Department of Automation and Robotics

BOS Meeting Details for the Last Five Years

KLE Technological University

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Minutes of 2016 BOS Meeting

02nd April 2016

Agenda

Sl.No	Points to discuss	Documents
1.	Identification of verticals of the department as Automation & Robotics	Curriculum structure & Syllabus
2.	Identification of Program specific Core subjects	
3.	Identification of Essential electives	
4.	Identification of subjects	
5.	Reduction of the credits from 200 to 176	
6.	Review of Syllabus of III & IV Semesters for 2015-19	
7.	Review of Syllabus of V & VI Semesters for 2015-19	
8.	Review of Syllabus of VII & VIII Semesters for 2015-19	
9.	Other points	

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General Points:

Sl.No	Points raised	Changes made	Raised By
1.0 General points	• HOD welcomed members of BOS-2016 • Identified verticals of the department as Mechatronics ,Automation & Informatics & Control under curriculum for A&R program under KLE University. • Identification of Program specific Core subjects And electives • Discussed the subjects prescribed for Minor in Robotics , which is a 15 credit program.	Review done and action planned	Mr. Jitendrakumar Kataria, MD Beckhoff Automation Pvt.,Ltd,. Pune. Somashekhar. Hiremath , IIT Chennai Dr Dhanesh N Manik, IIT Mumbai
2.0 Review of minutes of Previous BOS	• Reviewed the syllabus and action plan .	Reviewed & found OK	
3.0 General points **Curriculum & Syllabus of 2015-19**	• Reviewed the subjects prescribed for III & IV semester. • There is a need to plan an orientation program to all students about the prerequisites needed for every subject prescribed at the beginning of each semester. • Reviewed the syllabus structure, sequence of flow and assignment of credits for the subjects under III semester. • Division of topics under modules can be implemented for easier and effective implementation of syllabus. • Collaboration of teaching faculty members taking related subjects to happen in order to decide on the syllabus before freezing and understand the prerequisites for each subject. • Discussed about the distribution of CIE and SEE marks	Review done and action planned	Mr. Jitendrakumar Kataria, MD Beckhoff Automation Pvt.,Ltd,. Pune. Somashekhar. Hiremath , IIT Chennai Dr Dhanesh N Manik, IIT Mumbai

	and the activities planned under subjects apart from Minor Exams. • To plan for more number of quizzes to monitor progress of student learning. • Only one Course project can be planned under each semester so that the requirements under each subject can be addressed. • Planned to have some subjects like Industrial IOT, Industrial Data networks, Industrial Control Systems conducted by Industry experts and evaluation done through projects instead of semester end exam.		
4.0	• Review of curricular structure & syllabus of III & IV Semesters for 2015-19 done as per the changes suggested by external and internal members.	Review done and action planned	Mr. Jitendrakumar Kataria, MD Beckhoff Automation Pvt.,Ltd,. Pune. Somashekhar. Hiremath , IIT Chennai Dr Dhanesh N Manik, IIT Mumbai
5.0	• Review of curricular structure & syllabus of V & VI Semesters for 2015-19 done as per the changes suggested by external and internal members.		
6.0	• Review of curricular structure & syllabus of VII & VIII Semesters for 2015-19 done as per the changes suggested by external and internal members.		

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Changes made in Curriculum Content for batch, 2015-19 in VIIIth BOS held in HOD Room, A&R dept. on 02nd April 2016

Approved by:

Sl No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson ,HOD, Dept. A&R	
2	Dr. Somashekhar. Hiremath , IIT Chennai	
3	Mr.Jitendrakumar. Kataria MD Beckhoff Automation India Pvt.,Ltd,. Pune.	
4	Prof. Dhanesh Manik Department of Mechanical Engineering IIT, Mumbai	
5	Mrs. Jyoti. S. Bali, Asst. Prof. Dept. A&R	
6	Mr. Vinodkumar. V. Meti, Asst. Prof. Dept. A&R	
7	Mrs. Manjula P P, Asst. Prof. Dept. A&R	

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Resolutions made at 8th BOS meeting held on 02nd April 2016

Time: 10.00 am to 4.30 pm

Venue: HOD Room, Dept .of Automation & Robotics

1.0 Resolved to approve III & IV semesters for 2015-19 batch with changes suggested.

2.0 Resolved to approve V & VI semesters for 2015-19 batch with changes suggested.

3.0 Resolved to approve VII & VIII semesters for 2015-19 batch with changes suggested.

Changes made in Curriculum Content for batches 2013-17, 2014-18 and 2015-19 in VIIIth BOS held in HOD Room, Dept .of Automation & Robotics on 02nd April 2016

Approved By:

Sl No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson ,HOD, Dept of A&R	
2	Dr. Somashekhar. Hiremath , IIT Chennai	
3	Mr.Jitendrakumar. Kataria MD Beckhoff Automation India Pvt.,Ltd,. Pune.	
4	Prof. Dhanesh Manik Department of Mechanical Engineering , IIT Mumbai	
5	Mrs. Jyoti. S. Bali, Asst. Prof. Dept of A&R	
6	Mr. Vinodkumar. V. Meti, Asst. Prof. Dept of A&R	
7	Mrs. Manjula P P, Asst. Prof. Dept of A&R	

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Department of Automation and Robotics Structure of Board of Studies 2016-17
02nd April 2016

S. No.	Category	Nomination of the Committee		Name of the Person	Signature
1	Concerned Head of the Department/ School/ Center	Chairperson	1	Arunkumar C Giriyapur	
2	ONE Professor, ONE Associate Professor and ONE Assistant Professor from the Department/ School/ Center, nominated by the Dean Academic Affairs	Members	1	Mrs Jyoti Bali	
			2	Mrs Manjula P.P	
			3	Vinod Meti	
3	ONE PG Coordinator for each of the PG programmes offered by the Department/ School/ Center	Member(s)	1		
			2		
3	TWO Subject experts from outside the college nominated by the Vice-Chancellor	Members	1	Dr Somashekar Hiremath	
			2	Dr Dhanesh N Manik	
4	TWO representative from industry corporate sector/ allied area relating to placement nominated by the Vice-Chancellor	Members	1	Mr Jitendra Kataria, Beckhoff Automation India Pvt. Ltd.	
			2		
5	ONE Post-graduate meritorious alumnus nominated by the Vice-Chancellor	Member	1		
6	ONE Student Member representing each of the program offered by the Department/ School/ Center	Invited Member	1	UG Student (Not Applicable at present)	
			2	PG Student (Not Applicable at present)	
			3	PhD Student (Not Applicable at present)	

The concerned Chairman of Board of Studies may invite additional experts to the Departmental Board of Studies as deemed fit.

A Departmental Board of Studies shall:
Meet at least once a year, sufficiently before the commencement;
Prepare detailed curricula and syllabi of concerned Programmes and submit to the Academic Council for approval and publication; and
Revise the curricula and syllabi from time to time and submit to the Academic Council for approval and publication

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document# :FMCD2006	Rev:1.0
Review-Curriculum Design and Development			Page of Year

2015-19 Batch Date of Review:02/04/2016

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours	✓		
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents		✓	
b	Unitization	✓		
c	Reference books		✓	
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
1.	To plan an orientation classes to take up pre requisites
2	Division of topics under each subject for easier implementation
3.	To plan for one course project under a semester for having alignments to the unit under each subject

Reviewed by (use initials)	ACG	SSH	JPK	DNM	JSB	VM	MPP				
Signature											

KLE Technological University — Creating Value, Leveraging Knowledge (KLE TECH.)	FORM ISO 9001:2008- BVBCET Department of A & R Engineering	Document # : FMCD2003	Rev:1.0
Title: Curriculum Structure- Overall			Page of Year:

	Semester 2015-19 Batch					
Course with course code	III	IV	V	VI	VII	VIII
	Statistics and integral transforms Calculus and integral transforms	Numerical Methods and partial differential equations Vector calculus and differential				
	Analog & Digital Electronic circuits	Kinematics of Machinery				
	Mechanics of Materials	Control system				
	Manufacturing Technology & Metrology	Engineering Design				
	Problem solving and programming - I	Machine Design				
	Programming Lab -1	Microcontrollers				
	Machine Drawing Lab	Manufacturing & Metrology lab				
	Analog/ Digital electronics lab	Microcontroller Lab				
		Kinematics lab				

Approved by (Use Initials)	ACG	SSH	DNM	JPK	SSB	VM	MP						
Signature													

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FORM

ISO 9001: 2008 – BVBCET

Department of A & R Engineering

Document #: FMCD2007

Title: Verification-Curriculum Design and Development

Sr.No	Agenda	Inputs from members	Decisions
1	**Overall scheme of the program**		
a	Credits	Advice for minor changes	Accepted with changes
b	Flow	Suggested modification in some places	Accepted with minor changes.
c	Contact hours	Found ok	Accepted
2	**Semester wise curriculum structure**		
a	Credits	Verified & found ok.	Accepted.
b	Flow	No deviation suggested	Accepted with minor changes
c	Contact hours	Found ok.	Accepted
d	Evaluation scheme	Verified & found ok.	Accepted.
3	**Course contents**		
a	Subject contents	Verified for each subject	Accepted.
b	Unitization	Found ok.	Accepted.
c	Reference books	Suggestions on inclusion of books.	Accepted with small changes
d	Evaluation method	found ok	Accepted.

Members (Use Initials)	ACG	SSH	JPK	DNM	JSB	VM	MP			
Signature										

A: Accepted AMC: Accepted under Minor Changes NA: Not Accepted

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31ST March 2018

Agenda

Sl.No	Points to discuss	Documents
1.	Introduction & Review of Actions initiated from previous BOS meeting	Curriculum structure & Syllabus
2.	Review of modifications recommended by the Academic Council or the Principal after BOS 2018.	
3.	General Points	
4.	Review and approval of Syllabi for VII & VIII Semester of the batch 2015-19 , KLE Tech.	
5.	Review and approval of Syllabi for V & VI Semester of the batch 2016-20 , KLE Tech.	
6.	Review and approval of Syllabi for III & IV Semester of the batch 2017-21 , KLE Tech.	
7.	Other points	

Minutes Prepared by

Jyoti Bali

Prof. A. C. Giriyapur

Chairperson, HOD, A&R

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Sl.No	Points raised	Changes made	Raised By
1.0 General points	• HOD welcomed members of Third BOS-2018 for KLE Tech • Reviewed the minutes of BOS 2017 • Review of modifications recommended by the Academic Council or the Principal after BOS 2017. • Reviewed the verticals of the department • Reviewed the curriculum structure and credit distribution • Briefing of Students achievements 1. Participation of Student Team on Delta Robot exhibited at FIESTA-2017 in South Korea 2. Student Participation in Robocon-2018 at Pune, entered Super League round for the first time 3. Development of Basic version of Humanoid Robot under capstone project 4. Projects problems taken up for VRL Transport Company	Review done and action planned	Mr. Jitendra Kataria, Beckhoff Automation, Pvt.,Ltd. Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai
2.0 Curriculum & Syllabus	• **Review of Syllabi for III & IV Semester of the batch 2017-21, KLE Tech.** • Sufficient number of hard copies of books in library to be kept for every subject. • Reviewed Syllabus of Kinematics of Machinery theory and Lab was appreciated. • Briefed about the event Hackathon conducted for the subject Algorithm Analysis & Program Design (AAPD) • As per Academic Council suggestion, Engineering Design introduced at III semester followed by Product Realization subject. • No much major changes suggested in III & IV Sem Syllabus theory content.	Review done and action planned	Mr. Jitendra Kataria, Beckhoff Automation, Pvt. Ltd Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai

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1.0 General points	• HOD welcomed members of Third BOS-2018 for KLE Tech • Reviewed the minutes of BOS 2017 • Review of modifications recommended by the Academic Council or the Principal after BOS 2017. • Reviewed the verticals of the department • Reviewed the curriculum structure and credit distribution • Briefing of Students achievements 1. Participation of Student Team on Delta Robot exhibited at FIESTA-2017 in South Korea 2. Student Participation in Robocon-2018 at Pune, entered Super League round for the first time 3. Development of Basic version of Humanoid Robot under capstone project 4. Projects problems taken up for VRL Transport Company	Review done and action planned	Mr. Jitendra Kataria, Beckhoff Automation, Pvt.,Ltd. Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai
2.0 Curriculum & Syllabus	• **Review of Syllabi for III & IV Semester of the batch 2017-21, KLE Tech.** • Sufficient number of hard copies of books in library to be kept for every subject. • Reviewed Syllabus of Kinematics of Machinery theory and Lab was appreciated. • Briefed about the event Hackathon conducted for the subject Algorithm Analysis & Program Design (AAPD) • As per Academic Council suggestion, Engineering Design introduced at III semester followed by Product Realization subject. • No much major changes suggested in III & IV Sem Syllabus theory content.	Review done and action planned	Mr. Jitendra Kataria, Beckhoff Automation, Pvt. Ltd Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai

