SYLLABUS OF
UNDERGRADUATE DEGREE COURSE

Mechatronics

Effective for the students admitted in year 2021-22 and onwards.

B.Tech. : Mechatronics
4th Year - VII Semester

SN	Category	Course Code	Course Title	Hours			Marks			Credit
				L	T	P	IA	ETE	Total	
THEORY										
1	DC	7MX4-01	Design of Mechatronics System	3	0	0	30	70	**100**	**3**
2	DE		**DE-IV(Any one)**	2	0	0	30	70	**100**	**2**
		7MX5-11	Robotics							
		7MX5-12	Integrated Circuit Technology							
		7MX5-13	VLSI Design							
		7MX5-14	Fundamentals of Machine Learning							
3	UE		**University Elective I (Any one)**	3	0	0	30	70	**100**	**3**
			SUB TOTAL	**8**	**0**	**0**	**90**	**210**	**300**	**8**
PRACTICAL & SESSIONAL										
4	DC	7MX4-20	Mechatronics Lab	0	0	2	60	40	**100**	**1**
5	UI	7MX7-30	Industrial Training	0	0	2*	60	40	**100**	**3**
6		7MX7-50	Project Stage-1	0	0	4*	60	40	**100**	**2**
7	CCA	7MX8-00	SODECA/NCC/NSS/ ANANDAM/IPR	-	-	-	-	100	**100**	**1**
			SUB TOTAL	**0**	**0**	**8**	**180**	**220**	**400**	**7**
			TOTAL OF VII SEMESTER	**8**	**0**	**8**	**270**	**430**	**700**	**15**

L = Lecture, **T** = Tutorial, **P** = Practical, **IA**=Internal Assessment, **ETE**=End Term Exam, **Cr**=Credits

***for calculation of contact hours**

B.Tech. : Mechatronics
4th Year - VIII Semester

THEORY										
SN	Category	Course Code	Course Title	Hours			Marks			Credit
				L	T	P	IA	ETE	Total	
1	UE		**University Elective II (Any one)**	3	0	0	30	70	**100**	**3**
			SUB TOTAL	**3**	**0**	**0**	**30**	**70**	**100**	**3**
PRACTICAL & SESSIONAL										
2	UI	8MX7-50	Project stage II	0	0	4*	60	40	**100**	**4**
3		8MX7-40	Seminar	0	0	2*	60	40	**100**	**2**
4	CCA	8MX8-00	SODECA/NCC/NSS/ ANANDAM/IPR	-	-	-	-	100	**100**	**2**
			SUB TOTAL	**0**	**0**	**6**	**120**	**180**	**300**	**8**
			TOTAL OF VIII SEMESTER	**3**	**0**	**6**	**150**	**250**	**400**	**11**

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***for calculation of contact hours**

7MX4-01: Design of Mechatronics System

Credit: 3Max **Marks: 100(IA: 30, ETE: 70)**

3L+0T+0P **End Term Exam: 3 Hours**

Course Objectives

1. Enable the students to explain fundamentals of mechatronics system.
2. Develop the ability to understand system modeling.
3. Ability to analyze and design System Interfacing.
4. Ability to analyze Case Studies of Mechatronics System
5. Understand the Micro Mechatronic System

Course Outcomes

Student will be able to

1. Students will be able to explain fundamentals of mechatronics system
2. Students will be able understand system modeling.
3. Ability to analyze and design System Interfacing.
4. Students will be able Case Studies of Mechatronics System.
5. Students will be able understand the Micro Mechatronic System

S. No	Contents	Hours
1	Fundamentals: Introduction to Mechatronics system- key element Mechatronics Design process-Types of design-Design Parameter-Traditional and Mechatronics designs- Advanced approaches in Mechatronics Industrial design and ergonomics, safety	6
2	System Modelling: Introduction-model categories-fields of application-model development-model verification-model validation-model simulation-design of mixed systems-electro mechanics design-model transformation-domain-independent description forms simulator coupling	8
3	System Interfacing: Introduction-selection of interface cards-DAQ card-single channel-multichannal-RS232/422/485 communication- IEEE devices, 488 standard interface-GUI card-GPIB-Ethernet switch -Man machine interface	8
4	Case Studies of Mechatronics System: Introduction-Fuzzy based Washing machine-pH control system- Autofocus Camera, exposure control-Motion control using D.C.Motor & Solenoids-Engine management systems. Controlling temperature of a hot/cold reservoir using PID- Control of pick and place robot- Part identification and tracking using RFID – Online surface measurement using image processing.	9
5	Micro Mechatronic System: Introduction- System principle - Component design – System design-Scaling laws- Micro actuation- Micro robot- Micro pump - Applications of micro mechatronic components.	9

