Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information

Programme	M. Tech. (Electronics Engineering)
Class, Semester	First Year M. Tech., Sem III
Course Code	5EN601
Course Name	Legal, Financial aspects of industrial project
Desired Requisites:	

Teaching Scheme (Hrs)		**Examination Scheme (Marks)**			
Lecture	2	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives

1	To identify and analyze the relevant legal issues involved in Industrial Project and criminal matters affecting business.
2	To understand theories of value, risk and return, capital investment decisions, wages and working hours, insurance schemes, labour laws
3	To become familiar with intellectual property in cyber space and different cyber laws

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	To understand the terms involved and laws applicable for an Industrial Project	Understand
CO2	To get acquainted with investments, taxes and employee schemes	Apply
CO3	To be familiar with Cyber laws applicable for cyber crimes	Apply

Course Content

Module	Module Contents	Hours
I	**Economic Decision Making** Introduction, Mathematics of Time Value of Money: Compound Interest, Cash Flow Diagram, Uniform Annual Series, Irregular Cash Flows, Cost Comparison: Present Worth Analysis, Annual Cost Analysis, Capitalized Cost Analysis	4
II	**Taxes and Profitability** Taxes, Profitability Of Investments: Rate of Return, Payback Period, Net Present Worth, Internal Rate of Return, Inflation, Sensitivity and Break-Even Analysis, Uncertainty in Economic Analysis	4

III	**Factories Act, 1948:** Health, Safety, Provisions relating to Hazardous Processes, Welfare, Working Hours of Adults, Employment of young persons, Annual Leave with wages. The Employees Provident Fund and Miscellaneous Provisions Act, 1952 (10 of 1952). Employees Provident Fund Schemes, Central Board, Employees' Pension Scheme, Employees Deposit Linked Insurance Scheme, Contributions.	4
IV	**Constitution and Labour Laws:** labour laws, Equality before law and its application in Labour Laws, Equal pay for equal work; and Article-16 and reservation policies, Articles 19, 21, 23 and 24 and its implications.	4
V	**Intellectual Property in Cyber Space** Computer Software and Copyright Law, Software Licences, Computer Databases and the law, Domain Names and the law, Trademark issues in cyberspace	4
VI	**Cyber Crimes and Cyber Laws** Cyber Crimes, Malware, Computer Source Code, Digital Signature, Information Technology Laws, IT ACT & how to prevent yourself from being a victim of Cyber Crime	5

Text Books	
1	P.L. Mehta, *Managerial Economics Analysis, Problems and cases*, S. Chand & Co. Ltd., 2001
2	Dieter G.E., *Engineering Design*, McGraw-Hill Education 5th edition, 2012.
3	N. Godbole, S. Belapure, *Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India Pvt. Ltd.

References	
1	Peterson and Lewis: Managerial Economics, 4th Ed., Prentice Hall , 2004
2	R. Drefuss, J. Pila; The Oxford Handbook of Intellectual Property Law, Oxford University Press, 2018.
3	Adv. P. Mali, Cyber Law & Cyber Crimes Simplified, Cyber Infomedia, 2017.

Useful Links	
1	Video on 'Intellectual Property Rights in Cyber Space': Link
2	Video on Cybersquatting and Internet Domain Names in 2016- by WIPO: Link
3	Video on Cyber Laws in India - I: Link
4	Video on Cyber Crimes - Cyber Law: Link

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

CO3				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 (for Theory Course)
The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember				
2	Understand				
3	Apply	5	5	20	30
4	Analyze	5	5	20	30
5	Evaluate	10	10	20	40
6	Create				
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information	
Programme	M. Tech. (Electronics Engineering)
Class, Semester	Second Year M. Tech., Sem I
Course Code	5EN690
Course Name	Dissertation Phase I
Desired Requisites:	Concept knowledge of research methodology, project management, Electronics Engineering

Teaching Scheme (Hrs)		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	20				
Interaction	-	**Credits: 10**			

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	Acquire knowledge to tackle real world problems of societal concerns	
3	Impart flexibility to the student to have increased control over his/ her learning	
4	Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor	
5	Enhance a students' learning through increased interaction with peers and colleagues.	
Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, students will be able to,		
CO1	Search the existing literature and identification of research problem	Analyze
CO2	Design and develop the solution for complex engineering problem	Evaluate
CO3	Create the new knowledge in the specialized field	Create