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3.0	• **Review of Syllabi for V & VI Semester of the batch 2016-20 , KLE Tech.** • Prerequisites to be mentioned for only electives, not for core subjects. • Reviewed Syllabus of Robot Analysis & Design and advised to stick to the same syllabus and do small changes, wherever required.		
	Summary of the changes proposed for different Courses: **2016-20, V Sem** OOP and Python Practice - 16EARP305 (48 hours) Experiments added are OOP fundamentals (6 hrs), concept of arrays, Strings and String Buffer class and exception Handling (6 hrs), swings, (6 hrs) concept of Generic class, Inheritance, Interface and Package (6 hrs), concepts of python scripting elements python constructs, data structures(6 hrs), concept of functions, modules, packages and regular expressions(6 hrs), Python scripting elements and constructs, data structures, and repository of standard library(6 hrs), Solving a Maze problem(6 hrs) DBMS Practice 16EARP306 (48 hours) To improve the database designing proficiency topics were added and practised are -Data base design principles[12hrs],Creation and updation of database[12hrs],Queries-various clauses like joint ,aggregate operations[14hrs],Normalization rules-Normal form,2nd normal form,3rd normal form and BCNF form[10hrs] . Batch 2016-20, VI Sem Power Electronics, Motors & Drives 16EARE301 (20 hours) CHAPTER1. INTRODUCTION TO PE AND ELECTRIC DRIVE SYSTEMS Peripheral Effects, Characteristics and Specifications of Switches--5 hrs. CHAPTER NO. 3. THYRISTORS AND COMMUTATION THEORY: Natural and Forced Commutation – Class A and Class B types, Gate Trigger Circuit: Resistance Firing Circuit, Resistance capacitance firing circuit-5 hrs. CHAPTER NO. 4. STATIC		Mr. Jitendra Kataria, Beckhoff Automation, Pvt. Ltd Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai

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	SWITCHES AND POWER SUPPLIES Single phase ac static switches, three phase ac static switches, three phase reversing switches, Solid state relays, Design of static switches, DC power supplies, DC Switched Mode DC power supplies, bidirectional power supplies, Switched Mode AC power supplies -5 hrs.CHAPTER NO. 7. STEPPER MOTOR :Principles and Applications of Stepper motor.-5 hrs Hydraulics and Pneumatics Lab 16EARP302 (12 hours) - Few topics are newly added to the current syllabus based on the inputs from the department review committee and topics added are - Simulation and analysis of fluid power circuit using MATLAB (6 Hours), Exercise on Hydraulic accumulator, Sequential control of drives, control of hydraulic circuits using logic gates (6 Hours). **Batch 2017-21 , III Sem** Algorithm Analysis & Program Design 17EARC203 (12 hours) Topics related to dynamic and greedy methods [12 hrs] were added-Depth First Search and Breadth First Search, The General Method, Warshall's Algorithm, Floyd's Algorithm for the All-Pairs Shortest Paths Problem, Single-Source Shortest Paths, The Traveling Salesperson problem, Kruskal's algorithm, Huffman trees. Analysis of the algorithms were added. **Batch 2017-21 , IV Sem** Microcontrollers 17EARC207 (12 hours) Topics related to AVR Microcontrollers [2 hours] high end processors: architecture and pin definitions of 80386 and 80486, EFLAG Register Of The 80486, 80486 Memory System, Real Address Mode [5 hours] and programming microcontrollers using python: Design Philosophy ,Exploring MicroPython, Object-Oriented Programming and Some Python Basics, Using MicroPython with a Pyboard [5 hours] were introduced.		Mr. Jitendra Kataria, Beckhoff Automation, Pvt. Ltd Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai

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	Control Systems 17EARC209 (12 hours) Topics related to introduction to time response namely Poles, Zeros, and System Response, First-order system response to step, ramp and impulse inputs was added.(6 hrs) Introduction to PID controller design: Types of Controllers, Mathematical modeling of PID, ON-OFF controller, Effect of Proportional, Derivative and Integral elements on system behavior, Design of controller for simple applications.(4 hrs). Topics related to state space content was added. The General State-Space Representation, Applying the State-Space Representation. (2 hrs) Microcontrollers Lab 17EARP207 (8 hours) To get hands-on experience on PCB design and fabrication exercises related to Design a development board using Atmega328 or PIC 18 using eagle/ Dip-trace [3 hours], Develop a printed circuit board (PCB) for your designed Atmega328 or PIC18 development board[2hours], Design a programmer for your PIC18 development board to burn the program using PICkit2[3 hours]		
4.0	• **Review and approval of Syllabi for VII & VIII Semester of the batch 2015-19 , KLE Tech.** • Reviewed core subjects and electives prescribed • Subject to be named as Mechanical Measurements for the VI semester core course • Changes in the syllabus content of elective Industrial Data Networks to be proposed and sent to external BOS members for approval. • Additional electives with syllabus to be proposed for BOS approval. • External BOS members suggested for choosing Titles of the subjects carefully. • Reviewed Syllabus of electives, Manufacturing Execution Systems and suggested to streamline the objectives of the course.		Mr. Jitendra Kataria, Beckhoff Automation, Pvt.,Ltd Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai

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	• Reviewed syllabus of Parallel Computing and suggested for inclusion of practice using soft PLC to demonstrate parallel computing • Suggested to launch Open Electives from Dept.		

Changes made in Curriculum Content for III and IV Semester of batch 2017-21, IV & V Semester of the batch 2016-20, VII & VIII Semester of the batch 2015-19, in III BOS held in HOD Room, A&R dept. on 31st March 2018

Approved by:

Sl No	Members, BOS	Signature
1.	Prof. A. C. Giriyapur, Chairperson, HOD, A&R	
2.	Dr. Somashekhar. Hiremath , IIT Chennai	
3.	Mr. Jitendra Kataria, Beckhoff Automation Pvt. Ltd.	
4.	Prof. Dhanesh Manik, Dept. of Mechanical Engineering , IIT, Mumbai	
5.	Mrs. Jyoti Bali, Asst. Prof. A&R	
6.	Mr. Vinodkumar Meti, Asst. Prof. A&R	
7.	Mr. Nagaraj B. Asst. Prof. A&R	
8.	Mr. Shridhar D. Asst. Prof. A&R	

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Resolutions Made During the 3rd Board of Studies Meeting held on 1st April 2017 , in HOD Room, A&R dept. on 31st March 2018

1.0 Resolved to approve Syllabi for III and IV Semester of batch 2017-21, KLE Tech. as per the changes suggested by external and internal members

2.0 Resolved to approve Syllabi for, V & VI Semester of the batch 2016-20, KLE Tech. as per the changes suggested by external and internal members

3.0 Resolved to approve Syllabi for, VII & VIII Semester of the batch 2015-19, KLE Tech. as per the changes suggested by external and internal members

Changes made in Curriculum Content for III and IV Semester of batch 2017-21, V & VI Semester of the batch 2016-20, VII & VIII Semester of the batch 2015-19, in III BOS held in HOD Room, A&R dept. on 31st March 2018

Approved by:

Sl No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson, HOD, A&R	
2	Dr. Somashekhar. Hiremath , IIT Chennai	
3	Mr. Jitendra Kataria, Beckhoff Automation Pvt. Ltd.	
4	Prof. Dhanesh Manik, Dept. of Mechanical Engineering , IIT, Mumbai	
5	Mrs. Jyoti Bali, Asst. Prof. A&R	
6	Mr. Vinodkumar Meti, Asst. Prof. A&R	
7	Mr. Nagaraj B. Asst. Prof. A&R	
8	Mr. Shridhar D. Asst. Prof. A&R	

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KLE Society's
KLE Technological University
DEPARTMENT OF AUTOMATION & ROBOTICS

Department of Automation & Robotics
Structure of Board of Studies 2018-19 01st April 2018

S. No.	Category	Nomination of the Committee		Name of the Person	Signature
1	Concerned Head of the Department/ School/ Center	Chairperson	1	Arunkumar C Giriyapur	
2	ONE Professor, ONE Associate Professor and ONE Assistant Professor from the Department/ School/ Center, nominated by the Dean Academic Affairs	Members		Mrs Jyoti Bali	
				Mr Vinod Meti	
				Mr. Nagaraj.M.B	
				Mr. Shridhar D	
3	ONE PG Coordinator for each of the PG programmes offered by the Department/ School/ Center	Member(s)	1		
			2		
3	TWO Subject experts from outside the college nominated by the Vice-Chancellor	Members	1	Dr Somashekar Hiremath IIT Chennai	
			2	Dr Dhanesh N Manik IIT Mumbai	
4	TWO representative from industry corporate sector/ allied area relating to placement nominated by the Vice-Chancellor	Members	1	Mr. Jitendra Kataria, Beckhoff Automation Pvt. Ltd. Pune	
			2		
5	ONE Post-graduate meritorious alumnus nominated by the Vice-Chancellor	Member	1		
6	ONE Student Member representing each of the program offered by the Department/ School/ Center	Invited Member	1	UG Student (Not Applicable at present)	
			2	PG Student (Not Applicable at present)	
			3	PhD Student (Not Applicable at present)	

The concerned Chairman of Board of Studies may invite additional experts to the Departmental Board of Studies as deemed fit.

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Prepare detailed curricula and syllabi of concerned Programmes and submit to the Academic Council for approval and publication; and
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DEPARTMENT OF AUTOMATION & ROBOTICS

Department of Automation & Robotics
Structure of Board of Studies 2018-19 01st April 2018

S. No.	Category	Nomination of the Committee		Name of the Person	Signature
1	Concerned Head of the Department/ School/ Center	Chairperson	1	Arunkumar C Giriyapur	
2	ONE Professor, ONE Associate Professor and ONE Assistant Professor from the Department/ School/ Center, nominated by the Dean Academic Affairs	Members		Mrs Jyoti Bali	
				Mr Vinod Meti	
				Mr. Nagaraj.M.B	
				Mr. Shridhar D	
3	ONE PG Coordinator for each of the PG programmes offered by the Department/ School/ Center	Member(s)	1		
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3	TWO Subject experts from outside the college nominated by the Vice-Chancellor	Members	1	Dr Somashekar Hiremath IIT Chennai	
			2	Dr Dhanesh N Manik IIT Mumbai	
4	TWO representative from industry corporate sector/ allied area relating to placement nominated by the Vice-Chancellor	Members	1	Mr. Jitendra Kataria, Beckhoff Automation Pvt. Ltd. Pune	
			2		
5	ONE Post-graduate meritorious alumnus nominated by the Vice-Chancellor	Member	1		
6	ONE Student Member representing each of the program offered by the Department/ School/ Center	Invited Member	1	UG Student (Not Applicable at present)	
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KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2006	Rev: 1.0
Review-Curriculum Design and Development			Page 1 of 1 Year:2018

2015- 19 Batch

Date of Review:01/04/2018

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
d	Evaluation scheme		✓	
03	**Course contents**			
a	Subject contents		✓	
b	Unitization	✓		
c	Reference books		✓	
d	Evaluation method		✓	

Changes Suggested (Serial number wise)	
1)	Verified syllabus of Robot Dynamics & Control & suggested necessary changes
2)	Suggested to add sufficient copies of textbooks & Reference books in Library
3.	Activities planned & Evaluation methods planned verified & found ok

Reviewed by (Use initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr .Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature		Dhanesh Manik			J S Bali			

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2006	Rev: 1.0
Review-Curriculum Design and Development			Page 1 of 1 Year:2018

2016- 20 Batch

Date of Review:01/04/2018

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
d	Evaluation scheme			
03	**Course contents**			
a	Subject contents		✓	
b	Unitization	✓		
c	Reference books		✓	
d	Evaluation method		✓	

Changes Suggested (Serial number wise)	
1.	Checked for credit distribution of specific subjects & found ok.
	Verified content of Robot analysis & Design & suggested
2	Suggested changes in the flow of the subjects change
	content & verified for necessary changes
3.	Evaluation methods & activities planned
	under various courses discussed.