TEXT BOOKS

1. Shetty, D., and Kolk, R.A., "Mechatronics System Design," 2010/2nd Edition, Cengage Learning.

REFERENCE BOOKS

1. Mahalik, N.P., "Mechatronics: Principles, Concepts and Applications," 2012, McGraw-Hill Education.
2. Bolton, W., "Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering," 2018/7th

Edition, Pearson Education.

3. Karnopp, D.C., Margolis, D.L., and Rosenberg, R.C., "System Dynamics: Modeling, Simulation, and Control of Mechatronic Systems," 2012/5th Edition, Wiley.
4. Fukuda, T., and Nakagawa, H., "Micro Mechatronics," 1998, Springer.

7MX5-11: Robotics

Credit: 2 Max **Marks: 100(IA: 30, ETE: 70)**

2L+0T+0P **End Term Exam: 3 Hours**

Course Objectives

1. To provide knowledge of history and basics of Robots
2. To share knowledge of the direct and inverse kinematics of the Robotic manipulator.
3. To impart knowledge of sensors and its vision

Course Outcomes

Student will be able to

1. CO-1: To understand clearly the types of robot and its application in the engineering field.
2. CO-2: To be able to understand clearly the direct kinematics of robotic manipulators.
3. CO-3: To be able to understand clearly the inverse kinematics of robotic manipulators.
4. CO-4: To select appropriate sensors as per the application in robotics.
5. CO-5: To understand clearly about sensing and digitization function in machine vision.

Sr. No.	Contents	Hours
1.	Introduction: Definition and classification of ROBOTS by function, by size and by application manipulators; robotic arm, robotic hand, motion generators; Parallel robots, SCARA systems, Locomotors; legged robots, wheeled robots and rovers.	5
2.	Manipulator Kinematics: link description, link-connection description, convention for affixing frames to links, manipulator kinematics.	5
3.	Inverse Manipulator Kinematics: solvability, the notion of manipulator subspace when degrees of freedom less than six, algebraic verses geometric, algebraic solution reduction to polynomial PIEPER's solution when three axes intersect, Examples of inverse manipulator kinematics	6
4.	Sensors in Robotics: Transducers and sensors, sensors in robotics, tactile sensors, proximity and range sensors. Overview of modern sensor systems like LIDAR, ultrasonic, and infrared sensors.	6
5.	Open-loop vs. closed-loop control, PID Controllers: Design and application in robotics, Adaptive and Learning Control: Overview of advanced control strategies, Trajectory Planning: Path planning algorithms and real-time execution.	5
	Total	27

TEXT BOOKS

1. K. S. Fu, R. C. Gonzalez and C.S.G. Lee, ROBOTICS: Control, Sensing,Vision and Intelligence, McGraw-Hill, 1987.
2. B. K. P. Horn, Robot Vision, MIT Press, Cambridge,1986.

REFERENCE BOOKS

1. J. J. Craig, Introduction to Robotics, Addision-Wesley,1989.
2. Y. Koren, Robotics for Engineers, MsGraw Hill,1985.

7MX5-12: Integrated Circuit Technology

Credit: 2 Max **Marks: 100(IA: 30, ETE: 70)**

2L+0T+0P **End Term Exam: 3 Hours**

Course Objectives

1. To provide students with a thorough understanding of the ideal and practical characteristics of operational amplifiers, including their stages, internal circuit diagrams, and frequency response.
2. To equip students with the knowledge to apply operational amplifiers in various circuits and understand advanced concepts such as analog multipliers, phase-locked loops, and data converters.