Course Content

In dissertation Phase 1, the student has to complete the partial work of the Dissertation in Electronics Engineering which will consist of problem statement, literature review from IEEE Transactions and Journals, design, and scheme of implementation (viz. Block diagram, Mathematical Model, Algorithm, Simulation tool, hardware setup requirements etc.)
The student is expected to complete the dissertation at least up to the design phase. As a part of the progress report of Dissertation Phase I, the candidate shall deliver a presentation on the advancement in Technology pertaining to the selected dissertation topic.
The student shall submit the duly approved and certified progress report of Dissertation Phase I in standard format for satisfactory completion of the work by the concerned guide and head of the Department.
The student will be assessed by a panel of examiners in the department for LA. In ESE there will be one external examiner, internal examiner/guide and a chairman for assessment. The assessment will be broadly based on literature study, work undergone, content delivery, presentation skills,documentation and report

Text Books	
1	As per the research topic

References	
1	National and International Journals

Useful Links	
1	https://nptel.ac.in/courses/121/106/121106007/
2	https://www.youtube.com/watch?v=mAVswCbz_jM&feature=emb_imp_woyt
3	https://nptel.ac.in/courses/110/104/110104073/
4	https://nptel.ac.in/courses/110/107/110107081/

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

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2021-22					
Course Information					
Programme	M. Tech. (Electronics Engineering)				
Class, Semester	Second Year M. Tech., Sem III				
Course Code	5EN602				
Course Name	Industry Orientation Course				
Desired Requisites:					
Teaching Scheme (Hrs)		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100

Practical	1	
Interaction	-	**Credits: 1**

Course Objectives	
1	To provide a hands on experience of software in solving complex Electronics Engineering problems.
2	To enhance the employability of Electronics Engineering student.

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, students will be able to,		
CO1	Use of the software related to Electronics Engineering effectively.	Evaluate
CO2	Develop the solution for Electronics Engineering problem using software.	Create
CO3	Explain the working of research and development department.	Understand

Course Content
This course is based on computers as a tool to design and analyse the Electronics system. In the modern day work environment, the Electronics Engineering should be able to simulate and solve complex problems on computers. The Electronics Engineer must be highly computer literate. The engineer with strong fundamentals in Electronics Engineering and computer software proficiency is highly in demand from industry. Employability of the student can be enhanced by providing software training.

Text Books	
1	Suitable books based on the software selected.

References	
1	Suitable books based on the contents of software selected

Useful Links	
1	As per the need of the software training

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1		1				
CO2			2			2
CO3				3		
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	10	10	10	**30**
Apply				
Analyze				
Evaluate	10	10	15	**35**
Create	10	10	15	**35**
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information

Programme	M. Tech. (Electronics Engineering)
Class, Semester	First Year M. Tech., Semester III
Course Code	5EN611
Course Name	Professional Elective -5 Remote Sensing Techniques and Applications
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives

1	To acquire skills in advance techniques such as hyper spectral, thermal and LiDAR scanning for mapping, modeling and monitoring.
2	
3	

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Describe the importance and role of remote sensing and digital image processing in land resource mapping, monitoring and modelling.	Understand

CO2	Demonstrate knowledge of the concepts and techniques involved in digital image processing of remotely sensed data	Apply
CO3	Analyze and compare different information extraction techniques	Analyse
CO4		

Module	Module Contents	
I	**Remote Sensing Data Collection:** The Remote Sensing Process, Remote Sensing data analysis, Analog (hard-copy) Image Digitization, Digital Remote Sensor Data Collection	**6**
II	**Multispectral Imaging** Multispectral imaging using discrete detectors and scanning mirrors, linear arrays, Imaging spectrometry, Types of Digital cameras for imaging	6
III	**Display Alternatives and Scientific Evaluation** Image display considerations, Merging (fusing) remotely sensed data, length (distance) measurement, perimeter, area and shape measurement	7
IV	**Thematic Information Extraction** Supervised Classification, Unsupervised classification, Fuzzy classification, Object Based Image Analysis (OBIA) classification, Incorporating ancillary data in the classification	7
V	**Information extraction using Artificial Intelligence** Expert systems, Decision Tree Classification based on human derived rules and machine learning, Random forest classifier, Support vector machines	7
VI	**Information extraction using Image Spectroscopy** Panchromatic, M ultisp ectral and H yperspectral D ata Collection, Step s to Extract Information from H yp ersp ectral D ata, Initial Image Q uality Assessment, Radiometric Calibration, M ap p ing and M atching using H yp erspectral D ata, Selected Indices Useful for H yperspectral Data Analysis	7