Reviewed by (Use initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr .Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2006	Rev: 1.0
Review-Curriculum Design and Development			Page 1 of 1 Year:2018

2017- 21 Batch

Date of Review:01/04/2018

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
d	Evaluation scheme			
03	**Course contents**			
a	Subject contents		✓	
b	Unitization	✓		
c	Reference books		✓	
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
1.	Credit distribution for courses verified & found ok
2.	Checked for flow of the subject content, suggested changes wherever required
3.	Contact hours for chapter wise content verified & found ok
4.	Evaluation scheme rubrics verified & found ok
5.	Sufficient copies of books both Textbook & reference book to be maintained

Reviewed by (Use initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr .Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University — Creating Value, Leveraging Knowledge	FORM ISO 9001:2008- BVBCET Department of Automation & Robotics	Document # : FMCD2003	Rev:1.0
	Title: Curriculum Structure- Overall		Page of Year:2018

Semester 2017-21 Batch

Course with course code

III	IV	V	VI	VII	VIII
Analog & Digital Electronic circuits	Kinematics of Machinery				
Mechanics of Materials	Control system				
Manufacturing Technology & Metrology	Machine Design				
Engineering Design Practise	Microcontrollers				
Algorithm analysis & program design	Product Realization				
Machine Drawing Lab	Manufacturing & Metrology lab				
Analog & Digital electronics lab	Microcontroller Lab				
Statistics And Integral Transforms	Kinematics lab				
Calculus And Integral Transforms	Numerical methods and partial differential equations				
	Vector calculus and differential equations				

Approved by (Use Initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University Creating Value Leveraging Knowledge	FORM ISO 9001:2008- BVBCET Department of Automation & Robotics	Document # : FMCD2003	Rev:1.0
	Title: Curriculum Structure- Overall		Page of Year:2018

Semester 2016-20 Batch

Course with course code	III	IV	V	VI	VII	VIII
	Analog & Digital Electronic circuits	Kinematics of Machinery	Robot Analysis & Design	Real Time Embedded Systems		
	Mechanics of Materials	Microcontrollers	Hydraulics & Pneumatic	OOP & Python Practice		
	Manufacturing Technology	Machine Design	Mechatronics System Design	DBMS Practice		
	Algorithm analysis & program design	Control systems	Programming Industrial Automation	Power Electronics Motors and Drives (Department elective)		
	Engineering Design	Product Realization	Mechatronics Lab	Computer Vision & Digital Image Processing (Department elective)		
	Analog & Digital electronics lab	Manufacturing & Metrology lab	Automation Lab	Computer-Integrated Manufacturing (Department elective)		
	Statistics And Integral Transforms	Kinematics lab	Mini Project	Robotics Lab		
	Calculus And Integral Transforms	Microcontroller Lab	Numerical Methods And Statistics	Hydraulics & Pneumatics Lab		
		numerical methods and partial differential equations		Real Time Embedded Systems Lab		
		vector calculus and differential equations		Minor project		

Approved by (Use Initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University Creating Value Leveraging Knowledge	FORM ISO 9001:2008- BVBCET Department of Automation & Robotics	Document # : FMCD2003	Rev:1.0
Title: Curriculum Structure- Overall			Page of Year:2018

Semester 2015-19 Batch

Course with course code

III	IV	V	VI	VII	VIII
Analog & Digital Electronic circuits	Kinematics of Machinery	Robot Analysis & Design	Real Time Embedded Systems	Measurements	Department elective
Mechanics of Materials	Control system	Hydraulics & Pneumatic	OOP & Python Practice	Robot Dynamics, Control and Parallel Manipulators	Department elective
Manufacturing Technology & Metrology	Machine Design	Mechatronics System Design	DBMS Practice	Parallel Computing (Department elective)	Open Elective
Algorithm analysis & program design	Microcontrollers	Programming Industrial Automation	Power Electronics Motors and Drives	Manufacturing Execution Systems (Department elective)	HSS 3 – AFM
Machine Drawing Lab	Engineering Design Practice	Mechatronics Lab	Computer Vision & Digital Image Processing	Open Elective	Project -2
Analog & Digital electronics lab	Manufacturing & Metrology lab	Automation Lab	Computer-Integrated Manufacturing	HSS 2 – MTP	
Statistics And Integral Transforms	Microcontroller Lab	Mini Project	Robotics Lab	CIPE	
Calculus And Integral Transforms	Kinematics lab	Numerical Methods And Statistics	Hydraulics & Pneumatics Lab	Project -1	
	Numerical methods and partial differential equations		Real Time Embedded Systems Lab		
	Vector calculus and differential equations		Minor project		

Approved by (Use Initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2007	Rev: 1.0
Title: Verification-Curriculum Design and Development 2017-21 Batch			Page : 1 of 1 Year:2018

Sr.No	Agenda	Inputs from members	Decisions	Verification status		
				A	AMC	NA
1	**Overall scheme of the program**					
a	Credits	Checked credit distribution	Found ok	✓		
b	Flow	ICOM, ADC verified	Found ok	✓	✓	
c	Contact hours		Verified & found ok	✓		
2	**Semester wise curriculum structure**					
a	Credits	–	checked, found ok	✓		
b	Flow	–	" "		✓	
c	Contact hours	–	" "	✓		
d	Evaluation scheme	–	"	✓		
3	**Course contents**					
a	Subject contents		Verified & found ok	✓		
b	Unitization		Verified & found ok	✓		
c	Reference books	To add sufficient books under each subject			✓	
d	Evaluation method	–	Verified & found ok	✓		

Members (Use Initials)	Dr. Somashekhar Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	Prof A.C.Giriyapur	Mrs Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr.Shridhar D
Signature		Dhanesh Manik			J S Bali	Vinod		

A: Accepted AMC: Accepted under Minor Changes NA: Not Accepted

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2007	Rev: 1.0
Title: Verification-Curriculum Design and Development 2016-20 Batch			Page : 1 of 1 Year:2018

Sr.No	Agenda	Inputs from members	Decisions	Verification status		
				A	AMC	NA
1	**Overall scheme of the program**					
a	Credits	checked distribution of credits	Approved	✓		
b	Flow	Suggested changes in some subjects	Verified & approved for changes.	✓		
c	Contact hours	–	Verified & Approved.	✓		
2	**Semester wise curriculum structure**					
a	Credits	checked for few subjects	Verified & Approved.			
b	Flow	Checked for flow		✓		
c	Contact hours	–		✓		
d	Evaluation scheme	–		✓		
3	**Course contents**					
a	Subject contents	Verified	Approved	✓		
b	Unitization	Verified	Approved.	✓		
c	Reference books	Verified	Approved with minor changes	✓	✓	
d	Evaluation method	Verified	Approved	✓		

Members (Use Initials)	Dr. Somashekhar Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	Prof A.C.Giriyapur	Mrs Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr.Shridhar D
Signature								

A: Accepted AMC: Accepted under Minor Changes NA: Not Accepted

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2007	Rev: 1.0
Title: Verification-Curriculum Design and Development 2015-19 Batch			Page : 1 of 1 Year:2018

Sr.No	Agenda	Inputs from members	Decisions	Verification status		
				A	AMC	NA
1	**Overall scheme of the program**					
a	Credits	checked	Verified & found ok	✓		
b	Flow	Verified flow	found ok	✓		
c	Contact hours	checked distributions	found ok.	✓		
2	**Semester wise curriculum structure**					
a	Credits	Robot dynamics & Control	Suggested changes & Verified		✓	
b	Flow	checked for flow	Approved & found ok	✓		
c	Contact hours	Verified specific subjects	Approved & found ok			
d	Evaluation scheme	Verified	found ok	✓		
3	**Course contents**					
a	Subject contents	Verified				
b	Unitization	Verified				
c	Reference books	sufficient text books & reference books. is library	To add sufficient copies in Library	✓	✓	
d	Evaluation method	Verified activities planned	Approved	✓		

Members (Use Initials)	Dr. Somashekhar Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	Prof A.C.Giriyapur	Mrs Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr.Shridhar D
Signature		Dhanesh			J.S.Bali	Vinod		

A: Accepted AMC: Accepted under Minor Changes NA: Not Accepted

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31ST March 2018

Agenda

Sl.No	Points to discuss	Documents
1.	Introduction & Review of Actions initiated from previous BOS meeting	Curriculum structure & Syllabus
2.	Review of modifications recommended by the Academic Council or the Principal after BOS 2018.	
3.	General Points	
4.	Review and approval of Syllabi for VII & VIII Semester of the batch 2015-19 , KLE Tech.	
5.	Review and approval of Syllabi for V & VI Semester of the batch 2016-20 , KLE Tech.	
6.	Review and approval of Syllabi for III & IV Semester of the batch 2017-21 , KLE Tech.	
7.	Other points	

Minutes Prepared by

Jyoti Bali

Prof. A. C. Giriyapur

Chairperson, HOD, A&R

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Sl.No	Points raised	Changes made	Raised By
1.0 General points	• HOD welcomed members of Third BOS-2018 for KLE Tech • Reviewed the minutes of BOS 2017 • Review of modifications recommended by the Academic Council or the Principal after BOS 2017. • Reviewed the verticals of the department • Reviewed the curriculum structure and credit distribution • Briefing of Students achievements 1. Participation of Student Team on Delta Robot exhibited at FIESTA-2017 in South Korea 2. Student Participation in Robocon-2018 at Pune, entered Super League round for the first time 3. Development of Basic version of Humanoid Robot under capstone project 4. Projects problems taken up for VRL Transport Company	Review done and action planned	Mr. Jitendra Kataria, Beckhoff Automation, Pvt.,Ltd. Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai
2.0 Curriculum & Syllabus	• **Review of Syllabi for III & IV Semester of the batch 2017-21, KLE Tech.** • Sufficient number of hard copies of books in library to be kept for every subject. • Reviewed Syllabus of Kinematics of Machinery theory and Lab was appreciated. • Briefed about the event Hackathon conducted for the subject Algorithm Analysis & Program Design (AAPD) • As per Academic Council suggestion, Engineering Design introduced at III semester followed by Product Realization subject. • No much major changes suggested in III & IV Sem Syllabus theory content.	Review done and action planned	Mr. Jitendra Kataria, Beckhoff Automation, Pvt. Ltd Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai

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3.0	• **Review of Syllabi for V & VI Semester of the batch 2016-20 , KLE Tech.** • Prerequisites to be mentioned for only electives, not for core subjects. • Reviewed Syllabus of Robot Analysis & Design and advised to stick to the same syllabus and do small changes, wherever required.		
	Summary of the changes proposed for different Courses: **2016-20, V Sem** OOP and Python Practice - 16EARP305 (48 hours) Experiments added are OOP fundamentals (6 hrs), concept of arrays, Strings and String Buffer class and exception Handling (6 hrs), swings, (6 hrs) concept of Generic class, Inheritance, Interface and Package (6 hrs), concepts of python scripting elements python constructs, data structures(6 hrs), concept of functions, modules, packages and regular expressions(6 hrs), Python scripting elements and constructs, data structures, and repository of standard library(6 hrs), Solving a Maze problem(6 hrs) DBMS Practice 16EARP306 (48 hours) To improve the database designing proficiency topics were added and practised are -Data base design principles[12hrs],Creation and updation of database[12hrs],Queries-various clauses like joint ,aggregate operations[14hrs],Normalization rules-Normal form,2nd normal form,3rd normal form and BCNF form[10hrs] . Batch 2016-20, VI Sem Power Electronics, Motors & Drives 16EARE301 (20 hours) CHAPTER1. INTRODUCTION TO PE AND ELECTRIC DRIVE SYSTEMS Peripheral Effects, Characteristics and Specifications of Switches--5 hrs. CHAPTER NO. 3. THYRISTORS AND COMMUTATION THEORY: Natural and Forced Commutation – Class A and Class B types, Gate Trigger Circuit: Resistance Firing Circuit, Resistance capacitance firing circuit-5 hrs. CHAPTER NO. 4. STATIC		Mr. Jitendra Kataria, Beckhoff Automation, Pvt. Ltd Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai

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	SWITCHES AND POWER SUPPLIES Single phase ac static switches, three phase ac static switches, three phase reversing switches, Solid state relays, Design of static switches, DC power supplies, DC Switched Mode DC power supplies, bidirectional power supplies, Switched Mode AC power supplies -5 hrs.CHAPTER NO. 7. STEPPER MOTOR :Principles and Applications of Stepper motor.-5 hrs Hydraulics and Pneumatics Lab 16EARP302 (12 hours) - Few topics are newly added to the current syllabus based on the inputs from the department review committee and topics added are - Simulation and analysis of fluid power circuit using MATLAB (6 Hours), Exercise on Hydraulic accumulator, Sequential control of drives, control of hydraulic circuits using logic gates (6 Hours). **Batch 2017-21 , III Sem** Algorithm Analysis & Program Design 17EARC203 (12 hours) Topics related to dynamic and greedy methods [12 hrs] were added-Depth First Search and Breadth First Search, The General Method, Warshall's Algorithm, Floyd's Algorithm for the All-Pairs Shortest Paths Problem, Single-Source Shortest Paths, The Traveling Salesperson problem, Kruskal's algorithm, Huffman trees. Analysis of the algorithms were added. **Batch 2017-21 , IV Sem** Microcontrollers 17EARC207 (12 hours) Topics related to AVR Microcontrollers [2 hours] high end processors: architecture and pin definitions of 80386 and 80486, EFLAG Register Of The 80486, 80486 Memory System, Real Address Mode [5 hours] and programming microcontrollers using python: Design Philosophy ,Exploring MicroPython, Object-Oriented Programming and Some Python Basics, Using MicroPython with a Pyboard [5 hours] were introduced.		Mr. Jitendra Kataria, Beckhoff Automation, Pvt. Ltd Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai

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	Control Systems 17EARC209 (12 hours) Topics related to introduction to time response namely Poles, Zeros, and System Response, First-order system response to step, ramp and impulse inputs was added.(6 hrs) Introduction to PID controller design: Types of Controllers, Mathematical modeling of PID, ON-OFF controller, Effect of Proportional, Derivative and Integral elements on system behavior, Design of controller for simple applications.(4 hrs). Topics related to state space content was added. The General State-Space Representation, Applying the State-Space Representation. (2 hrs) Microcontrollers Lab 17EARP207 (8 hours) To get hands-on experience on PCB design and fabrication exercises related to Design a development board using Atmega328 or PIC 18 using eagle/ Dip-trace [3 hours], Develop a printed circuit board (PCB) for your designed Atmega328 or PIC18 development board[2hours], Design a programmer for your PIC18 development board to burn the program using PICkit2[3 hours]		
4.0	• **Review and approval of Syllabi for VII & VIII Semester of the batch 2015-19 , KLE Tech.** • Reviewed core subjects and electives prescribed • Subject to be named as Mechanical Measurements for the VI semester core course • Changes in the syllabus content of elective Industrial Data Networks to be proposed and sent to external BOS members for approval. • Additional electives with syllabus to be proposed for BOS approval. • External BOS members suggested for choosing Titles of the subjects carefully. • Reviewed Syllabus of electives, Manufacturing Execution Systems and suggested to streamline the objectives of the course.		Mr. Jitendra Kataria, Beckhoff Automation, Pvt.,Ltd Dr. Dhanesh Manik, IIT Bombay Dr.Somashekhar. Hiremath , IIT Chennai

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	• Reviewed syllabus of Parallel Computing and suggested for inclusion of practice using soft PLC to demonstrate parallel computing • Suggested to launch Open Electives from Dept.		

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	• Reviewed syllabus of Parallel Computing and suggested for inclusion of practice using soft PLC to demonstrate parallel computing • Suggested to launch Open Electives from Dept.		

Changes made in Curriculum Content for III and IV Semester of batch 2017-21, IV & V Semester of the batch 2016-20, VII & VIII Semester of the batch 2015-19, in III BOS held in HOD Room, A&R dept. on 31st March 2018

Approved by:

Sl No	Members, BOS	Signature
1.	Prof. A. C. Giriyapur, Chairperson, HOD, A&R	
2.	Dr. Somashekhar. Hiremath , IIT Chennai	
3.	Mr. Jitendra Kataria, Beckhoff Automation Pvt. Ltd.	
4.	Prof. Dhanesh Manik, Dept. of Mechanical Engineering , IIT, Mumbai	
5.	Mrs. Jyoti Bali, Asst. Prof. A&R	
6.	Mr. Vinodkumar Meti, Asst. Prof. A&R	
7.	Mr. Nagaraj B. Asst. Prof. A&R	
8.	Mr. Shridhar D. Asst. Prof. A&R	

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Resolutions Made During the 3rd Board of Studies Meeting held on 1st April 2017 , in HOD Room, A&R dept. on 31st March 2018

1.0 Resolved to approve Syllabi for III and IV Semester of batch 2017-21, KLE Tech. as per the changes suggested by external and internal members

2.0 Resolved to approve Syllabi for, V & VI Semester of the batch 2016-20, KLE Tech. as per the changes suggested by external and internal members

3.0 Resolved to approve Syllabi for, VII & VIII Semester of the batch 2015-19, KLE Tech. as per the changes suggested by external and internal members

Changes made in Curriculum Content for III and IV Semester of batch 2017-21, V & VI Semester of the batch 2016-20, VII & VIII Semester of the batch 2015-19, in III BOS held in HOD Room, A&R dept. on 31st March 2018

Approved by:

Sl No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson, HOD, A&R	
2	Dr. Somashekhar. Hiremath , IIT Chennai	
3	Mr. Jitendra Kataria, Beckhoff Automation Pvt. Ltd.	
4	Prof. Dhanesh Manik, Dept. of Mechanical Engineering , IIT, Mumbai	
5	Mrs. Jyoti Bali, Asst. Prof. A&R	
6	Mr. Vinodkumar Meti, Asst. Prof. A&R	
7	Mr. Nagaraj B. Asst. Prof. A&R	
8	Mr. Shridhar D. Asst. Prof. A&R	

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KLE Society's
KLE Technological University
DEPARTMENT OF AUTOMATION & ROBOTICS

Department of Automation & Robotics
Structure of Board of Studies 2018-19 01st April 2018

S. No.	Category	Nomination of the Committee		Name of the Person	Signature
1	Concerned Head of the Department/ School/ Center	Chairperson	1	Arunkumar C Giriyapur	
2	ONE Professor, ONE Associate Professor and ONE Assistant Professor from the Department/ School/ Center, nominated by the Dean Academic Affairs	Members		Mrs Jyoti Bali	
				Mr Vinod Meti	
				Mr. Nagaraj.M.B	
				Mr. Shridhar D	
3	ONE PG Coordinator for each of the PG programmes offered by the Department/ School/ Center	Member(s)	1		
			2		
3	TWO Subject experts from outside the college nominated by the Vice-Chancellor	Members	1	Dr Somashekar Hiremath IIT Chennai	
			2	Dr Dhanesh N Manik IIT Mumbai	
4	TWO representative from industry corporate sector/ allied area relating to placement nominated by the Vice-Chancellor	Members	1	Mr. Jitendra Kataria, Beckhoff Automation Pvt. Ltd. Pune	
			2		
5	ONE Post-graduate meritorious alumnus nominated by the Vice-Chancellor	Member	1		
6	ONE Student Member representing each of the program offered by the Department/ School/ Center	Invited Member	1	UG Student (Not Applicable at present)	
			2	PG Student (Not Applicable at present)	
			3	PhD Student (Not Applicable at present)	

The concerned Chairman of Board of Studies may invite additional experts to the Departmental Board of Studies as deemed fit.

A Departmental Board of Studies shall:
Meet at least once a year, sufficiently before the commencement;
Prepare detailed curricula and syllabi of concerned Programmes and submit to the Academic Council for approval and publication; and
Revise the curricula and syllabi from time to time and submit to the Academic Council for approval and publication

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2006	Rev: 1.0
Review-Curriculum Design and Development			Page 1 of 1 Year:2018

2015- 19 Batch Date of Review:01/04/2018

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
d	Evaluation scheme		✓	
03	**Course contents**			
a	Subject contents		✓	
b	Unitization	✓		
c	Reference books		✓	
d	Evaluation method		✓	

Changes Suggested (Serial number wise)	
1)	Verified syllabus of Robot Dynamics & Control & suggested necessary changes
2)	Suggested to add sufficient copies of textbooks & Reference books in Library
3.	Activities planned & Evaluation methods planned verified & found ok

Reviewed by (Use initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr .Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature		Dhanesh Manik						

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2006	Rev: 1.0
Review-Curriculum Design and Development			Page 1 of 1 Year:2018

2016- 20 Batch Date of Review:01/04/2018

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
d	Evaluation scheme			
03	**Course contents**			
a	Subject contents		✓	
b	Unitization	✓		
c	Reference books		✓	
d	Evaluation method		✓	

Changes Suggested (Serial number wise)	
1.	Checked for credit distribution of specific subjects & found ok.
	Verified content of Robot analysis & Design & suggested changes
2.	Suggested changes in the flow of the subjects content & verified for necessary changes
3.	Evaluation methods & activities planned under various courses discussed.

Reviewed by (Use initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr .Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2006	Rev: 1.0
Review-Curriculum Design and Development			Page 1 of 1 Year:2018

2017- 21 Batch

Date of Review:01/04/2018

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits	✓		
b	Flow		✓	
c	Contact hours	✓		
d	Evaluation scheme			
03	**Course contents**			
a	Subject contents		✓	
b	Unitization	✓		
c	Reference books		✓	
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
1.	Credit distribution for courses verified & found ok
2.	Checked for flow of the subject content, suggested changes wherever required
3.	Contact hours for chapter wise content verified & found ok
4.	Evaluation scheme rubrics verified & found ok
5.	Sufficient copies of books both Textbook & reference book to be maintained

Reviewed by (Use initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr .Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University Creating Value Leveraging Knowledge	FORM ISO 9001:2008- BVBCET Department of Automation & Robotics	Document # : FMCD2003	Rev:1.0
	Title: Curriculum Structure- Overall		Page of Year:2018

Semester 2017-21 Batch

Course with course code

III	IV	V	VI	VII	VIII
Analog & Digital Electronic circuits	Kinematics of Machinery				
Mechanics of Materials	Control system				
Manufacturing Technology & Metrology	Machine Design				
Engineering Design Practise	Microcontrollers				
Algorithm analysis & program design	Product Realization				
Machine Drawing Lab	Manufacturing & Metrology lab				
Analog & Digital electronics lab	Microcontroller Lab				
Statistics And Integral Transforms	Kinematics lab				
Calculus And Integral Transforms	Numerical methods and partial differential equations				
	Vector calculus and differential equations				

Approved by (Use Initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University Creating Value Leveraging Knowledge	FORM ISO 9001:2008- BVBCET Department of Automation & Robotics	Document # : FMCD2003	Rev:1.0
	Title: Curriculum Structure- Overall		Page of Year:2018

Semester 2016-20 Batch

Course with course code

III	IV	V	VI	VII	VIII
Analog & Digital Electronic circuits	Kinematics of Machinery	Robot Analysis & Design	Real Time Embedded Systems		
Mechanics of Materials	Microcontrollers	Hydraulics & Pneumatic	OOP & Python Practice		
Manufacturing Technology	Machine Design	Mechatronics System Design	DBMS Practice		
Algorithm analysis & program design	Control systems	Programming Industrial Automation	Power Electronics Motors and Drives (Department elective)		
Engineering Design	Product Realization	Mechatronics Lab	Computer Vision & Digital Image Processing (Department elective)		
Analog & Digital electronics lab	Manufacturing & Metrology lab	Automation Lab	Computer-Integrated Manufacturing (Department elective)		
Statistics And Integral Transforms	Kinematics lab	Mini Project	Robotics Lab		
Calculus And Integral Transforms	Microcontroller Lab	Numerical Methods And Statistics	Hydraulics & Pneumatics Lab		
	numerical methods and partial differential equations		Real Time Embedded Systems Lab		
	vector calculus and differential equations		Minor project		

Approved by (Use Initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University — Creating Value, Leveraging Knowledge	FORM ISO 9001:2008- BVBCET Department of Automation & Robotics	Document # : FMCD2003	Rev:1.0
	Title: Curriculum Structure- Overall		Page of Year:2018

Semester 2015-19 Batch

Course with course code

III	IV	V	VI	VII	VIII
Analog & Digital Electronic circuits	Kinematics of Machinery	Robot Analysis & Design	Real Time Embedded Systems	Measurements	Department elective
Mechanics of Materials	Control system	Hydraulics & Pneumatic	OOP & Python Practice	Robot Dynamics, Control and Parallel Manipulators	Department elective
Manufacturing Technology & Metrology	Machine Design	Mechatronics System Design	DBMS Practice	Parallel Computing (Department elective)	Open Elective
Algorithm analysis & program design	Microcontrollers	Programming Industrial Automation	Power Electronics Motors and Drives	Manufacturing Execution Systems (Department elective)	HSS 3 – AFM
Machine Drawing Lab	Engineering Design Practice	Mechatronics Lab	Computer Vision & Digital Image Processing	Open Elective	Project -2
Analog & Digital electronics lab	Manufacturing & Metrology lab	Automation Lab	Computer-Integrated Manufacturing	HSS 2 – MTP	
Statistics And Integral Transforms	Microcontroller Lab	Mini Project	Robotics Lab	CIPE	
Calculus And Integral Transforms	Kinematics lab	Numerical Methods And Statistics	Hydraulics & Pneumatics Lab	Project -1	
	Numerical methods and partial differential equations		Real Time Embedded Systems Lab		
	Vector calculus and differential equations		Minor project		

Approved by (Use Initials)	Dr. Somashekhar. Hiremath	Dr Dhanesh N Manik	Mr Jitendra Kataria	A.C.Giriyapur	Mrs.Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr. Shridhar D
Signature								

