deep-learning

CO-PO Mapping

	Programme Outcomes (PO)														
	1	2	3	4	5	6									
CO1	1														
CO2	2		2												
CO3			2	1											
CO4		2			1	2									

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	ISE	MSE	ESE	Total
Remember				
Understand	10			**10**

Apply	10			**10**
Analyze	10	10		**20**
Evaluate		10	20	**30**
Create		10	20	**30**
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

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AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	Second Year M.Tech., Sem I
Course Code	6CO612
Course Name	Computer Vision
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To build an understanding on detailed models of image formation
2	To expose the students to image feature detection and matching.
3	To introduce fundamental algorithms for pattern recognition.
4	To introduce various classification techniques.
5	To expose the students to various structural pattern recognition and feature extraction techniques.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Appreciate the detailed models of image formation	UNDERSTAND
CO2	Analyse the techniques for image feature detection and matching	ANALYSE
CO3	Apply various algorithms for pattern recognition	APPLY
CO4	Examine various clustering algorithms.	APPLY

Module	**Module Contents**	**Hours**
I	Image formation and Image model- Components of a vision system- Cameras- camera model and camera calibrationRadiometry- Light in space- Light in surface - Sources, shadows and shading.	6
II	ultiple images-The Geometry of multiple views- StereopsisAffine structure from motion- Elements of Affine Geometry Affine structure and motion from two images- Affine structure and motion from multiple images- From Affine to Euclidean images.	7
III	ultiple images-The Geometry of multiple views- StereopsisAffine structure from motion- Elements of Affine Geometry Affine structure and motion from two images- Affine structure and motion from multiple images- From Affine to Euclidean images.	7
IV	Introduction to pattern and classification, supervised and unsupervised learning, Clustering Vs classification, Bayesian Decision Theory- Minimum error rate classification Classifiers, discriminant functions, decision	7

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	surfaces- The normal density and discriminant-functions for the Normal density.	
V	Linear discriminant based classifiers and tree classifiers Linear discriminant function based classifiers- PerceptronMinimum Mean Squared Error (MME) method, Support Vector machine, Decision Trees: CART, ID3	7
VI	Unsupervised Methods Basics of Clustering; similarity / dissimilarity measures; clustering criteria. Different distance functions and similarity measures, K-means algorithm. Recent Advances in Pattern Recognition Neural network structures for pattern recognition, Pattern classification using Genetic Algorithms	8

	Text Books
1	Bernd Jahne and Horst HauBecker, Computer vision and Applications, Academic press, 2000
2	David A. Forsyth & Jean Ponce, Computer vision – A Modern Approach, Prentice Hall, 2002

	References
1	C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
2	R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification, John Wiley, 2001.
3	Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, 2004.
4	S. Theodoridis and K. Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009.

	Useful Links
1	NPTEL Lectures

CO-PO Mapping

	Programme Outcomes (PO)														
	1	2	3	4	5	6									
CO1	1														
CO2			2												
CO3		2		2											
CO4					2										

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	**Based on**	**Conducted by**	**Typical Schedule (for 26-week Sem)**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30

LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)				
Bloom's Taxonomy Level	**ISE**	**MSE**	**ESE**	**Total**
Remember				
Understand				
Apply	15			**15**
Analyze	15	10		**25**
Evaluate		10	20	**30**
Create		10	20	**30**
Total Marks	**30**	**30**	**40**	**100**

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AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	Second Year M.Tech., Sem I
Course Code	6CO613
Course Name	High Performance Computing
Desired Requisites:	Data structures, Basic Programming knowledge

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To provide an introduction to the arithmetic and software tools and techniques needed to implement effective, high performance programs on modern parallel computing systems.
2	To be introduced with current trends in parallel computer architectures and programming models(i.e. languages and libraries) for shared memory, manycore/multicore architecture.
3	
4	
5	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	explain principles of parallel algorithm design, analytical modelling of parallel programs, programming models for shared and distributed memory systems, parallel computer architectures, along with numerical and non-numerical algorithms for parallel systems	apply
CO2	demonstrate understanding of learned concepts of parallel algorithm design, performance evaluation, communication operators by writing algorithms and programs exploiting parallel architecture	apply
CO3	analyze the efficiency of parallel algorithms designed for matrix, graph and sorting operations	analyze