Text Books	
1	Robert A. Schowengerdt, “Techniques for Image Processing and Classification in Remote Sensing” ,Academic press, 1983
2	
3	

References	
1	John R. Jensen,” Introductory Digital Image Processing A Remote Sensing Perspective”, University of South Carolina, Pearson , 2015
2	
3	

Useful Links	
1	NPTEl Lectures
2	Coursera Lectures
3	
4	

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2			2											
CO3						2								
CO4														
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
The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember				
2	Understand	20	10		**30**
3	Apply		10	30	**40**
4	Analyze			30	**30**
5	Evaluate				
6	Create				
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2021-22					
Course Information					
Programme	M.Tech. (Electronics Engineering)				
Class, Semester	Second Year M.Tech., Sem III				
Course Code	5EN612				
Course Name	Professional Elective 5 - Advanced Automotive Electronics				
Desired Requisites:	Analog Electronics, Digital electronics, Microcontrollers				
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-	Nil			

Interaction	-	Credits: 2

Course Objectives	
1	Overview of Automotive electronics system and its components
2	Automotive sensor and actuator software modules
3	CAN J1939 protocol
4	AUTOSAR technical overview

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	Illustrate significance of AUTOMOTIVE Electronics	Illustrate
CO2	Develop automotive subsystems, Interfaces for automotive sensors and actuators software modules as closed loop	Develop
CO3	Develop Communication between various controllers using CAN bus and others buses	Develop
CO4	Explain the AUTOSAR layered architecture	Explain
CO5	Develop Model based automotive system using MATLAB	Develop
CO6	Illustrate automotive systems for EMC complaint	Illustrate

Module	Module Contents	Hours
I	**Module 1 : Overview of Automotive electronics system and its components** Automotive Market: On road vehicle, off road vehicle, safety and connectivity Hardware :ECU-ICs, PCB, Sensors, Actuators Software: Boot Loader, OS + Application, Calibration parameters. Battery charging system, Engine control system, Steering control system, Automatic transmission system, Cruise control system.	4
II	**Module 2: Automotive sensor and actuator software modules** Sensor: Temperature, Air Mass sensor, Pressure sensor, Speed sensors, Knocking Sensor, Lamda (Oxygen) Sensor, Throttle Position sensor, Cam sensor, Crank position sensor. Physical Sensor Connection, Sensor environment, Harness, Reference voltage, closed loop sensor software module, Calibration, OORH, OORL, In Range, Auto and Manual mode. Actuator: Physical actuator, Actuator driver faults, shorted to Low, Shorted to High, Open circuit. Check to give ON/OFF commands. Failure Mode Identification.	8
III	**Module 3 : Communication protocol**	6

	CAN Bus, CAN J1939 Protocol, LIN Bus ,Flex ray, Automotive Ethernet, RF, Bluetooth, WiFi, Diagnostic Protocol: UDS, Inter-ECU communication protocol, Inter vehicle communication to form autonomous vehicle system Tools: CANoe, Vehicle spy, CAPEL,TAE scripting	
IV	**Module 4: Software Architecture** Classical architecture, Layered architecture (AUTOSAR), Increased E/E complexity, AUTOSAR organization, All layer information(e.g. RTE,BSW, applications) Tools: Davinci developer, configurator, Raphsody	6
V	**Module 5: Model based Development:** Algorithm/application development using Simulink, Stateflow, Code generation for various control algorithms like ESP,ABS, TCS etc.	8
VI	**Module 6: Electromagnetic Compatibility** Introduction to various regulatory requirements and international electrical and EMC standards, Understanding origin of pulses, disturbances, circuit and PCB layout design techniques to meet EMC.	4

Text Books	
1	Bosch Automotive Electrics and Automotive Electronics by Robert Bosch