Course Outcomes

Student will be able to

1. Analyze and describe the DC and AC characteristics, frequency response, and slew rate of operational amplifiers.
2. Students will be capable of designing and implementing various op-amp based circuits, including amplifiers, converters, filters, and waveform generators.
3. Students will understand and utilize various analog-to-digital and digital-to-analog conversion techniques, and perform SPICE simulations for these converters.

S. No		Hours
1	BASICS OF OPERATIONAL AMPLIFIERS Ideal OP-AMP characteristics, General operational amplifier stages -and internal circuit diagrams of IC 741, DC characteristics, AC characteristics, frequency response of OP-AMP, slew rate	6
2	APPLICATIONS OF OPERATIONAL AMPLIFIERS Basic applications of op-amp – Inverting and Non-inverting Amplifiers-V/I & I/V converters ,Voltage Follower, summer, subtractor, differentiator and integrator. Instrumentation amplifier, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.	8
3	ANALOG MULTIPLIER AND PLL Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.	8
4	ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R - 2R Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters. SPICE Simulation of D/A and A/D converters	6

5	WAVEFORM GENERATORS AND SPECIAL FUNCTION ICS 15 Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - Design and testing of Astable & Monostable multivibrators, Phase shift and Wien bridge oscillators, DC power supply	6

TEXT BOOKS

1. D.Roy Choudhry, Shail Jain, “Linear Integrated Circuits”, New Age International Pvt. Ltd.,Fifth edition 2018.
2. Sergio Franco, “Design with Operational Amplifiers and Analog Integrated Circuits”, Forth Edition,Tata Mc Graw-Hill, 2014.

REFERENCE BOOKS

1. Ramakant A. Gayakwad, “OP-AMP and Linear ICs”, 4 th Edition, Prentice Hall / Pearson Education,2001.
2. Robert F.Coughlin, Frederick F.Driscoll, “Operational Amplifiers and Linear Integrated Circuits”,Sixth Edition, PHI, 2001.
3. B.S.Sonde, “System design using Integrated Circuits” , 2 nd Edition, New Age Pub, 2001
4. Gray and Meyer, “Analysis and Design of Analog Integrated Circuits”, Wiley International, 2005

7MX5-13: VLSI Design

Credit: 2 Max **Marks: 100(IA: 30, ETE: 70)**

2L+0T+0P **End Term Exam: 3 Hours**

Course Objectives

1. To provide students with a comprehensive understanding of MOS transistors, CMOS logic, and the fundamental principles of digital circuit design.
2. To equip students with the knowledge and skills required to design and test various combinational and sequential MOS logic circuits, as well as arithmetic building blocks and subsystems.

Course Outcomes

Student will be able to

1. Students will be able to analyze and design circuits using MOS transistors, CMOS logic, and understand the associated layout design rules and characteristics.
2. Students will be capable of designing and implementing combinational and sequential logic circuits, including various circuit families and power optimization techniques.
3. Students will gain proficiency in designing arithmetic building blocks, implementing FPGA-based systems, and applying various testing strategies for digital circuits.

S. No	Contents	Hours
1	INTRODUCTION TO MOS TRANSISTOR MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate, Layout Design Rules, Gate Layouts, Stick Diagrams, Long-Channel I-V Charters tics, C-V Charters tics, Non ideal I-V Effects, DC Transfer characteristics.	7
2	COMBINATIONAL MOS LOGIC CIRCUITS Circuit Families: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass Transistor Logic, Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG, DPL, Circuit Pitfalls. Power: Dynamic Power, Static Power, Low Power Architecture.	8
3	SEQUENTIAL CIRCUIT DESIGN Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense Amplifier Based Register, Pipelining, Schmitt Trigger, Monostable Sequential Circuits, Astable Sequential Circuits.	5
4	DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speed tradeoffs, Case Study: Design as a tradeoff.	6
5	IMPLEMENTATION STRATEGIES AND TESTING FPGA Building Block Architectures, FPGA Interconnect Routing Procedures. Design for Testability: Ad Hoc Testing, Scan Design, BIST, IDDQ Testing.	4

TEXT BOOKS

1. Weste, N.H.E., and Harris, D., "CMOS VLSI Design: A Circuits and Systems Perspective," 2010/4th Edition, Addison-Wesley.
2. Kang, S.M., and Leblebici, Y., "CMOS Digital Integrated Circuits: Analysis and Design," 2014/4th Edition,

McGraw-Hill Education.