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Module	Module Contents	Hours
I	Introduction to Parallel Computing: Implicit Parallelism, Limitations of Memory, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks, Impact of Process-Processor Mapping and Mapping Techniques	6
II	Principals of Parallel Algorithm Design: Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Parallel Algorithm Models Basic Communication Operations: One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, All-Reduce and Prefix-Sum Operations, Scatter and Gather	7
III	Analytical Modeling: Performance Metrics for parallel systems. The effect of Granularity and Data Mapping on Performance. The Scalability of parallel systems, Iso efficiency metric of scalability, sources of parallel overhead, Minimum execution time and minimum cost-optimal execution time.	6
IV	Parallel Programming: OpenMP, MPI, CUDA/OpenCL, Chapel, etc. Thread basics ,Work Sharing constructs, Scheduling, Reduction, Mutual Exclusion Synchronization & Barriers, The MPI Programming Model, MPI Basics, Global Operations , Asynchronous Communication, Modularity, Other MPI Features Basic of GPGPU, CUDA Programming model, CUDA memory type Performance Issues	7
V	Dense Matrix Algorithms: Matrix-Vector Multiplication, Matrix-Matrix Multiplication Sorting: Issues, Sorting Networks, Bubble Sort and its Variants, Quicksort	6
VI	Graph Algorithms: Definitions and Representation, Minimum Spanning Tree: Prim's Algorithm, Single-Source Shortest Paths: Dijkstra's Algorithm, All-Pairs Shortest Path	6

Text Books	
1	Grama Ananth, Gupta Anshul, George Karypis, and Vipin Kumar, Introduction to Parallel

	Computing, Addison Wesley (2nd ed.),.
2	Buyya Raijkumar, High Performance Cluster Computing : Programming and Applications, Volume 2, Printice Hall PTR Upper Saddle River, New Jersey
3	Cook shane, CUDA Programming: A Developer's Guide to Parallel Computing with GPUs
	References
1	Michael J. Quinn, Parallel Programming in C with MPI and OpenMP, McGraw-Hill.
	Useful Links
1	High Performance Computing, Charles Severance, 1998. Link
2	Marc Snir, Steve Otto, Steven Huss-Lederman, David Walker, and Jack Dongarra, MPI: The Complete Reference, 1996. Link
3	Ian Foster, Designing and Building Parallel Programs, 1995. Link

CO-PO Mapping

	Programme Outcomes (PO)														
	1	2	3	4	5	6									
CO1			2			2									
CO2	1	2	2	1		1									
CO3	2		3	2		1									

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)				
Bloom's Taxonomy Level	**ISE**	**MSE**	**ESE**	**Total**
Remember				
Understand				
Apply	10			**10**
Analyze	10	10		**20**
Evaluate		10	20	**30**
Create		10	20	**30**
Total Marks	**20**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information

Programme	M. Tech. (Computer Science and Engineering)
Class, Semester	Second Year M. Tech., Sem I
Course Code	6CO645
Course Name	Dissertation Phase I
Desired Requisites:	Research Methodology, Project management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**ISE/ LA**			**Total**
Tutorial	-	100			100
Practical	6 hrs/week				
Interaction	-	**Credits: 3**			

Course Objectives

1	To develop the student to apply the knowledge gained to identify problems for research and provide the solutions by self-study and interaction with stakeholders.
2	Share knowledge to tackle real world problems of societal concerns
3	Impart flexibility to the student to have increased control over his/ her learning
4	Enhance a students' learning through increased interaction with peers and colleagues.
5	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, students will be able to,

CO1	study and survey the existing literature and identify the research problem	Analyze
CO2	design and develop the solution for complex engineering problem	Evaluate
CO3	create new prototypes or models in the specialized field	Create

Course Content

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In the Dissertation Phase 2, the students would continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analysed the results obtained as proposed in the synopsis. The work should be completed in all respects till fourth semester. The students are required to submit the dissertation work in the form of report as per the institute rule.

Text Books

1	As per the research topic

References

1	Papers from National and International Journals

Useful Links

1	Introduction to Research- NPTEL Course: Link
2	Overview of Research – Video: Link

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3	Project Management- Course: Link
4	Project Management for Managers- Course: Link

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule (for 26-week Sem)**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**Lab ESE**	**Total**
Remember				
Understand				
Apply				
Analyze	15	15	15	**45**
Evaluate	15	15	15	**45**
Create			10	**10**
Total Marks	**30**	**30**	**40**	**100**

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Course Information

Programme	M. Tech. (Computer Science and Engineering)
Class, Semester	Second Year M. Tech., Sem I
Course Code	6CO646
Course Name	Dissertation Phase 2
Desired Requisites:	Research Methodology, Project management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**ISE/ LA**			**Total**
Tutorial	-	100			100
Practical	6 hrs/week				
Interaction	-	**Credits: 3**			