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2007	Rev: 1.0
Title: Verification-Curriculum Design and Development 2017-21 Batch			Page : 1 of 1 Year:2018

Sr.No	Agenda	Inputs from members	Decisions	Verification status		
				A	AMC	NA
1	**Overall scheme of the program**					
a	Credits	Checked credit distribution	Found ok	✓		
b	Flow	ICOM, ADC verified	Found ok	✓	✓	
c	Contact hours		Verified & found ok	✓		
2	**Semester wise curriculum structure**					
a	Credits	–	checked, found ok	✓		
b	Flow	–	" "		✓	
c	Contact hours	–	" "	✓		
d	Evaluation scheme	–	"	✓		
3	**Course contents**					
a	Subject contents		Verified & found ok	✓		
b	Unitization		Verified & found ok	✓		
c	Reference books	To add sufficient books under each subject			✓	
d	Evaluation method	–	Verified & found ok	✓		

Members (Use Initials)	Dr. Somashekhar Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	Prof A.C.Giriyapur	Mrs Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr.Shridhar D
Signature		Dhanesh Manik			JS Bali			

A: Accepted AMC: Accepted under Minor Changes NA: Not Accepted

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2007	Rev: 1.0
Title: Verification-Curriculum Design and Development 2016-20 Batch			Page : 1 of 1 Year:2018

Sr.No	Agenda	Inputs from members	Decisions	Verification status		
				A	AMC	NA
1	**Overall scheme of the program**					
a	Credits	checked distribution of credits	Approved	✓		
b	Flow	Suggested changes in some subjects	Verified & approved for changes.	✓		
c	Contact hours	–	Verified & Approved.	✓		
2	**Semester wise curriculum structure**					
a	Credits	checked for few subjects	Verified & Approved.			
b	Flow	Checked for flow		✓		
c	Contact hours	–		✓		
d	Evaluation scheme	–		✓		
3	**Course contents**					
a	Subject contents	Verified	Approved	✓		
b	Unitization	Verified	Approved.	✓		
c	Reference books	Verified	Approved with minor changes	✓	✓	
d	Evaluation method	Verified	Approved	✓		

Members (Use Initials)	Dr. Somashekhar Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	Prof A.C.Giriyapur	Mrs Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr.Shridhar D
Signature		Dhanesh			JSBali			

A: Accepted AMC: Accepted under Minor Changes NA: Not Accepted

KLE Technological University	FORM ISO 9001: 2008 – BVBCET Department of Automation & Robotics	Document #: FMCD2007	Rev: 1.0
Title: Verification-Curriculum Design and Development 2015-19 Batch			Page : 1 of 1 Year:2018

Sr.No	Agenda	Inputs from members	Decisions	Verification status		
				A	AMC	NA
1	**Overall scheme of the program**					
a	Credits	checked	Verified & found ok	✓		
b	Flow	Verified flow	found ok	✓		
c	Contact hours	checked distributes	found ok.	✓		
2	**Semester wise curriculum structure**					
a	Credits	Robot dynamics & Control	Suggested changes & Verified		✓	
b	Flow	checked for flow	Approved & found ok	✓		
c	Contact hours	Verified specific subjects	Approved & found ok			
d	Evaluation scheme	Verified	found ok	✓		
3	**Course contents**					
a	Subject contents	Verified				
b	Unitization	Verified				
c	Reference books	sufficient text books & reference books in library	To add sufficient copies in Library	✓	✓	
d	Evaluation method	Verified activities planned	Approved	✓		

Members (Use Initials)	Dr. Somashekhar Hiremath	Dr Dhanesh N Manik	Mr. Jitendra Kataria	Prof A.C.Giriyapur	Mrs Jyoti Bali	Mr.Vinod Meti	Mr.Nagaraj M B	Mr.Shridhar D
Signature		Dhanesh			J.S.Bali			

A: Accepted AMC: Accepted under Minor Changes NA: Not Accepted

KLE Technological University
Creating Value
Leveraging Knowledge

13th April 2019

Agenda

Sl.No	Points to discuss	Documents
1.	Introduction & Review of Actions initiated from previous BOS meeting	Curriculum structure & Syllabus
2.	Review of modifications recommended by the Academic Council or the Principal after BOS 2019.	
3.	General Points	
4.	Review and approval of Syllabi for VII & VIII Semester of the batch 2016-20 , KLE Tech.	
5.	Review and approval of Syllabi for V & VI Semester of the batch 2017-21 , KLE Tech.	
6.	Review and approval of Syllabi for III & IV Semester of the batch 2018-22 , KLE Tech.	
7.	Other points	

Minutes Prepared by

Jyoti Bali

Prof. A. C. Giriyapur

Chairperson, HOD, A&R

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Sl.No	Points raised	Changes made	Raised By
1.0 General points	• HOD welcomed members of Fourth BOS-2019 for KLE Tech • Reviewed the minutes of BOS 2018. • Review of modifications recommended by the Academic Council or the Principal after BOS 2018. • Reviewed the verticals of the department. • Reviewed the curriculum structure and credit distribution. • Discussed about final year project/internship/industry internship. • Involved project based learning in theory and lab courses. • A & R department established Center for Automation Systems Engineering consultancy. • All BOS documents should have page numbers. • Briefing of Students achievements 1. Participation of Student Team on Delta Robot exhibited at FIESTA-2018 in South Korea 2. Student Participation in Robocon-2019 at Pune. 3. Development of Basic version of Humanoid Robot under capstone project 4. Projects problems taken up for VRL Transport Company.	Review done and action planned	Dr. Dhanesh Manik, IIT Bombay. Mr. Abhijit Lele Robert Bosch India. Mr. Sachinkumar Gorlewar Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.
2.0 Curriculum & Syllabus	• **Review of Syllabi for III & IV Semester of the batch 2018-22, KLE Tech.** • Suggested to Combine Machine Drawing and Manufacturing Lab. Course content related to Machine drawing and Manufacturing lab to be proposed and sent to external BOS members for approval. IP Protections can be included in Machine Drawing lab. • Suggested changes in the course content of Microcontrollers to be proposed and sent to external	Review done and action planned	Dr. Dhanesh Manik, IIT Bombay. Mr. Abhijit Lele Robert Bosch India. Mr. Sachinkumar Gorlewar Mr. Supreet Kamatagi,

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	BOS members for approval. • Reviewed and approved the course content of Kinematics and Dynamics of Machinery theory and Lab. • Suggested changes in the course content of Real Time Embedded system to be proposed and sent to external BOS members for approval. Suggested to change the approach of delivery in the course of Real Time Embedded system.		Griffyn Robotech Pvt. Ltd.
3.0	• **Review of Syllabi for V & VI Semester of the batch 2017-21, KLE Tech.** • Object Oriented Programming & Database Management Systems 17EARC301 (50 hours): The course was newly created to support the previously offered OOP & Python Practice (16EARP305) and DBMS Practice (16EARP306). The new course included Java programming, Python programming and MySQL database. Overall, 50 hours of content was newly created.	Review done and action planned	Dr. Dhanesh Manik, IIT Bombay. Mr. Abhijit Lele Robert Bosch India Mr. Sachinkumar Gorlewar Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.
4.0	• **Summary of changes proposed in different courses** **Batch 2016-20, VII Sem** Machine Learning and ROS 16EARE403 (40 hours) Topics related to Robot operating system[5 hours]: messages, classes, and servers[5 hours] were introduced and topics related to machine learning[5hours], computational learning theory[4hours], decision tree[4 hours], kernel methods[7 hours], reinforcement learning[5hours], and ANN[5 hours] were added. Measurement System 16EARE401 (40 hours) Measurement as an elective has been introduced for the academic year based on the inputs of the department committee and topics added are -.Chapter1. Introduction to Measurement Systems (5 hrs), Chapter No. 2. Sensors and Signal conditioning (5 hrs), Chapter No. 3. Motion Measurement (5 hrs), Chapter No. 4. Force, Torque, and Shaft Power Measurement(5 hrs), Chapter No. 5. Pressure &	Review done and action planned	Dr. Dhanesh Manik, IIT Bombay. Mr. Abhijit Lele Robert Bosch India Mr. Sachinkumar Gorlewar Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.

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	Sound Measurement(5 hrs), Chapter No. 6. Flow and Temperature Measurement(5 hrs), Chapter No.7. Data Acquisition Systems(5 hrs), Chapter No. 8. Transmission and Recording of Data(5 hrs). **Batch 2017-21 , V Sem** Measurement System 17EARC304 (40 hours) Chapter No. 1. Introduction to Measurement Systems (5 hrs), Chapter No. 2. Sensors and Signal conditioning (5 hrs), Chapter No. 3. Motion Measurement (5 hrs), Chapter No. 4. Force, Torque, and Shaft Power Measurement(5 hrs), Chapter No. 5. Pressure & Sound Measurement(5 hrs), Chapter No. 6. Flow and Temperature Measurement(5 hrs), Chapter No.7. Data Acquisition Systems(5 hrs), Chapter No. 8. Transmission and Recording of Data(5 hrs). Mechatronics and Measurement Lab 17EARP303-12 hours Exercise on Sensors and Sensor Modeling-4 hrs , Exercise on Transfer Functions & Model based design- 4hrs, Exercise on System Identification and Parametrization :4hrs Machine Learning & ROS 17EARC305 (40 hours) Topics related to the Robotic operating system were added- ROS services, ROS messages, ROS publisher and subscriber and various simulation tools were added. Chapter 1:Introduction to Robot operating system [5hrs],Chapter 2:Messages, Classes and Servers in ROS[5hrs], Chapter 3: Introduction to machine learning [5hrs],Chapter 4: Computational learning theory and decision tree learning[8hrs],Chapter 5:Kernel methods and Graphical models[7hrs],Chapter 6:Reinforcement Learning[5hrs],Chapter 7: Artificial neural network[5hrs] Object Oriented Programming & Database Management Systems 17EARC301 (50 hours) The course was newly created to support the previously offered OOP & Python Practice (16EARP305) and DBMS Practice (16EARP306). The new course included Java programming, Python programming and MySQL database. Overall, 50 hours of content was newly created. Chapter 1: Introduction to Software Development Lifecycle and Unified Modeling Language (6 hrs), Chapter 2: Data Modeling using the ER Model (6 hrs), Chapter 3: Introduction to Object-		Dr. Dhanesh Manik, IIT Bombay. Mr. Abhijit Lele Robert Bosch India Mr. Sachinkumar Gorlewar Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.

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	Oriented Programming - I (8 hrs), Chapter 4: Object-Oriented Programming - II (4 hrs), Chapter 5: Object-Oriented Programming - III (10 hrs), Chapter 6: Introduction to Database Management Systems (6 hrs), Chapter 7: Relational Data Model (5 hrs) and SQL and Chapter 8: Object-Relational Databases and Semantic Modeling Approach (5 hrs) Mechatronics System Design 17EARC303 (20 hours) Introduced additional topics under : System Modeling : 5 hrs, Electric Drives- 10 hrs, Model based design of Systems and Identification and Case studies -5hrs Object Oriented Programming & Database Management Systems Lab 17EARP301 (24 hours) The lab was newly created to complement the new course on Object Oriented Programming & Database Management Systems (17EARC306). The lab focused on Java programming, Python programming and MySQL database with emphasis on industry relevant context. Overall, 7 experiments or 13 lab sessions were introduced. **Batch 2017-21 , VI Sem** AI for Autonomous Robots 17EARE301 (40 hours) Topics related robotics paradigms ,robotic architectures-Hierarchical paradigm,reactive paradigm and deliberative paradigm ,animal models based algorithms,multi agents and navigation and localizations methods were added under the chapters- 1: Introduction to Artificial intelligence and autonomous systems [5hrs],Chapter 2: Robotic software architectures[5hrs],Chapter 3: Biological Foundations of the Reactive Paradigm,Chapter 4: Capturing intelligence - Designing a reactive implementation with common sensing techniques for robotics perception[8hrs],Chapter 5: Multi-agents and navigation in robotics[7hrs],Chapter 6:Localization and Map Making[6hrs],Chapter 7: Deep learning and natural language processing[4hrs] Digital System Design and FPGA Programming 17EARE304 (40 hours) Chapter 1. Review of Logic Design Fundamentals: 9 hours, Chapter 2. Introduction to State Machine Charts and		Dr. Dhanesh Manik, IIT Bombay. Mr. Abhijit Lele Robert Bosch India Mr. Sachinkumar Gorlewar Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.