REFERENCE BOOKS

1. Rabaey, J.M., Chandrakasan, A., and Nikolic, B., "Digital Integrated Circuits: A Design Perspective," 2003/2nd Edition, Prentice Hall.
2. Uyemura, J.P., "CMOS Logic Circuit Design," 2001, Springer.
3. Baker, R.J., "CMOS: Circuit Design, Layout, and Simulation," 2019/4th Edition, Wiley-IEEE Press.

7MX5-14: Fundamentals of Machine Learning

(Common with ME and MX)

Credit: 2 Max **Marks: 100(IA: 30, ETE: 70)**

2L+0T+0P **End Term Exam: 3 Hours**

Course Objective:

Provide a comprehensive understanding of machine learning techniques, including advanced algorithms and feature engineering, to effectively analyse and solve real-world problems

Course Outcomes:

Student will be able to

1. Understand the basic concept of machine learning techniques and their applications to real-life problems.
2. Explain the theories and principles underlying various machine learning algorithms.
3. Apply appropriate machine learning algorithm to solve problems of varying complexity.
4. Analyse and evaluate the performance of machine learning models, including their strength and limitations.
5. Optimize machine learning models learned and report on the expected accuracy and potential improvement for real-world problems.

S. No	Contents	Hours
1	**Introduction:** Introduction to Machine Learning, Applications of machine learning, Need of ML in Mechanical Engineering, Understanding ML vs. AI vs. DL, Types of ML: Supervised, Unsupervised, Reinforcement learning, Feature engineering and model selection.	4
2	**Classification:** Classification definition, Naive Bayes, Support vector machines (SVM), Ensemble methods (bagging, boosting), XGBoost (Extreme Gradient Boosting), CatBoost, LightGBM.	5
3	**Regression:** Linear regression, Logistic regression, Support vector machines, Decision trees, Random forests, K-Means, K-Nearest Neighbour (KNN).	5
4	**Unsupervised Learning:** K-Means, MeanShift, DBSCAN (Density-Based Spatial Clustering of Applications with Noise), Distribution-based Clustering (Gaussian Mixture Model), Hierarchical Clustering, BIRCH (Balanced Iterative Reducing and Clustering using Hierarchies).	6
5	**Feature Extraction and Selection** Feature extraction: Statistical features, Principal Component Analysis, Creating new features from domain knowledge. Feature selection: Ranking, Decision tree - Entropy reduction and information gain, Exhaustive, best first, Greedy forward & backward.	6
6	**Reinforced learning:** Algorithms: Value Based, Policy Based, Model Based; Positive vs Negative Reinforced Learning; Models: Markov Decision Process, Q Learning.	4

TEXT BOOKS

1. Bishop, C. M., “Pattern Recognition and Machine Learning”, New York: Springer, 2006.
2. Géron, A., “Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow”, O'Reilly Media, Inc., 2022.
3. James, G., Witten, D., Hastie, T., & Tibshirani, R., “An Introduction to Statistical Learning: With Applications in R”. New York: Springer, 2013.
4. Theobald O., “Machine Learning for Absolute Beginners: A Plain English Introduction”, The author, 2017.

REFERENCE BOOKS

1. Mitchell. T, “Machine Learning”, McGraw Hill, 1997.
2. Nilsson, Nils J. "Introduction to machine learning: An early draft of a proposed textbook", Robotics Laboratory, Department of Computer Science, Stanford University, Stanford, 1998.
3. Flach, P., “Machine Learning: The Art and Science of Algorithms that Make Sense of Data”, Cambridge University Press, 2012.
4. Zollanvari, A., “Machine Learning with Python: Theory and Implementation”, Springer Nature, 2023.