Course Objectives

1	To develop the student to apply the knowledge gained to identify problems for research and provide the solutions by self-study and interaction with stakeholders.
2	Share knowledge to tackle real world problems of societal concerns
3	Impart flexibility to the student to have increased control over his/ her learning
4	Enhance a students' learning through increased interaction with peers and colleagues.
5	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, students will be able to,

CO1	study and survey the existing literature and identify the research problem	Analyze
CO2	design and develop the solution for complex engineering problem	Evaluate
CO3	create new prototypes or models in the specialized field	Create

Course Content

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In the Dissertation Phase 2, the students would continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analysed the results obtained as proposed in the synopsis. The work should be completed in all respects till fourth semester. The students are required to submit the dissertation work in the form of report as per the institute rule.

Text Books

1	As per the research topic

References

1	Papers from National and International Journals

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Useful Links	
1	Introduction to Research- NPTEL Course: Link
2	Overview of Research – Video: Link
3	Project Management- Course: Link
4	Project Management for Managers- Course: Link

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)				
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember				
Understand				
Apply				
Analyze	15	15	15	**45**
Evaluate	15	15	15	**45**
Create			10	**10**
Total Marks	**30**	**30**	**40**	**100**

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Course Information

Programme	M. Tech. (Computer Science and Engineering)
Class, Semester	Second Year M. Tech., Sem I
Course Code	6CO647
Course Name	Dissertation Phase 3
Desired Requisites:	Research Methodology, Project management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**ESE**			**Total**
Tutorial	-	100			100
Practical	8 hrs/week				
Interaction	-	**Credits: 4**			

Course Objectives

1	To develop the student to apply the knowledge gained to identify problems for research and provide the solutions by self-study and interaction with stakeholders.
2	Share knowledge to tackle real world problems of societal concerns
3	Impart flexibility to the student to have increased control over his/ her learning
4	Enhance a students' learning through increased interaction with peers and colleagues.
5	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, students will be able to,

CO1	study and survey the existing literature and identify the research problem	Analyze
CO2	design and develop the solution for complex engineering problem	Evaluate
CO3	create new prototypes or models in the specialized field	Create

Course Content

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In the Dissertation Phase 2, the students would continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analysed the results obtained as proposed in the synopsis. The work should be completed in all respects till fourth semester. The students are required to submit the dissertation work in the form of report as per the institute rule.

Text Books

1	As per the research topic

References

1	Papers from National and International Journals
	Useful Links
1	Introduction to Research- NPTEL Course: Link
2	Overview of Research – Video: Link
3	Project Management- Course: Link
4	Project Management for Managers- Course: Link

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule (for 26-week Sem)**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**Lab ESE**	**Total**
Remember				
Understand				
Apply				
Analyze	15	15	15	**45**
Evaluate	15	15	15	**45**
Create			10	**10**
Total Marks	**30**	**30**	**40**	**100**

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Course Information

Programme	M. Tech. (Computer Science and Engineering)
Class, Semester	Second Year M. Tech., Sem II
Course Code	6CO691
Course Name	Dissertation Phase 4
Desired Requisites:	Research Methodology, Project management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**ISE/ LA**			**Total**
Tutorial	-	100			100
Practical	10 hrs/week				
Interaction	-	**Credits: 5**			

Course Objectives

1	To develop the student to apply the knowledge gained to identify problems for research and provide the solutions by self-study and interaction with stakeholders.
2	Share knowledge to tackle real world problems of societal concerns
3	Impart flexibility to the student to have increased control over his/ her learning
4	Enhance a students' learning through increased interaction with peers and colleagues.
5	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, students will be able to,

CO1	study and survey the existing literature and identify the research problem	Analyze
CO2	design and develop the solution for complex engineering problem	Evaluate
CO3	create new prototypes or models in the specialized field	Create

Course Content

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In the Dissertation Phase 2, the students would continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analysed the results obtained as proposed in the synopsis. The work should be completed in all respects till fourth semester. The students are required to submit the dissertation work in the form of report as per the institute rule.

