Scheme & Syllabus of

UNDERGRADUATE DEGREE COURSE

B.Tech. VII & VIII Semester

Electrical and Electronics Engineering

Rajasthan Technical University, Kota

Effective from session: 2020 – 2021

Teaching & Examination Scheme
B.Tech. : Electrical and Electronics Engineering
4th Year - VII Semester

SN	Category	Course		Hours per Week			Marks				Cr
		Code	Name	L	T	P	Exm Hrs	IA	ETE	Total	
1	PEC	7EX5-11	Digital Signal Processing.	3	0	0	3	30	120	**150**	**3**
2		7EX5-12	Digital Control System.								
3		7EX5-13	Image Processing and Pattern Recognitation								
4	OE		Open Elective-I	3	0	0	3	30	120	**150**	**3**
			Sub total	**6**	**0**	**0**		**60**	**240**	**300**	**6**
PRACTICAL & SESSIONAL											
5	PCC	7EX4-21	DBMS Lab	0	0	4	2	60	40	**100**	**2**
6	PCC	7EX4-22	Advanced Control System Lab	0	0	4	2	60	40	**100**	**2**
7	PSIT	7EX7-30	Industrial Training	1	0	0		75	50	**125**	**2.5**
8		7EX7-40	Seminar	2	0	0		60	40	**100**	**2**
9	SODECA	7EX8-00	Social Outreach, Discipline & Extra Curricular Activities	0	0	0			25	**25**	**0.5**
			Sub total	**3**	**0**	**8**		**255**	**195**	**450**	**9**
			TOTAL of VII SEMESTER	**9**	**0**	**8**		**315**	**435**	**750**	**15**

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

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

Teaching & Examination Scheme
B.Tech. : Electrical and Electronics Engineering
4th Year - VIII Semester

SN	Category	Course		Hours per Week			Marks				Cr
		Code	Name	L	T	P	Exm Hrs	IA	ETE	Total	
1	PCC	8EX4-01	Digital Communication and Information Theory	3	0	0	3	30	120	**150**	**3**
2	OE		Open Elective-II	3	0	0	3	30	120	**150**	**3**
			Sub Total	**6**	**0**	**0**		**60**	**240**	**300**	**6**
PRACTICAL & SESSIONAL											
3	PCC	8EX4-21	Embedded Systems Lab	0	0	4		60	40	**100**	**2**
6	Project	8EX7-50	Project	3	0	0		210	140	**350**	**7**
7	SODECA	8EX8-00	SODECA	0	0	0		0	25	**25**	**0.5**
			Total	**3**	**0**	**4**		**270**	**205**	**475**	**9.5**
	TOTAL of VII SEMESTER			**9**	**0**	**4**		**330**	**445**	**775**	**15.5**

L: *Lecture,* ***T:*** *Tutorial,* ***P:*** *Practical,* ***Cr:*** *Credits*
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List of Open Electives for Electrical and Electronics Engineering				
Subject Code	**Title**		**Subject Code**	**Title**
Open Elective - I			**Open Elective - II**	
7AG6-60.1	Human Engineering and Safety		8AG6-60.1	Energy Management
7AG6-60.2	Environmental Engineering and Disaster Management		8AG6-60.2	Waste and By-product Utilization
7AN6-60.1	Aircraft Avionic System		8AN6-60.1	Finite Element Methods
7AN6-60.2	Non-Destructive Testing		8AN6-60.2	Factor of Human Interactions
7CH6-60.1	Optimization Techniques		8CH6-60.1	Refinery Engineering Design
7CH6-60.2	Sustainable Engineering		8CH6-60.2	Fertilizer Technology
7CR6-60.1	Introduction to Ceramic Science & Technology		8CR6-60.1	Electrical and Electronic Ceramics
7CR6-60.2	Plant, Equipment and Furnace Design		8CR6-60.2	Biomaterials
7CE6-60.1	Environmental Impact Analysis		8CE6-60.1	Composite Materials
7CE6-60.2	Disaster Management		8CE6-60.2	Fire and Safety Engineering
7CS6-60.1	Quality Management/ISO 9000		8CS6-60.1	Big Data Analytics
7CS6-60.2	Cyber Security		8CS6-60.2	IPR, Copyright and Cyber Law of India
7EC6-60.1	Principle of Electronic communication		8EC6-60.1	Industrial and Biomedical applications of RF Energy
7EC6-60.2	Micro and Smart System Technology		8EC6-60.2	Robotics and control
7ME6-60.1	Finite Element Analysis		8ME6-60.1	Operations Research
7ME6-60.2	Quality Management		8ME6-60.2	Simulation Modeling and Analysis
7MI6-60.1	Rock Engineering		8MI6-60.1	Experimental Stress Analysis
7MI6-60.2	Mineral Processing		8MI6-60.2	Maintenance Management
7PE6-60.1	Pipeline Engineering		8PE6-60.1	Unconventional Hydrocarbon Resources
7PE6-60.2	Water Pollution control Engineering		8PE6-60.2	Energy Management & Policy
7TT6-60.1	Technical Textiles		8TT6-60.1	Material and Human Resource Management
7TT6-60.2	Garment Manufacturing Technology		8TT6-60.2	Disaster Management