References	
1	https://elearning.vector.com/vl_can_introduction_en.html
2	https://www.nxp.com/docs/en/reference-manual/BCANPSV2.pdf
3	http://www.analog.com/media/en/technical-documentation/application-notes/AN-1123.pdf
4	https://www.autosar.org/
5	https://elearning.vector.com/vl_autosar_introduction_en.html
6	https://www.kpit.com/resources/downloads/kpit-autosar-handbook.pdf
7	https://www.autosar.org/fileadmin/user_upload/standards/classic/3-2/AUTOSAR_Glossary.pdf
8	https://www.autosar.org/fileadmin/user_upload/standards/classic/3-2/AUTOSAR_LayeredSoftwareArchitecture.pdf
9	https://www.autosar.org/fileadmin/user_upload/standards/classic/3-0/AUTOSAR_TechnicalOverview.pdf

Useful Links	
1	NPTEL Lectures

2	

CO-PO Mapping															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1			2												
CO2				2											
CO3			2												
CO4				1											
CO5			1												
CO6				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
The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember				
2	Understand				
3	Apply	20	10	30	**60**
4	Analyze		10	30	**40**
5	Evaluate				
6	Create				
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*	
AY 2021-22	
Course Information	
Programme	M.Tech. (Electronics Engineering)
Class, Semester	Second Year M.Tech., Sem I
Course Code	5EN651
Course Name	Activity based Lab Professional Elective 5 Remote Sensing Techniques and Applications Lab
Desired Requisites:	Digital Image Processing
Teaching Scheme	**Examination Scheme (Marks)**

Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100
Practical	2 Hrs/week	Nil			
Interaction	-	**Credits: 1**			

Course Objectives	
1	Apply acquired knowledge and critical thinking skills to solve a real-world problem with appropriate remote sensing data and processing methods.
2	Communicate findings from the analysis of remotely sensed data through the written word and graphical products.
3	
4	

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO 1	Classify remotely sensed data to make it useful in geographic information systems	Understand
CO 2	Interpret information from remotely sensed data using a variety of manual and automated techniques	Apply
CO 3	Develop multi-step remote sensing workflows to solve problems in a variety of application areas	Create

Mini Project Guideline

1. The students should learn following concepts before planning Mini Project
   a. Introduction to Erdas Imagine
   b. Algorithms for Image Enhancement and Rectification
   c. Supervised and unsupervised classification algorithms for remotely sensed data
   d. Object-Based Image Analysis
   e. Lidar and NAIP Imagery
   f. Image Operations and Data Fusion

2. In discussion with the concerned faculty during Laboratory hours Student should plan the Mini project and prepare synopsis

3. The progress of work and discussion must be documented.

4. Testing of final system, Preparation, Checking & Correcting be done in discussion with faculty

5. The Student must submit a brief project report(25-30 pages) that must include the following
   a. Introduction
   b. Literature survey
   c. Hardware & Software Requirements
   d. System Design Architecture
   e. Implementation (screenshots to be included)
   f. Testing
   g. Conclusion
   h. Future enhancements.
   j. Bibliography

Text Books	
1	Robert A. Schowengerdt, “Techniques for Image Processing and Classification in Remote Sensing” ,Academic press, 1983
2	
3	
References	
1	John R. Jensen,” Introductory Digital Image Processing A Remote Sensing Perspective”, University of South Carolina, Pearson , 2015
2	
3	
Useful Links	
1	https://rscc.umn.edu/lessons/labs
2	https://www.coursera.org/
3	
4	

CO-PO Mapping

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

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	15			**15**
Apply	15	20	20	**55**
Analyze				
Evaluate				
Create		10	20	**30**
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2021-22					
Course Information					
Programme	M.Tech. (Electronics Engineering)				
Class, Semester	Second Year M.Tech., Sem III				
Course Code	5EN652				
Course Name	Activity based Lab Advanced Automotive Electronics				
Desired Requisites:	Analog Electronics, Digital electronics, Microcontrollers				
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	-	Nil			
Interaction	-	**Credits: 1**			

Course Objectives	
1	Overview of Automotive electronics system and its components
2	Automotive sensor and actuator software modules
3	CAN J1939 protocol
4	AUTOSAR technical overview

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	Illustrate significance of AUTOMOTIVE Electronics	Illustrate
CO2	Develop automotive subsystems, Interfaces for automotive sensors and actuators software modules as closed loop	Develop

CO3	Develop Communication between various controllers using CAN bus and others buses	Develop
CO4	Explain the AUTOSAR layered architecture	Explain
CO5	Develop Model based automotive system using MATLAB	Develop
CO6	Illustrate automotive systems for EMC complaint	Illustrate

Module	**Mini project Guideline**	**Hours**

1. The students must understand following aspects while planning Mini Project
   a. Concept Automotive sensor and actuator software modules
   b. CAN J1939 protocol
   c. AUTOSAR technical overview
   d. Challenges
   e. Various applications/smart objects
   f. Major Players/Industry, Standards.