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	Microprogramming: 6hrs,Chapter 3. Designing with Field Programmable Gate Arrays: Chapter 4. Modeling and design with HDL -8 hrs,Chapter 5. Testing and Verification-5 hrs,Case studies on FPGA technologies in Automation and Robotics applications -5 hrs Hydraulics and Pneumatics 17EARC308 (10 hours) Topics related to Hydraulic System Maintenance (5 hours) and few topics related to hydraulics control system (5 hours) were not included in the syllabus. Industrial Robotics Lab 17EARP306 (12 hours) Robotics Toolbox by peter corke was added to solve problems on orientation and pose in 2D and 3D (SO (2), SE (2), SO (3), SE (3)) as matrices, quaternions, twists, triple angles, and matrix exponentials. RoboAnalyzer tool was introduced in the lab to perform kinematic analysis of industrial robots (4 - DOF, and 6 DOF), Forward and Inverse kinematics analysis, Transformation matrix (2D and 3D), Path generation and building custom robots. Topics regarding Reachability and Multimove by using Robotstudio were added. 2018-22 batch, III Sem Analog and Digital Electronics 18EARC201 (12 hours) **Data conversions - 6hours, Digital integrated circuits - 6hrs** Data Structures, Algorithm Design and Analysis 18EARC203. (12 hours) Topics related to C++ programming were added-class and objects, abstractions, polymorphism, encapsulation and inheritance ,types of inheritance under the chapters Chapter 6: Introduction to C++[6 hrs],Chapter 7: Basic oopS concepts [6 hrs] 2018-22 batch, IV Sem Object Oriented Programming & Database Management Systems 18EARC209 (20 hours) Course was shifted to IV semester as courses from V semester onwards required proficiency in programming.		Dr. Dhanesh Manik, IIT Bombay. Mr. Abhijit Lele Robert Bosch India Mr. Sachinkumar Gorlewar Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.

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	Additionally, the number of programming languages were reduced with focus solely on classical OOP and databases. This required deletion of Chapter 5: Object Oriented Programming-III (10 hrs), Chapter 7: Relational Data Model and SQL (5 hrs) and Chapter 8: Object-Relational Databases and Semantic Modeling Approach (5 hrs). The deletion of some DBMS content was shifted to the lab with a more hands-on approach, and some to Chapter 5: Entity Relationship (ER) Model (3 hrs) and Chapter 6: Database Management System (2 hrs). Also, the content was adjusted to teach classical OOP instead of java specific, and introduced the concepts of cloud computing as part of Chapter 7: Cloud Computing (5 hrs). Object Oriented Programming & Database Management Systems Lab 18EARP209 (24 hours) Python related experiments and Java related experiments (3 labs or 6 hours) were adapted to work on experiments related to classical OOP. The lab experiments were enhanced to include additional experiments on classical OOP, file handling and user interfaces. Microcontrollers Programming and Interfacing 18EARC208 (12 hours) Exposure to advanced microcontrollers [2 hours], the topics related to STmicroelectronics microcontrollers [5 hours] and programming using timers and interrupts [5 hours] were added. **Control Systems 18EARC207 (12 hours)** Root Locus: Incorporation of Performance Specifications in Controller Design, Analysis of Steady State Errors, Root Locus and its Application in Control Design. (3 hrs) , Case Studies of control systems were introduced. Some important case studies are on Plants for Pressure Control, Electromechanical Plants, Modeling and design of Inverted Pendulum, Modeling and design of Aircraft. (5 hrs) Controllers – Proportional (P), Integral (I) and Derivative (D) Blocks, Examples of PID controller design, Problems. (4 hrs) Microcontrollers Programming and Interfacing Lab 18EARP208 SD (8 hours)		Dr. Dhanesh Manik, IIT Bombay. Mr. Abhijit Lele Robert Bosch India Mr. Sachinkumar Gorlewar Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.

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	Experiments related to development of IOT systems[3 hours], interrupt programming with STM MCU [2 hours], and development of applications using STM MCU to predict the data using the existing trained module[3 hours] were introduced.		

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Changes made in Curriculum Content for III and IV Semester of batch 2018-22, IV & V Semester of the batch 2017-21, VII & VIII Semester of the batch 2016-20, in IV BOS held in Mechanical Library on 13th April 2019.

Approved by:

Sl No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson, HOD, A & R Dept.	
2	Dr. Dhanesh Manik, IIT Bombay.	
3	Mr. Abhijit Lele, Robert Bosch India.	
4	Mr. Sachinkumar Gorlewar, Griffyn Robotech Pvt. Ltd.	
5	Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.	
6	Mrs. Jyoti Bali, A & R Dept.	
7	Mr. Vinod Kumar V Meti, A & R Dept.	
8	Mr. Nagaraj M B, A & R Dept.	
9	Mr. Sachin Karadgi, A & R Dept.	

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Resolutions Made During the 4th Board of Studies Meeting held on 13th April 2019 in Mechanical Library.

1. Resolved to approve Syllabi for III and IV Semester of batch 2018-22, KLE Tech., as per the changes suggested by external and internal members.
2. Resolved to approve Syllabi for V & VI Semester of the batch 2017-21, KLE Tech., as per the changes suggested by external and internal members.
3. Resolved to approve Syllabi for VII & VIII Semester of the batch 2016-20, KLE Tech., as per the changes suggested by external and internal members.

Changes made in the Curriculum Content for III and IV Semester of the batch 2018-22, V & VI Semester of the batch 2017-21, VII & VIII Semester of the batch 2016-20, in 4th BOS held in Mechanical Library on 13th April 2019.

The suggested changes in the content of all the courses and laboratories discussed in the BOS meeting are attached with this document.

Approved by:

Sl No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson, HOD, A & R Dept.	
2	Dr. Dhanesh Manik, IIT Bombay.	
3	Mr. Abhijit Lele, Robert Bosch India.	
4	Mr. Sachinkumar Gorlewar, Griffyn Robotech Pvt. Ltd.	
5	Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.	
6	Mrs. Jyoti Bali, A & R Dept.	
7	Mr. Vinod Kumar V Meti, A & R Dept.	
8	Mr. Nagaraj M B, A & R Dept.	
9	Mr. Sachin Karadgi, A & R Dept.	

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KLE Society's
KLE Technological University
DEPARTMENT OF AUTOMATION & ROBOTICS

Department of Automation & Robotics
Structure of Board of Studies 2019-20, 13th April 2019

S. No.	Category	Nomination of the Committee		Name of the Person	Signature
1	Concerned Head of the Department/ School/ Center	Chairperson	1	Arunkumar C Giriyapur	
2	ONE Professor, ONE Associate Professor and ONE Assistant Professor from the Department/ School/ Center, nominated by the Dean Academic Affairs	Members		Mrs Jyoti Bali	
				Mr. Vinod Kumar V Meti	
				Mr. Nagaraj.M.B	
				Mr.Sachin Karadgi	
3	ONE PG Coordinator for each of the PG programmes offered by the Department/ School/ Center	Member(s)	1		
			2		
3	TWO Subject experts from outside the college nominated by the Vice-Chancellor	Members	1	Dr. Dhanesh Manik, IIT Bombay.	
			2		
4	TWO representative from industry corporate sector/ allied area relating to placement nominated by the Vice-Chancellor	Members	1	Mr. Abhijit Lele, Robert Bosch India.	
			2	Mr. Sachinkumar Gorlewar, Griffyn Robotech Pvt. Ltd.	
5	ONE Post-graduate meritorious alumnus nominated by the Vice-Chancellor	Member	1	Mr. Supreet Kamatagi	
6	ONE Student Member representing each of the program offered by the Department/ School/ Center	Invited Member	1	UG Student (Not Applicable at present)	
			2	PG Student (Not Applicable at present)	
			3	PhD Student (Not Applicable at present)	

The concerned Chairman of Board of Studies may invite additional experts to the Departmental Board of Studies as deemed fit.

A Departmental Board of Studies shall:
Meet at least once a year, sufficiently before the commencement;
Prepare detailed curricula and syllabi of concerned Programmes and submit to the Academic Council for approval and publication; and
Revise the curricula and syllabi from time to time and submit to the Academic Council for approval and publication

KLE TECH.	FORM ISO 9001: 2015- KLE TECH Department of Automation & Robotics	Document #: FMCD2003	Rev: 1.0
Title: Curriculum Structure-Overall			Page of 1 Year:2019

COURSE WITH COURSE CODE	Semester 2018-22 Batch					
	III	IV	V	VI	VII	VIII
	Statistics And Integral Transforms	Numerical Methods and Partial differential equations	Robot analysis & design	Realtime Embedded Systems	Industrial Data Networks	Department Elective-6
	Calculus And Integral Transforms	Vector calculus and differential	Mechatronics System Design	Programming Industrial Automation Systems	Department Elective-3	Open Elective
	Analog & Digital Electronic Circuits	Kinematics Of Machinery	Microcontrollers	Department Elective-1	Department Elective-4	Project
	Mechanics Of Materials	Control Systems	Artificial Intelligence & Machine Learning	Department Elective-2	Department Elective-5	Internship
	Algorithm Analysis And Program Design	Machine Design	Hydraulics & Pneumatics	PA & LR	Open Elective	Industry Internship - Project Work
	Manufacturing Technology	Measurement systems	Microcontroller Lab	Automation Lab	CIPE	
	Analog And Digital Electronic Lab	Object Oriented System Design	Robotics Lab	Hydraulics And Pneumatics Lab		
	Machine Drawing & Manufacturing Technology Lab	OOSD Lab	Mechatronics & Measurements Lab	Realtime Embedded Systems Lab		
		Kinematics Lab	Mini Project (Engineering Design Practice)	Minor project		

Approved by (Use Initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature	Dhanesh Manik	A.M.Lele							

KLE TECH.	FORM ISO 9001: 2015- KLE TECH Department of Automation & Robotics	Document #: FMCD2003	Rev: 1.0
Title: Curriculum Structure-Overall			Page of 1 Year:2019

Course with course code	Semester 2017-21 Batch					
	III	IV	V	VI	VII	VIII
	Statistics And Integral Transforms	Numerical Methods and Partial differential equations	Robot analysis & design	Hydraulics & Pneumatics	Industrial Data Networks	Department Elective-6
	Calculus And Integral Transforms	Vector calculus and differential	Mechatronics System Design	Realtime Embedded Systems	Department Elective -3	Open Elective
	Analog & Digital Electronic Circuits	Kinematics Of Machinery	Programming Industrial Automation Systems	Department Elective -1	Department Elective -4	Project
	Mechanics Of Materials	Microcontrollers	Robotics Lab	Department Elective -2	Department Elective -5	Internship
	Algorithm Analysis And Program Design	Control Systems	Mechatronics & Measurement Lab	Hydraulics And Pneumatics Lab	Open Elective	Industry Internship - Project Work
	Machine Design	Manufacturing Technology	Automation Lab	Realtime Embedded Systems Lab	CIPE	
	Analog And Digital Electronic Circuits Lab	Manufacturing & Metrology lab	Measurements	Artificial Intelligence & Machine Learning		
	Machine Drawing Lab	Kinematics Lab	Object Oriented System Design	Minor project		
	Programming Lab	Microcontroller Lab	OOSD Lab	PA & LR		
			Engineering Design (Mini project)			

Approved by (Use Initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature									

Course with course code

Semester 2016-20 Batch					
III	IV	V	VI	VII	VIII
Statistics and integral transforms Calculus and integral transforms	Numerical Methods and partial differential equations Vector calculus and differential	Robot analysis & design	Hydraulics & Pneumatics	Industrial Data Networks	Department Elective -6
Analog & Digital Electronic circuits	Kinematics of Machinery	Mechatronics System Design	Real Time Embedded Systems	Department Elective -3	Open Elective
Mechanics of Materials	Microcontrollers	Programming Industrial Automation Systems	Department Elective -1	Department Elective -4	Project
Manufacturing Technology	Machine Design	Robotics Lab	Department Elective -2	Department Elective -5	Internship
Algorithm analysis & program design	Control systems	Mechatronics Lab	Hydraulics & Pneumatics Lab	Open Elective	Industry Internship - Project Work
Engineering Design	Manufacturing & Metrology lab	Automation Lab	Real Time Embedded Systems Lab	CIPE	
Analog & Digital electronics lab	Kinematics lab	OOP & Python Practice	Minor project		
Programming Lab	Microcontroller Lab	DBMS Practice	PA & LR		
	Product Realization	Mini project			

Approved by (Use Initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature		A.M.Lele							

KLE TECH.	FORM ISO 9001: 2015- KLE TECH Department of Automation & Robotics	Document #: FMCD2007	Rev: 1.0
Title: Verification-Curriculum Design and Development 2016- 20 Batch			Page : of 1 Year:2019