7MX4-20: Mechatronics Lab

Credit: 1Max **Marks: 100(IA: 60, ETE: 40)**

0L+0T+2P

Course Objectives

1. Measuring of physical quantity such as displacement, force and temperature and also the operation of signal conditioning circuits
2. Applying a suitable sensor and image processing technique for Mechatronics systems.
3. Design appropriate circuits to automate and control the hydraulic, pneumatic and electric actuators
4. Apply PLC, PID and 8085 microcontroller as a control unit Mechatronics system
5. Developing a model of pneumatic and hydraulic circuits by using simulation software

Course Outcomes

Upon successful completion of the course the students will be able to;

1. Measuring of physical quantity such as displacement, force and temperature and also the operation of signal conditioning circuits
2. Applying a suitable sensor and image processing technique for Mechatronics systems
3. Design appropriate circuits to automate and control the hydraulic, pneumatic and electric actuators
4. Apply PLC, PID and 8085 microcontroller as a control unit in Mechatronics system
5. Developing a model of pneumatic and hydraulic circuits by using simulation software

S.No.	Practical
1.	Introduction to Mechatronics
2.	Assembly language programming of 8085 – Addition – Subtraction – Multiplication – Division – Sorting – Code Conversion
3.	Stepper motor interface
4.	Traffic light interface
5.	Speed control of DC motor
6.	Study of various types of transducers
7.	Study of hydraulic, pneumatic and electro-pneumatic circuits
8.	Modelling and analysis basic hydraulic, pneumatic and electrical circuits using software
9.	Study of PLC and its applications
10.	Study of image processing

SCHEME OF
UNDERGRADUATE DEGREE COURSE

Mechatronics

Effective for the students admitted in year 2021-22 and onwards.

B.Tech.: Mechatronics
2nd Year - III Semester

f THEORY										
SN	Category	Course Code	Course Title	Hours			Marks			Credit
				L	T	P	IA	ETE	Total	
1	DC	3MX4-01	Engineering Thermodynamics	3	1	0	30	70	**100**	**4**
2		3MX4-02	Digital System Design	3	0	0	30	70	**100**	**3**
3		3MX4-03	Manufacturing Processes	3	0	0	30	70	**100**	**3**
4		3MX4-04	Materials Engineering and Technology	3	0	0	30	70	**100**	**3**
5		3MX4-05	Elements of Electronics	3	0	0	30	70	**100**	**3**
6	UC	3MX2-01	Engineering Mechanics	2	1	0	30	70	**100**	**3**
			Sub Total	**17**	**2**	**0**	**180**	**420**	**600**	**19**
PRACTICAL & SESSIONAL										
7	DC	3MX4-20	Machine Drawing Practice	0	0	2	60	40	**100**	**1**
8		3MX4-21	Production Practice Lab	0	0	2	60	40	**100**	**1**
9		3MX4-22	Electronic Devices and Circuits Lab	0	0	2	60	40	**100**	**1**
10		3MX4-23	Digital System Design Lab	0	0	2	60	40	**100**	**1**
11	UI	3MX7-30	Professional Training	0	0	2*	60	40	**100**	**1**
12	CCA	3MX8-00	SODECA/NCC/NSS/ ANANDAM/IPR	0	0	-	-	100	**100**	**1**
			Sub- Total	**0**	**0**	**10**	**300**	**300**	**600**	**6**
			TOTAL OF III SEMESTER	**17**	**2**	**10**	**480**	**720**	**1200**	**25**

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***for calculation of contact hours**