2. In discussion with the concerned faculty and using links mentioned below, during Laboratory hours Student should plan the Mini project and prepare synopsis

3. The progress of work and discussion must be documented.

4. Testing of final product, Preparation, Checking & Correcting be done in discussion with faculty

5. The Student must submit a brief project report(25-30 pages) that must include the following
   a. Introduction
   b. Literature survey
   c. Hardware & Software Requirements
   d. System Design Architecture
   e. Implementation (screenshots to be included)
   f. Testing
   g. Conclusion
   h. Future enhancements.
   j. Bibliography

Text Books	
1	Bosch Automotive Electrics and Automotive Electronics by Robert Bosch

References	
1	https://elearning.vector.com/vl_can_introduction_en.html
2	https://www.nxp.com/docs/en/reference-manual/BCANPSV2.pdf
3	http://www.analog.com/media/en/technical-documentation/application-notes/AN-1123.pdf
4	https://www.autosar.org/
5	https://elearning.vector.com/vl_autosar_introduction_en.html

6	https://www.kpit.com/resources/downloads/kpit-autosar-handbook.pdf
7	https://www.autosar.org/fileadmin/user_upload/standards/classic/3-2/AUTOSAR_Glossary.pdf
8	https://www.autosar.org/fileadmin/user_upload/standards/classic/3-2/AUTOSAR_LayeredSoftwareArchitecture.pdf
9	https://www.autosar.org/fileadmin/user_upload/standards/classic/3-0/AUTOSAR_TechnicalOverview.pdf

Useful Links	
1	NPTEL Lectures
2	

CO-PO Mapping															
	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1			2												
CO2				2											
CO3			2												
CO4				1											
CO5			1												
CO6				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	**LA1**	**LA2**	**Lab 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**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information	
Programme	M. Tech. (Electronics Engineering)
Class, Semester	Second Year M. Tech., Sem IV
Course Code	5EN691
Course Name	Dissertation Phase 2
Desired Requisites:	

Teaching Scheme (Hrs)		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	24				
Interaction	-	**Credits: 12**			

Course Objectives	
1	To develop the student to apply the knowledge gained to identify problem for research provide the solutions by self-study and interaction with stake holders
2	Acquire knowledge to tackle real world problems of societal concerns
3	Impart flexibility to the student to have increased control over his/ her learning.
4	Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor
5	Enhance student's learning through increased interaction with peers and colleagues.

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, students will be able to,		
CO1	Search the existing literature and identification of research problem	Analyze
CO2	Design and develop the solution for complex engineering problem	Evaluate
CO3	Create the new knowledge in the specialized field	Create

Course Contents

In Dissertation Phase–II, the student shall consolidate and complete the remaining part of the dissertation work in the field of Electronics Engineering which will consist of implementation of devised algorithm/ system using simulation tool and/or selected hardware, testing, results, measuring performance,comparative analysis, validation of results and conclusions.

The student shall prepare the duly certified final report of Dissertation in standard format for satisfactory completion of the work by the concerned guide and head of the Department.

The students are expected to validate their study undertaken by publishing it at standard platforms.

The investigations and findings need to be validated appropriately at standard platforms – conference and/or peer reviewed journal.

The student will be assessed by a panel of examiners in the department for LA1 and 2. In ESE there will be one external examiner, internal examiner/guide and a chairman for assessment. The assessment will be broadly based on literature study, work undergone, content delivery, presentation skills, documentation and report.