7EX5-11: DIGITAL SIGNAL PROCESSING

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Discrete-time signals and systems** Discrete time signals and systems: Sequences; representation of signals on orthogonal basis; Representation of discrete systems using difference equations, Samplingand reconstruction of signals - aliasing; Sampling theorem and Nyquist rate	08
3	**Z-transform** z-Transform, Region of Convergence, Analysis of Linear Shift Invariant systems using ztransform, Properties of z-transform for causal signals, Interpretation of stability in z-domain, Inverse z-transforms.	06
4	**Discrete Fourier Transform** Frequency Domain Analysis, Discrete Fourier Transform (DFT), Properties of DFT, Connvolution of signals, Fast Fourier Transform Algorithm, Parseval's Identity, Implementation of Discrete Time Systems	10
5	**Design of Digital filters** Design of FIR Digital filters: Window method, Park-McClellan's method. Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations; Low-pass, Band-pass, Bandstop and High-pass filters. Effect of finite register length in FIR filter design. Parametric and non-parametric spectral estimation. Introduction to multi-rate signal processing	11
6	**Applications of Digital Signal Processing** Correlation Functions and Power Spectra, Stationary Processes, Optimal filtering using ARMA Model, Linear Mean-Square Estimation, Wiener Filter.	06
	TOTAL	

Text/Reference Books	
1	S. K. Mitra, "Digital Signal Processing: A computer based approach", McGraw Hill, 2011.
2	A.V. Oppenheim and R. W. Schafer, "Discrete Time Signal Processing", Prentice Hall, 1989.
3	J. G. Proakis and D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms And Applications", Prentice Hall, 1997.
4	L. R. Rabiner and B. Gold, "Theory and Application of Digital Signal Processing", Prentice Hall, 1992.
5	J. R. Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 1992.
6	D. J. DeFatta, J. G. Lucas and W. S. Hodgkiss, "Digital Signal Processing", John Wiley & Sons, 1988.

7EX5-12: DIGITAL CONTROL SYSTEM

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Discrete Representation of Continuous Systems Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuit. Mathematical Modelling of sample and hold circuit. Effects of Sampling and Quantization. Choice of sampling frequency. ZOH equivalent.	05
3	Discrete System Analysis Z-Transform and Inverse Z Transform for analyzing discrete time systems. Pulse Transfer function. Pulse transfer function of closed loop systems. Mapping from s-plane to z plane. Solution of Discrete time systems. Time response of discrete time system.	06
4	Stability of Discrete Time System Stability analysis by Jury test. Stability analysis using bilinear transformation. Design of digital control system with dead beat response. Practical issues with dead beat response design.	06
5	State Space Approach for discrete time systems State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reach-ability, Reconstructibility and observability analysis. Effect of pole zero cancellation on the controllability & observability	06
6	Design of Digital Control System Design of Discrete PID Controller, Design of discrete state feedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.	05
7	Discrete output feedback control Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems	06
	TOTAL	36

Text/Reference Books	
1	K. Ogata, “Digital Control Engineering”, Prentice Hall, Englewood Cliffs, 1995.
2	M. Gopal, “Digital Control Engineering”, Wiley Eastern, 1988.
3	G. F. Franklin, J. D. Powell and M. L. Workman, “Digital Control of Dynamic Systems”, Addison-Wesley, 1998.
4	B.C. Kuo, “Digital Control System”, Holt, Rinehart and Winston, 1980.