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Text Books	
1	As per the research topic
References	
1	Papers from National and International Journals
Useful Links	
1	Introduction to Research- NPTEL Course: Link
2	Overview of Research – Video: Link
3	Project Management- Course: Link
4	Project Management for Managers- Course: Link

CO-PO Mapping

	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8 10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember				
Understand				
Apply				
Analyze	15	15	15	**45**
Evaluate	15	15	15	**45**
Create			10	**10**
Total Marks	**30**	**30**	**40**	**100**

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Course Information

Programme	M. Tech. (Computer Science and Engineering)
Class, Semester	Second Year M. Tech., Sem II
Course Code	6CO692
Course Name	Dissertation Phase 5
Desired Requisites:	Research Methodology, Project management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**ISE/ LA**			**Total**
Tutorial	-	100			100
Practical	10 hrs/week				
Interaction	-	**Credits: 5**			

Course Objectives

1	To develop the student to apply the knowledge gained to identify problems for research and provide the solutions by self-study and interaction with stakeholders.
2	Share knowledge to tackle real world problems of societal concerns
3	Impart flexibility to the student to have increased control over his/ her learning
4	Enhance a students' learning through increased interaction with peers and colleagues.
5	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, students will be able to,

CO1	study and survey the existing literature and identify the research problem	Analyze
CO2	design and develop the solution for complex engineering problem	Evaluate

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CO3	create new prototypes or models in the specialized field	Create

Course Content

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In the Dissertation Phase 2, the students would continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analysed the results obtained as proposed in the synopsis. The work should be completed in all respects till fourth semester. The students are required to submit the dissertation work in the form of report as per the institute rule.

Text Books

1	As per the research topic

References

1	Papers from National and International Journals

Useful Links

1	Introduction to Research- NPTEL Course: Link
2	Overview of Research – Video: Link
3	Project Management- Course: Link
4	Project Management for Managers- Course: Link

CO-PO Mapping

	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember				
Understand				
Apply				
Analyze	15	15	15	**45**
Evaluate	15	15	15	**45**
Create			10	**10**
Total Marks	**30**	**30**	**40**	**100**

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Course Information

Programme	M. Tech. (Computer Science and Engineering)
Class, Semester	Second Year M. Tech., Sem II
Course Code	6CO693
Course Name	Dissertation Phase 6
Desired Requisites:	Research Methodology, Project management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**ESE**			**Total**
Tutorial	-	100			100
Practical	12 hrs/week				
Interaction	-	**Credits: 6**			

Course Objectives

1	To develop the student to apply the knowledge gained to identify problems for research and provide the solutions by self-study and interaction with stakeholders.
2	Share knowledge to tackle real world problems of societal concerns
3	Impart flexibility to the student to have increased control over his/ her learning
4	Enhance a students' learning through increased interaction with peers and colleagues.
5	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, students will be able to,

CO1	study and survey the existing literature and identify the research problem	Analyze
CO2	design and develop the solution for complex engineering problem	Evaluate
CO3	create new prototypes or models in the specialized field	Create

Course Content

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In the Dissertation Phase 3, the students would continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analysed the results obtained as proposed in the synopsis. The work should be completed in all respects till fourth semester. The students are required to submit the dissertation work in the form of report as per the institute rule.

Text Books

1	As per the research topic

References

1	Papers from National and International Journals

Useful Links

1	Introduction to Research- NPTEL Course: Link
2	Overview of Research – Video: Link
3	Project Management- Course: Link
4	Project Management for Managers- Course: Link

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CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)				
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember				
Understand				
Apply				
Analyze	15	15	15	**45**
Evaluate	15	15	15	**45**
Create			10	**10**
Total Marks	**30**	**30**	**40**	**100**

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Course Information

Programme	M. Tech. (Computer Science and Engineering)
Class, Semester	Second Year M. Tech., Sem II
Course Code	6CO694
Course Name	Internship
Desired Requisites:	Research Methodology, Project management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	-				
Interaction	1 hrs/week	**Credits: 1**			

Course Objectives

1	to enhance those skills, obtain the perspective of a work environment and benefit from a mentor or supervisor's experience and advice.
2	to expose you to a particular job and a profession or industry.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, students will be able to,

CO1	Understanding the problem-solving methodologies in industry	Understand
CO2	Applying the project management skills to solve real world problems	Apply
CO3	Designing and developing industry oriented products	Create

Course Content

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In the Internship Phase 2, the students would continue their Internship work. It is expected that the student has completed most of the experimental/computation works and analysed the results obtained as proposed in the synopsis. The work should be completed in all respects till fourth semester. The students are required to submit the Internship work in the form of report as per the institute rule.

Text Books

1	As per the research topic

References

1	Papers from National and International Journals

Useful Links

1	Introduction to Research- NPTEL Course: Link
2	Overview of Research – Video: Link
3	Project Management- Course: Link
4	Project Management for Managers- Course: Link

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CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule (for 26-week Sem)**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**Lab ESE**	**Total**
Remember				
Understand	20			20
Apply	10	20	20	50
Analyze				
Evaluate				
Create		10	20	**30**
Total Marks	**30**	**30**	**40**	**100**