B.Tech. : Mechatronics
2nd Year - IV Semester

SN	Category	Course Code	Course Title	Hours			Marks			Credit
				L	T	P	IA	ETE	Total	
THEORY										
1	DC	4MX4-01	Mechanics of Solids	3	1	0	30	70	**100**	**4**
2		4MX4-02	Fluid Mechanics	3	1	0	30	70	**100**	**4**
3		4MX4-03	Analog Electronics	3	0	0	30	70	**100**	**3**
4		4MX4-04	Sensors and Instrumentation	3	0	0	30	70	**100**	**3**
5		4MX4-05	Internal Combustion Engines and Hybrid Controls	3	0	0	30	70	**100**	**3**
6	UC	4MX2-01	Advanced Engineering Mathematics	2	1	0	30	70	**100**	**3**
			Sub Total	**17**	**3**	**0**	**180**	**420**	**600**	**20**
PRACTICAL & SESSIONAL										
7	DC	4MX4-20	Materials Testing Lab	0	0	2	60	40	**100**	**1**
8		4MX4-21	Fluid Mechanics Lab	0	0	2	60	40	**100**	**1**
9		4MX4-22	Sensors and Instrumentation Lab	0	0	2	60	40	**100**	**1**
10		4MX4-23	Analog Electronics Lab	0	0	2	60	40	**100**	**1**
11	CCA	4MX8-00	SODECA/NCC/NSS/ ANANDAM/IPR	-	-	-	-	100	**100**	**1**
			Sub- Total	**0**	**0**	**8**	**240**	**260**	**500**	**5**
			TOTAL OF IV SEMESTER	**17**	**3**	**8**	**420**	**680**	**1100**	**25**

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***for calculation of contact hours**

B.Tech. : Mechatronics
3rd Year - V Semester

SN	Category	Course code	Course Title	Hours			Marks			Credit
				L	T	P	IA	ETE	Total	
THEORY										
1	DC	5MX4-01	Linear Integrated Circuits	3	0	0	30	70	**100**	**3**
2		5MX4-02	Linear Control Theory	3	0	0	30	70	**100**	**3**
3		5MX4-03	Microcontroller based System Design	3	0	0	30	70	**100**	**3**
4		5MX4-04	Theory of Machines	3	0	0	30	70	**100**	**3**
5		5MX4-05	Pneumatics and Hydraulic Systems	3	0	0	30	70	**100**	**3**
6	DE		**DE-I (Any one)**	3	0	0	30	70	**100**	**3**
		5MX5-11	CAD and CAM							
		5MX5-12	Heat Transfer							
		5MX5-13	Metrology and Measurements							
		5MX5-14	Digital Signal Processing							
			Sub Total	**18**	**0**	**0**	**180**	**420**	**600**	**18**
PRACTICAL & SESSIONAL										
7	DC	5MX4-20	Pneumatics and Hydraulic Lab	0	0	2	60	40	**100**	**1**
8		5MX4-21	Theory of Machines Lab	0	0	2	60	40	**100**	**1**
9		5MX4-22	Microcontroller Lab	0	0	2	60	40	**100**	**1**
10	DE		**DE II(Any one)** **(students have to opt the same lab relevant to DE-I)**	0	0	2	60	40	**100**	**1**
		5MX5-20	CAD and CAM Lab							
		5MX5-21	Heat Transfer Lab							
		5MX5-22	Metrology Lab							
		5MX5-23	Digital Signal Processing Lab							
11	UI	5MX7-30	Industrial Training	0	0	2*	60	40	**100**	**3**
12	CCA	5MX8-00	SODECA/NCC/NSS/ ANANDAM/IPR	-	-	-	-	100	**100**	**1**
			SUB TOTAL	**0**	**0**	**10**	**300**	**300**	**600**	**8**
			TOTAL OF V SEMESTER	**17**	**0**	**10**	**480**	**720**	**1200**	**26**

L = Lecture, **T** = Tutorial, **P** = Practical, **IA**=Internal Assessment, **ETE**=End Term Exam, **Cr**=Credits