Text Books	
1	As per the research topic

References	
1	National and International Journals
Useful Links	
1	https://nptel.ac.in/courses/110/104/110104073/

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1	1			1		2
CO2	1		1		2	2
CO3		2				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	**LA1**	**LA2**	**Lab ESE**	**Total**
Remember				
Understand				
Apply				
Analyze	10	10	10	**30**
Evaluate	10	10	15	**35**
Create	10	10	15	**35**
Total Marks	**30**	**30**	**40**	**100**

Course Information	
Programme	M. Tech. (Electronics Engineering)
Class, Semester	Second Year M. Tech., Sem IV
Course Code	5EN671
Course Name	Techno-Socio Activity
Desired Requisites:	

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

Course Objectives	
1	To record student performance in co-curricular and extra-curricular activities over four years will be considered.
2	To encourage the students to participate in activities that help develop leadership skills, team integrity, coordination skills, Time management, Communications skills, Interviewing skills etc.
3	To highlight importance of social responsibility.

Course Outcomes (CO) with Bloom's Taxonomy Level At the end of the course, students will be able to,		
CO1	Notice an improvement in his/her understanding and presentation skills.	Apply
CO2	Understand and value the importance of working in a diversified team.	Analyze
CO3	Demonstrate the soft skills like presentation skills, technical report writing etc.	Evaluate

Course Contents

The guide will be mentoring a given student batch for the duration of two years. The students shall submit proof of their achievements in various extra and co-curricular activities related to technical, cultural and social causes from first year to second year. The faculty will evaluate the students' performance at the end of 4thsemester, based on the rubrics provided by the department from time to time.

Text Books	
1	Not applicable

References	
1	Not applicable

Useful Links	
1	Not applicable

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

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	10	10	10	**30**
Analyze	10	10	15	**35**
Evaluate	10	10	15	**35**
Create				
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*	
AY 2021-22	
Course Information	
Programme	M.Tech. (Electronics Engineering)
Class, Semester	Second Year M.Tech., Sem III

Course Code		5EN621			
Course Name		Professional Elective 6 -DSP Architectures			
Desired Requisites:		Digital signal processing			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives	
1	Identify and formalize architectural level characterization of P-DSP hardware
2	Ability to design, programming (assembly and C), and testing code using Code Composer Studio environment
3	Deployment of DSP hardware for Control, Audio and Video Signal processing Applications
4	Understanding of major areas and challenges in DSP based embedded systems

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	After the completion of the course the student should be able to	Illustrate
CO2	Illustrate the DSP hardware architecture	Illustrate
CO3	Develop applications using assembly and C with DSP processors	Develop
CO4	Develop FPGA based DSP systems	Develop
CO5	Create High Performance Computing systems using P-DSP	Illustrate

Module	**Module Contents**	**Hours**
I	**Module 1 :** Programmable DSP Hardware Processing Architectures (von Neumann, Harvard), DSP core algorithms (FIR, IIR, Convolution, Correlation, FFT), IEEE standard for Fixed and Floating Point Computations, Special Architectures Modules used in Digital Signal Processors (like MAC unit, Barrel shifters), On-Chip peripherals, DSP benchmarking.	4
II	**Module 2:** Structural and Architectural Considerations Parallelism in DSP processing, Texas Instruments TMS320 Digital Signal Processor Families, Fixed Point TI DSP Processors: TMS320C5414 Family, Internal Architecture, Arithmetic and Logic Unit, Auxiliary Registers, Addressing Modes (Immediate, Direct and Indirect, Bit-reverse Addressing), Basics of TMS320C55XX DSP Architecture, Memory Map, Interrupt System, Peripheral Devices, Illustrative Examples for assembly coding.	8

III	**Module 3 :** VLIW Architecture: Current DSP Architectures, GPUs as an alternative to DSP Processors, TMS320C6X Family, Addressing Modes, Replacement of MAC unit by ILP, Detailed study of ISA, Assembly Language Programming, Code Composer Studio, Mixed C and Assembly Language programming, On-chip peripherals, Simple applications developments as an embedded environment.	6
IV	**Module 4:** Multi-core DSPs: Introduction to Multi-core computing and applicability for DSP hardware, Concept of threads, introduction to P-thread, mutex and similar concepts, heterogeneous and homogenous multi-core systems, Shared Memory parallel programming – OpenMP approach of parallel programming, PRAGMA directives, OpenMP Constructs for work sharing like for loop, Sections, TI TMS320C6678 (Eight Core subsystem).	6
V	**Module 5:** FPGA based DSP Systems Limitations of P-DSPs, Requirements of Signal processing for Cognitive Radio (SDR), FPGA based signal processing design-case study of a complete design of DSP processor.	8
VI	**Module 6:** High Performance Computing using P-DSP: Preliminaries of HPC, MPI, OpenMP, multicore DSP as HPC infrastructure	4