Sr.No	Agenda	Inputs from members	Decisions	Verification status		
				A	AMC	NA
1	**Overall schemes of the program**					
a	Credits	Verified for different subject	Found satisfactory.		✓	
b	Flow	Changes specified for few subjects	change was approved.		✓	
c	Contact hours	Verified	Found ok		✓	
2	**Semester wise curriculum structure**					
a	Credits	Verified	Found ok., satisfactory		✓	
b	Flow	Minor changes incorporated.	Found ok. accepted		✓	
c	Contact hours	Verified	Found Ok., accepted		✓	
d	Evaluation scheme	Verified	Accepted.		✓	
3	**Course contents**					
a	Subject contents	Suggested changes	Approved with incorporated changes		✓	
b	Unitization	Verified	Found Ok.		✓	
c	Reference books	Verified for specific subjects	Approved. with changes.		✓	
d	Evaluation method	Verified	Found satisfactory		✓	

Verified by(Use Initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature	Dhanesh Manik	A.M.lele		Skamatagi		J S Bali	V Meti		Sachin K

KLE TECH.	FORM ISO 9001: 2015- KLE TECH Department of Automation & Robotics	Document #: FMCD2007	Rev: 1.0
Title: Verification-Curriculum Design and Development 2017- 21 Batch			Page : of 1 Year:2019

Sr.No	Agenda	Inputs from members	Decisions	Verification status		
				A	AMC	NA
1	**Overall schemes of the program**					
a	Credits	Suggested changes, incorporated	Found satisfactory		✓	
b	Flow	Minor changes incorporated	Accepted.		✓	
c	Contact hours	Verified	Found Ok, Accepted.		✓	
2	**Semester wise curriculum structure**					
a	Credits	Minor changes incorporated	Found satisfactory.		✓	
b	Flow	Verified & suggested few changes.	Accepted		✓.	
c	Contact hours	Verified	Found Ok Accepted.		✓	
d	Evaluation scheme	Verified	Found Ok. Accepted		✓	
3	**Course contents**					
a	Subject contents	Verified few changes suggested	Found Ok		✓	
b	Unitization	Verified and	Accepted.		✓	
c	Reference books	Added few text books	Accepted		✓	
d	Evaluation method	Verified	Found Ok.		✓	

Verified by(Use Initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature	Dhanesh Mani	A.M.lele							

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Title: Verification-Curriculum Design and Development 2018- 22 Batch			Page : of 1 Year:2019

Sr.No	Agenda	Inputs from members	Decisions	Verification status		
				A	AMC	NA
1	**Overall schemes of the program**					
a	Credits	Suggested changes in some subjects	Verified & Accepted.		✓	
b	Flow	Verified for few core subjects	Found Ok Accepted		✓	
c	Contact hours	Verified for few subjects	Accepted.		✓	
2	**Semester wise curriculum structure**					
a	Credits	Verified	Found Ok. Satisfactory		✓	
b	Flow	Minor changes suggested	Found Ok. Accepted		✓	
c	Contact hours	Verified	Accepted		✓	
d	Evaluation scheme	Verified	Accepted with minor changes		✓	
3	**Course contents**					
a	Subject contents	Verified for some subjects	Accepted with incorporated changes		✓	
b	Unitization	Verified	Found Ok.		✓	
c	Reference books	Verified for specific subjects	Approved with changes		✓	
d	Evaluation method	Verified	Found satisfactory		✓	

Verified by(Use Initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature	Dhanesh Manik	A.M.Lele		Kamatagi		JSBali			Sachin K

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			Year:

Semester: VII (2016-20 batch) Date of Review: 13-04-2019

Inputs for review: PEO- Mapping of CLO with PO – Academic Guidelines-Previous review outcomes

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
02	**Semester wise curriculum structure**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents		✓	
b	Unitization		✓	
c	Reference books		✓	
d	Evaluation method		✓	

Changes Suggested (Serial number wise)	
1.	Syllabus content of IDN, Advanced MCU & CIM, Measurement s/ms. verified after changes.
2.	Added Reference books for some subjects like Measurement s/m.
3.	Review of elective subjects done and suggested modifications

Reviewed by (Use initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature	Dhanesh Manik	AM. lele							

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			Year:

Semester: VIII (2016-20 batch)

Date of Review: 13-04-2019

Inputs for review: PEO- Mapping of CLO with PO – Academic Guidelines-Previous review outcomes

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
02	**Semester wise curriculum structure**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents		✓	
b	Unitization		✓	
c	Reference books		✓	
d	Evaluation method		✓	

Changes Suggested (Serial number wise)	
1)	Verified syllabus of Computer Integrated Manufacturing and suggested changes
2)	Verified the prescribed books for each of the subject and added few books.

Reviewed by (Use initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature		A.M.Lele							

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			Year:

Semester: V (2017-21 batch) Date of Review: 13-04-2019

Inputs for review: PEO- Mapping of CLO with PO – Academic Guidelines-Previous review outcomes

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
02	**Semester wise curriculum structure**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents		✓	
b	Unitization		✓	
c	Reference books		✓	
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
1.	Changes spcified in Robot analysis & Design, PIAS MSD.
2.	Changes in the delivery of Robotics lab. suggested
3.	Changes purposed in Measurements / Mechatronics Lab accepted.

Reviewed by (Use initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature	Dhanesh Mai	A.M.lele							

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			Year:

Semester: VI (2017-21 batch) Date of Review: 13-04-2019

Inputs for review: PEO- Mapping of CLO with PO – Academic Guidelines-Previous review outcomes

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
02	**Semester wise curriculum structure**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents		✓	
b	Unitization		✓	
c	Reference books		✓	
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
1)	Changes proposed is course content of Artificial intelligence and Machine learning
2)	Suggested to change the course as two different subjects to justify the content prescribed one as Core course and other as Elective

Reviewed by (Use initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature	Dhanesh Manik	A.M.Lele		Kamatagi		JS Bali	Vinod	NMB	Sachin

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			Year:

Semester: III (2018-22 batch)

Date of Review:13-04-2019

Inputs for review: PEO- Mapping of CLO with PO – Academic Guidelines-Previous review outcomes

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
02	**Semester wise curriculum structure**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents		✓	
b	Unitization		✓	
c	Reference books		✓	
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
1.	Proposed to combine Machine Tng & Manufacturing Lab
2.	Reviewed the course content of Microcontrollers and proposed changes
3.	Reviewed the revised syllabus of Kinematics & Dynamics of Machinery & approved.
4.	changes in the delivery of RTES approved.

Reviewed by (Use initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature	Dhanesh Ma	AM.LCLC							

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Semester: IV (2018-22 batch)

Date of Review:13-04-2019

Inputs for review: PEO- Mapping of CLO with PO – Academic Guidelines-Previous review outcomes

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
02	**Semester wise curriculum structure**			
a	Credits		✓	
b	Flow		✓	
c	Contact hours		✓	
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents		✓	
b	Unitization		✓	
c	Reference books		✓	
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
1.	Reviewed the course content of Microcontrollers and Real time Embedded Systems.
2.	Emphasis on case study discussion was stressed by external members.

Reviewed by (Use initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Sachinkumar	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB	Sachin Karadgi
Signature	Dhanesh Manik	A.M.Lele							

KLE Technological University

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3rd June 2020

Agenda

Sl.No	Points to discuss	Documents
1.	Introduction & Review of Actions initiated from previous BOS meeting	Curriculum structure & Syllabus
2.	Review of modifications recommended by the Academic Council after BOS 2019.	
3.	Review and approval of Syllabi for VII & VIII Semester of the batch 2017-21 , KLE Tech.	
4.	Review and approval of Syllabi for V & VI Semester of the batch 2018-22 , KLE Tech.	
5.	Review and approval of Syllabi for III & IV Semester of the batch 2019-23 , KLE Tech.	
6.	Other points	

Minutes Prepared by

Dr. Jyoti Bali

Prof. A. C. Giriyapur

Chairperson, HOD, A&R

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Sl.No	Points raised	Changes made	Raised By
1.0	• HOD welcomed the members of fifth meeting of Board of Studies-2020 (BOS-2020) for KLE Technological University. • Reviewed the verticals of the department. • Reviewed the minutes of BOS 2019. • Discussed about final year project/internship/industry internship. • HOD discussed about the activities of Center for Automation Systems Engineering consultancy, at A & R department.	Review done and action proposed	Dr. Dhanesh Manik, IIT Bombay. Mr. Jitendra Kataria, Beckhoff Automation India Ltd.Pune Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.
2.0	• Review of modifications recommended by the Academic Council or the Principal after BOS 2019. • Reviewed the curriculum structure and credit distribution.		
3.0 Curriculum & Syllabus for batch 2017-21	• Review of Syllabi for VII & VIII Semester of the batch 2017-21, KLE Tech • As per the feedback from Academic council and BOS 2019, the changes made in the syllabus were proposed and presented. • Discussion on the electives prescribed in the syllabus was done and got inputs from the members. • HOD discussed about the capstone projects namely, Humanoid Robot, Ajit 2.0, Digital Twin and Automatic Storage and Retrieval System (ASRS). • HOD discussed about Autonomous Car project under Institutional Research Project(IRP) scheme with NVIDIA hardware platforms having high performance computing ability with AI solutions • Proposed the introduction of Project work titled Project 1 , 18EARW401 prescribed for 144 Hours. Decision taken in the Pre-BOS meeting to add one more project activity in VII semester for improving complex problem solving skills for students opting for internship program in VIII semester.	Review done and action proposed	Dr. Dhanesh Manik, IIT Bombay. Mr. Jitendra Kataria, Beckhoff Automation India Ltd.Pune Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.

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3.0 Curriculum & Syllabus for batch 2018-22	• **Review of Syllabi for V & VI Semester of the batch 2018-22, KLE Tech.**
	  • No major changes suggested in the V semester syllabus prescribed.
	  • Mrs. Ashwini, Asst. Professor, A&R Dept. shared the experience in handling the subject Machine Learning & Robot Operating System(ROS), for the current semester.
	  • The subject content and the hands on practices were reviewed by members.
	  • Reviewed the syllabus of AI for Autonomous Systems and got approval of BOS members
	  • No major changes suggested in the VI semester syllabus.
			Dr. Dhanesh Manik, IIT Bombay.
			Mr. Jitendra Kataria, Beckhoff Automation India Ltd.Pune
			Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.

4.0	• **Review and approval of Syllabi for III & IV Semester of the batch 2019-23, KLE Tech.** • No major changes introduced in the syllabus and get it approved	Review done	Dr. Dhanesh Manik, IIT Bombay. Mr. Jitendra Kataria, Beckhoff Automation India Ltd.Pune Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.
5.0 Other Points (Research related)	• HOD presented the proposal for grooming research culture in the department. The research groups were presented in the area of Smart manufacturing and Cognitive Robotics. The views of all members on selection of research areas were welcomed. The members urged the need for team based efforts in research process. They expressed the need for involving faculty in industrial projects. • The BOS members also insisted that the up gradation of project solution should happen from one batch to the next, to transfer knowledge from senior batch to the junior batches.		

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Changes made in Curriculum Content for III and IV Semester of batch 2019-22, IV & V Semester of the batch 2018-22, VII & VIII Semester of the batch 2017-21, in V BOS held as Virtual Google Meet 3rd June 2020.

Approved by:

Sl No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson, HOD, A & R Dept.	PRESENT
2	Dr. Dhanesh Manik, IIT Bombay.	PRESENT
3	Mr. Abhijit Lele, Robert Bosch India.	ABSENT
4	Mr. Jitendra Kataria, Beckhoff Automation India . Ltd. Pune	PRESENT
5	Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.	PRESENT
6	Dr. Jyoti Bali, A & R Dept.	PRESENT
7	Dr. Vinod Kumar V Meti, A & R Dept.	PRESENT
8	Dr. Sachin Karadgi, A & R Dept.	PRESENT
9	Mr. Nagaraj M B, A & R Dept.	PRESENT

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Resolutions Made During the 5th Board of Studies Meeting held on 3rd June 2020 as

- Resolved to approve Syllabi for III and IV Semester of batch 2019-23, KLE Tech., as per the changes suggested by external and internal members.
- Resolved to approve Syllabi for V & VI Semester of the batch 2018-22, KLE Tech., as per the changes suggested by external and internal members.
- Resolved to approve Syllabi for VII & VIII Semester of the batch 2017-21, KLE Tech., as per the changes suggested by external and internal members.
- Changes made in the Curriculum Content for III and IV Semester of the batch 2019-23, V & VI Semester of the batch 2018-22, VII & VIII Semester of the batch 2017-21, in 5th BOS held in Mechanical Library on 3rd June 2020.
- The suggested changes in the content of all the courses and laboratories discussed in the BOS meeting are attached with this document.