***for calculation of contact hours

B.Tech. : Mechatronics
3rd Year - VI Semester

THEORY										
S.N.	Category	Course Code	Course Title	Hours			Marks			Credit
				L	T	P	IA	ETE	Total	
1	DC	6MX4-01	Industrial Engineering	3	0	0	30	70	**100**	**3**
2		6MX4-02	Computational Fluid Dynamics	3	0	0	30	70	**100**	**3**
3		6MX4-03	Power Electronics and Electrical Devices	3	0	0	30	70	**100**	**3**
4		6MX4-04	Machine design	3	0	0	30	70	**100**	**3**
5		6MX4-05	MEMS and Microsystems	2	0	0	30	70	**100**	**2**
6	DE		**DE-III (Any one)**	2	0	0	30	70	**100**	**2**
		6MX5-11	Industrial Automation							
		6MX5-12	Finite Element Methods							
		6MX5-13	Modelling and Simulation of Manufacturing Systems							
			Sub Total	**16**	**0**	**0**	**180**	**420**	**600**	**16**
PRACTICAL & SESSIONAL										
7	DC	6MX4-20	Machine Design Lab	0	0	3	60	40	**100**	**1.5**
8		6MX4-21	Drives, Control and Simulation Lab	0	0	2	60	40	**100**	**1**
9		6MX4-22	MATLAB Programming	0	0	3	60	40	**100**	**1.5**
10	UI	6MX7-50	Mini Project			4*	60	40	**100**	**2**
11	CCA	6MX8-00	SODECA/NCC/NSS/ ANANDAM/IPR	-	-	-	-	100	**100**	**2**
			SUB TOTAL	**0**	**0**	**12**	**240**	**260**	**500**	**8**
			TOTAL OF VI SEMESTER	**16**	**0**	**12**	**420**	**680**	**1100**	**24**

L = Lecture, **T** = Tutorial, **P** = Practical, **IA**=Internal Assessment, **ETE**=End Term Exam, **Cr**=Credits

***for calculation of contact hours**

B.Tech. : Mechatronics
4th Year - VII Semester

THEORY											
SN	**Category**	**Course Code**	**Course Title**	**Hours**			**Marks**			**Credit**
				L	**T**	**P**	**IA**	**ETE**	**Total**	
1	DC	7MX4-01	Design of Mechatronics System	3	0	0	30	70	**100**	**3**
2	DE		**DE-IV(Any one)**	2	0	0	30	70	**100**	**2**
		7MX5-11	Robotics							
		7MX5-12	Integrated Circuit Technology							
		7MX5-13	VLSI Design							
		7MX5-14	Fundamentals of Machine Learning							
3	UE		**University Elective I (Any one)**	3	0	0	30	70	**100**	**3**
			SUB TOTAL	**8**	**0**	**0**	**90**	**210**	**300**	**8**
PRACTICAL & SESSIONAL										
4	DC	7MX4-20	Mechatronics Lab	0	0	2	60	40	**100**	**1**
5	UI	7MX7-30	Industrial Training	0	0	2*	60	40	**100**	**3**
6		7MX7-50	Project Stage-1	0	0	4*	60	40	**100**	**2**
7	CCA	7MX8-00	SODECA/NCC/NSS/ ANANDAM/IPR	-	-	-	-	100	**100**	**1**
			SUB TOTAL	**0**	**0**	**8**	**180**	**220**	**400**	**7**
			TOTAL OF VII SEMESTER	**8**	**0**	**8**	**270**	**430**	**700**	**15**

L = Lecture, **T** = Tutorial, **P** = Practical, **IA**=Internal Assessment, **ETE**=End Term Exam, **Cr**=Credits

***for calculation of contact hours**

B.Tech. : Mechatronics
4th Year - VIII Semester

THEORY										
SN	**Category**	**Course Code**	**Course Title**	**Hours**			**Marks**			**Credit**
				L	**T**	**P**	**IA**	**ETE**	**Total**	
1	UE		**University Elective II (Any one)**	3	0	0	30	70	**100**	**3**
			SUB TOTAL	**3**	**0**	**0**	**30**	**70**	**100**	**3**
PRACTICAL & SESSIONAL										
2	UI	8MX7-50	Project stage II	0	0	4*	60	40	**100**	**4**
3		8MX7-40	Seminar	0	0	2*	60	40	**100**	**2**
4	CCA	8MX8-00	SODECA/NCC/NSS/ ANANDAM/IPR	-	-	-	-	100	**100**	**2**
			SUB TOTAL	**0**	**0**	**6**	**120**	**180**	**300**	**8**
			TOTAL OF VIII SEMESTER	**3**	**0**	**6**	**150**	**250**	**400**	**11**

L = Lecture, **T** = Tutorial, **P** = Practical, **IA**=Internal Assessment, **ETE**=End Term Exam, **Cr**=Credits

***for calculation of contact hours**