Text Books	
1	Rohit Chandra, Ramesh Menon, Leo Dagum, David Kohr, DrorMaydan, Jeff McDonald,"Parallel Programming in OpenMP", 1st Edition, Morgan Kaufman,2000.
2	Ann Melnichuk,Long Talk, "Multicore Embedded systems", 1st Edition, CRC Press,2010.
3	Wayne Wolf, "High Performance Embedded Computing: Architectures, Applications and Methodologies", 1st Edition, Morgan Kaufman, 2006.
References	
1	M. Sasikumar, D. Shikhare, Ravi Prakash, "Introduction to Parallel Processing", 1st Edition, PHI, 2006.
2	Fayez Gebali, "Algorithms and Parallel Computing",1st Edition, John Wiley & Sons, 2011
3	E.S.Gopi, "Algorithmic Collections for Digital Signal Processing Applications Using MATLAB", 1st Edition, Springer Netherlands,2007.
4	Website ti.com
Useful Links	
1	NPTEL Lectures

CO-PO Mapping															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1			2												
CO2				2											
CO3	2														
CO4	1														
CO5			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
The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember				
2	Understand				
3	Apply	20	10	30	60
4	Analyze		10	30	40
5	Evaluate				
6	Create				
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2021-22					
Course Information					
Programme	M.Tech. (Electronics Engineering)				
Class, Semester	Second Year M. Tech., Sem IV				
Course Code	5EN622				
Course Name	Professional Elective 6 - Deep Learning				
Desired Requisites:	Probability & statistics				
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				

Interaction	-	Credits: 3

Course Objectives	
1	To understand various key paradigms for machine learning approaches
2	To familiarize with the mathematical and statistical techniques used in machine learning
3	To understand and differentiate among various machine learning techniques
4	

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	To formulate a machine learning problem.	Understand
CO2	Apply pattern recognition and machine learning techniques such as classification and feature selection.	Apply
CO3	To compare different artificial neural network algorithms.	Analyze
CO4		

Module	Module Contents	Hours
I	**Introduction**: Definitions, Datasets for Machine Learning, Different Paradigms of Machine Learning, Data Normalization, Hypothesis Evaluation, VC-dimensions and Distribution, Bias-Variance Tradeoff, Regression	7
II	**Bayes Decision Theory**: Bayes decision rule, Minimum error rate classification, Normal density and discriminant functions. Parameter Estimation: Maximum Likelihood and Bayesian Parameter Estimation	7
III	**Discriminative Methods**: Distance-based methods, Linear Discriminant functions, Decision Tree, Random Decision Forest and Boosting.	8
IV	**Feature Selection and Dimensionality Reduction**: Principle component analysis, Linear Discriminant Analysis, Independent component analysis, Sequential floating forward Selection, Sequential floating Backward Selection, Clustering: k-means clustering, Gaussian Mixture Modeling, Expectation Maximization algorithm.	8
V	**Artificial Neural Networks**: Multilayer Perceptron, Back propagation , and Rdial Basis Function-Net	5
VI	**Foundations of Deep Learning**: Deep Neural Network, Convolutional Neural Network, Autoencoders	5

Text Books	
1	Shalev-Shwartz,S., Ben-David,S., (2014), Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press
2	R. O. Duda, P. E. Hart, D. G. Stork (2000), Pattern Classification, Wiley-Blackwell, 2nd Edition
3	
4	

References	
1	Mitchell Tom (1997). Machine Learning, Tata McGraw-Hill.
2	C. M. BISHOP (2006), Pattern Recognition and Machine Learning, Springer-Verlag New York,

	1st Edition
3	
4	

Useful Links	
1	Department of Computer Science, Stanford University, https://see.stanford.edu/Course/CS229
2	https://www.coursera.org/
3	https://nptel.ac.in/
4	

CO-PO Mapping															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3														
CO2			3												
CO3				2											
CO4															
CO5															
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
The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember				
2	Understand	10		20	**30**
3	Apply	10	10	20	**40**
4	Analyze		10	20	**30**
5	Evaluate				
6	Create				
Total		**20**	**20**	**60**	**100**