Approved by:

Sl No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson, HOD, A & R Dept.	PRESENT
2	Dr. Dhanesh Manik, IIT Bombay.	PRESENT
3	Mr. Abhijit Lele, Robert Bosch India.	ABSENT
4	Mr. Jitendra Kataria, Beckhoff Automation India . Ltd. Pune	PRESENT
5	Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.	PRESENT
6	Mrs. Jyoti Bali, A & R Dept.	PRESENT
7	Mr. Vinod Kumar V Meti, A & R Dept.	PRESENT
8	Mr. Nagaraj M B, A & R Dept.	PRESENT
9	Mr. Sachin Karadgi, A & R Dept.	PRESENT

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KLE Society's
KLE Technological University
DEPARTMENT OF AUTOMATION & ROBOTICS

Department of Automation & Robotics
Structure of Board of Studies 2020-21, 03th June 2020

S. No.	Category	Nomination of the Committee		Name of the Person	Signature
1	Concerned Head of the Department/ School/ Center	Chairperson	1	Arunkumar C Giriyapur	Present
2	ONE Professor, ONE Associate Professor and ONE Assistant Professor from the Department/ School/ Center, nominated by the Dean Academic Affairs	Members		Dr. Jyoti Bali	Present
				Dr. Vinod Kumar V Meti	Present
				Dr. Sachin Karadgi	Present
				Mr. Nagaraj.M.B	Present
3	ONE PG Coordinator for each of the PG programmes offered by the Department/ School/ Center	Member(s)	1	NILL	
			2	NILL	
3	TWO Subject experts from outside the college nominated by the Vice-Chancellor	Members	1	Dr. Dhanesh Manik, IIT Bombay.	Present
4	TWO representative from industry corporate sector/ allied area relating to placement nominated by the Vice-Chancellor	Members	1	Mr. Jitendra Kataria, Beckhoff Automation India Ltd.Pune	Present
			2		
5	ONE Post-graduate meritorious alumnus nominated by the Vice-Chancellor	Member	1	Mr. Supreet Kamatagi	Present
6	ONE Student Member representing each of the program offered by the Department/ School/ Center	Invited Member	1	UG Student (Not Applicable at present)	
			2	PG Student (Not Applicable at present)	
			3	PhD Student (Not Applicable at present)	

The concerned Chairman of Board of Studies may invite additional experts to the Departmental Board of Studies as deemed fit.

A Departmental Board of Studies shall:
Meet at least once a year, sufficiently before the commencement;
Prepare detailed curricula and syllabi of concerned Programmes and submit to the Academic Council for approval and publication; and
Revise the curricula and syllabi from time to time and submit to the Academic Council for approval and publication

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Semester: III & IV (2019-23 batch)

Date of Review: 03-06-2020

Inputs for review: PEO- Mapping of CLO with PO – Academic Guidelines-Previous review outcomes

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits	✓		
b	Flow	✓		
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits	✓		
b	Flow	✓		
c	Contact hours	✓		
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents	✓		
b	Unitization	✓		
c	Reference books	✓		
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
	No major changes proposed by BOS members

Reviewed by (Use initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Jitendra Kataria	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB
Signature	Virtually present	Absent	Virtually present	Virtually present				

KLE TECH.	FORM ISO 9001: 2015- KLE TECH Department of Automation & Robotics	Document #: FMCD2006	Rev: 1.0
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Semester: V & VI (2018-22 batch)

Date of Review: 03-06-2020

Inputs for review: PEO- Mapping of CLO with PO – Academic Guidelines-Previous review outcomes

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits	✓		
b	Flow	✓		
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits	✓		
b	Flow	✓		
c	Contact hours	✓		
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents	✓		
b	Unitization	✓		
c	Reference books	✓		
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
	No major changes in the V semester syllabus suggested.
	Reviewed in specific the syllabus of Machine Learning & ROS and also the hands-on practices

Reviewed by (Use initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Jitendra Kataria	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB
Signature	Virtually present	Absent	Virtually present	Virtually present				

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Semester: VII & VIII (2017-21 batch)

Date of Review: 03-06-2020

Inputs for review: PEO- Mapping of CLO with PO – Academic Guidelines-Previous review outcomes

Sr.No	Features reviewed	Status of Review		
		Accepted	Accepted with minor changes	Not accepted
01	**Overall schemes of the program**			
a	Credits	✓		
b	Flow	✓		
c	Contact hours	✓		
02	**Semester wise curriculum structure**			
a	Credits	✓		
b	Flow	✓		
c	Contact hours	✓		
d	Evaluation scheme	✓		
03	**Course contents**			
a	Subject contents	✓		
b	Unitization	✓		
c	Reference books	✓		
d	Evaluation method	✓		

Changes Suggested (Serial number wise)	
	As per the feedback from Academic Council and BOS 2019, syllabus changes made are proposed.
	Discussion on the electives prescribed done and syllabus presented and got it approved.

Reviewed by (Use initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Jitendra Kataria	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB
Signature	Virtually present	Absent	Virtually present	Virtually present				

KLE Technological University — Creating Value, Leveraging Knowledge	FORM ISO 9001:2008- BVBCET Department of Automation & Robotics	Document # : FMCD2003	Rev:1.0
Title: Curriculum Structure- Overall			Page of Year:2020

Semester 2018-22 Batch

III	IV	V	VI	VII	VIII
STATISTICS AND INTEGRAL TRANSFORMS	numerical methods and partial differential equations	Mini Project	Computer Vision & Digital Image Processing	Industrial Data Networks	Department Elective-6
CALCULUS AND INTEGRAL TRANSFORMS	vector calculus and differential equations	NUMERICAL METHODS AND STATISTICS	Real Time Embedded Systems	Mobile robotics & Perception	Internship Training
Analog & Digital Electronic Circuits	Manufacturing & Metrology lab	Machine Learning & ROS	Power Electronics Motors and Drives	Design of automatic machinery	Industry Internship - Project Work
Kinematics Of Machinery	Machine Design	Programming Industrial Automation Systems	Hydraulics And Pneumatics Lab	Advanced Microcontroller	Project
Data Stucture Algorithm Design and Analysis	Control Systems	Real time Embedded Systems	Real Time Embedded Systems Lab	Project-1	
Mechanics Of Materials	Microcontrollers Programming & Interfacing	Mechatronics System Design	PA & LR	CIPE	
Manufacturing Technology	Object Oriented Programming & DBMS	Measurement Systems	Hydraulics & Pneumatics		
Analog & Digital Electronic Circuits Lab	Robot Analysis & Design	Machine Learning & ROS Lab	AI for Autonomous Robots		
Kinematics Of Machinery lab	Microcontrollers Programming & Interfacing Lab	Programming Industrial Automation Systems Lab	Digital System Design & FPGA Programming		
Machine Drawing Lab	Object Oriented Programming & DBMS Lab	Industrial Robotics Lab Minor Project	Industrial Robotics Lab		

Course with course code

Approved by (Use Initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Jitendra Kataria	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB
Signature	Virtually present	Absent	Virtually present	Virtually present				

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	Title: Curriculum Structure- Overall		Page of Year:2020

Semester 2019-23 Batch

Course with course code

III	IV	V	VI	VII	VIII
STATISTICS AND INTEGRAL TRANSFORMS	numerical methods and partial differential equations	Mini Project	Computer Vision & Digital Image Processing	Industrial Data Networks	Department Elective-6
CALCULUS AND INTEGRAL TRANSFORMS	vector calculus and differential equations	NUMERICAL METHODS AND STATISTICS	Real Time Embedded Systems	Mobile robotics & Perception	Internship Training
Analog & Digital Electronic Circuits	Manufacturing & Metrology lab	Machine Learning & ROS	Power Electronics Motors and Drives	Design of automatic machinery	Industry Internship - Project Work
Kinematics Of Machinery	Machine Design	Programming Industrial Automation Systems	Hydraulics And Pneumatics Lab	Advanced Microcontroller	Project
Data Stucture Algorithm Design and Analysis	Control Systems	Real time Embedded Systems	Real Time Embedded Systems Lab	Project-1	
Mechanics Of Materials	Microcontrollers Programming & Interfacing	Mechatronics System Design	PA & LR	CIPE	
Manufacturing Technology	Object Oriented Programming & DBMS	Measurement Systems	Hydraulics & Pneumatics		
Analog & Digital Electronic Circuits Lab	Robot Analysis & Design	Machine Learning & ROS Lab	AI for Autonomous Robots		
Kinematics Of Machinery lab	Microcontrollers Programming & Interfacing Lab	Programming Industrial Automation Systems Lab	Digital System Design & FPGA Programming		
Machine Drawing Lab	Object Oriented Programming & DBMS Lab	Industrial Robotics Lab Minor Project	Industrial Robotics Lab		

Approved by (Use Initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Jitendra Kataria	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB
Signature	Virtually present	Absent	Virtually present	Virtually present				

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Title: Curriculum Structure- Overall			Page of Year:2020

Semester 2017-21 Batch

Course with course code

III	IV	V	VI	VII	VIII
STATISTICS AND INTEGRAL TRANSFORMS	numerical methods and partial differential equations	NUMERICAL METHODS AND STATISTICS	Computer Vision & Digital Image Processing	Industrial Data Networks	Department Elective-6
CALCULUS AND INTEGRAL TRANSFORMS	vector calculus and differential equations	Object Oriented Programming and Data base management systems	Real Time Embedded Systems	Mobile robotics & Perception	Internship Training
Analog & Digital Electronic Circuits	Manufacturing Technology	Programming Industrial Automation Systems	Power Electronics Motors and Drives	Design of automatic machinery	Industry Internship -Project Work
Mechanics Of Materials	Manufacturing & Metrology lab	Mechatronics System Design	Hydraulics And Pneumatics Lab	Advanced Microcontroller	Project
Algorithm Analysis And Program Design	Kinematics of Machinery	Measurement Systems	Real Time Embedded Systems Lab	Project-1	
Machine Design	Microcontrollers	Machine Learning & ROS	PA & LR	CIPE	
Analog And Digital Electronic Circuits Lab	Control Systems	Robot analysis & design	Hydraulics & Pneumatics		
Machine Drawing Lab	Kinematics Lab	Object Oriented Programing and Data base management systems Lab	AI for Autonomous Robots		
Programming Lab	Microcontroller Lab	Programming Industrial Automation Systems Lab	Digital System Design & FPGA Programming		
		Mechatronics & Measurement Lab	Industrial Robotics Lab		
		Mini project	Minor Project		

Approved by (Use Initials)	DR. Dhanesh Manik	Mr. Abhijit Lele	Mr. Jitendra Kataria	Supreet Kamatagi	A.C.Giriyapur	Jyoti Bali	Vinod Meti	Nagaraj MB
Signature	Virtually present	Absent	Virtually present	Virtually present				

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Changes made in Curriculum Content for III and IV Semester of batch 2019-22, IV & V Semester of the batch 2018-22, VII & VIII Semester of the batch 2017-21, in Vth BOS meeting held as Virtual Google Meet 3rd June 2020.

Approved by:

Sl. No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson, HOD, A & R Dept.	
2	Dr. Dhanesh Manik, IIT Bombay.	On-line Presence
3	Mr. Abhijit Lele, Robert Bosch India.	ABSENT
4	Mr. Jitendra Kataria, Beckhoff Automation India . Ltd. Pune	On-line Presence
5	Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.	On-line Presence
6	Dr. Jyoti Bali, A & R Dept.	
7	Dr. Vinod Kumar V Meti, A & R Dept.	
8	Dr. Sachin Karadgi, A & R Dept.	
9	Mr. Nagaraj M B, A & R Dept.	

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Resolutions Made During the 5th Board of Studies Meeting held on 3rd June 2020:

- Resolved to approve Syllabi for III and IV Semester of batch 2019-23, KLE Tech., as per the changes suggested by external and internal members.
- Resolved to approve Syllabi for V & VI Semester of the batch 2018-22, KLE Tech., as per the changes suggested by external and internal members.
- Resolved to approve Syllabi for VII & VIII Semester of the batch 2017-21, KLE Tech., as per the changes suggested by external and internal members.
- The suggested changes in the content of all the courses and laboratories discussed in the BOS meeting are attached with this document.

Approved by:

Sl No	Members, BOS	Signature
1	Prof. A. C. Giriyapur, Chairperson, HOD, A & R Dept.	
2	Dr. Dhanesh Manik, IIT Bombay.	Online Presence
3	Mr. Abhijit Lele, Robert Bosch India.	ABSENT
4	Mr. Jitendra Kataria, Beckhoff Automation India . Ltd. Pune	Online Presence
5	Mr. Supreet Kamatagi, Griffyn Robotech Pvt. Ltd.	Online Presence
6	Dr. Jyoti Bali, A & R Dept.	
7	Dr. Vinod Kumar V Meti, A & R Dept.	
8	Dr. Sachin Karadgi, A & R Dept.	
9	Mr. Nagaraj M B, A & R Dept.	