7EX5-13: IMAGE PROCESSING AND PATTERN RECOGNITION

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Imaging in ultraviolet and visible band:** Fundamental steps in image processing. Components inimage processing. Image perception in eye, light and electromagnetic spectrum, Image sensing and acquisition using sensor array.	7
3	**Digital Image Fundamentals:** Image sampling and quantization, Representing digital images, Spatial and gray-level resolution, Aliasing and Moiré patterns, zooming and Shrinking digital images.	8
4	**Image Restoration:** Image restoration model, Noise Models, Spatial and frequency properties of noise, noise probability density functions. Noise - only spatial filter, Mean filter Statistic filter and adaptive filter, Frequency domain filters - Band reject filter, Band pass filter and Notch filter.	8
5	**Image Compression:** Compression Fundamentals - Coding Redundancy, Interpixel redundancy, Psycho visual redundancy and Fidelity criteria. Image Compression models, Source encoder and decoder. Channel encoder and decoder, Lossy compression and compression standards. Color space formats, scaling methodologies (like horizontal, vertical up/down scaling). Display format (VGA, NTSC, P AL).	8
6	**Expert System and Pattern Recognition:** Use of computers in problem solving, information representation, searching, theorem proving, and pattern matching with substitution. Methods for knowledge representation, searching, spatial, temporal and common sense reasoning, and logic and probabilistic inferencing. Applications in expert systems and robotics.	8
	TOTAL	

Text/Reference Books	
1	Rafael C. Gonzalez: Digital Image Processing, Pearson Education, Asia. 2009
2	Vipula Singh: Digital Image Processing, Elesvier. 2013
3	Nick Effard: Digital Image Processing, Pearson Education, Asia. 2000
4	Jain A. K.: Digital Image Processing, Prentice Hall of India 1989
5	Shinghal: Pattern Recognition- Techniques and Applications, Oxford. 2006 Jayaraman: Digital Image Processing, TMH. 2011

7EX4-21:DATA BASED MANAGEMENT SYSTEM LAB

Credit: 2 **Max. Marks: 100(IA:60, ETE:40)**

0L+0T+4P

SN	Contents
1	Designing database and constraints using DDL statements.
2	Experiments for practicing SQL query execution on designed database.
3	Database connectivity using JDBC/ODBC.
4	Features of embedded SQL.
5	Designing front end in HLL and accessing data from backend database.
6	Designing simple projects using front end-back end programming.
7	Project for generating Electricity Bills
8	Project for managing student's attendance/marks details.

7EE4-22: Advanced Control System Lab

Credit: 2 **Max. Marks: 100(IA:60, ETE:40)**

0L+0T+4P

SN	Contents
1	Determination of transfer functions of DC servomotor and AC servomotor.
2	Time domain response of rotary servo and Linear servo (first order and second order) systems using MATLAB/Simulink.
3	Simulate Speed and position control of DC Motor
4	Frequency response of small-motion, linearized model of industrial robot (first and second order) system using MATLAB.
5	Characteristics of PID controllers using MATLAB. Design and implementation of P, PI and PID Controllers for temperature and level control systems;
6	Design and implement closed loop control of DC Motor using MATLAB/Simulink and suitable hardware platform.
7	Implementation of digital controller using microcontroller;
8	Design and implementation of controller for practical systems - inverted pendulum system.
9	To design and implement control action for maintaining a pendulum in the upright position (even when subjected to external disturbances) through LQR technique in an Arduino Mega.
10	The fourth order, nonlinear and unstable real-time control system (Pendulum & Cart Control System)
11	Mini project on real life motion control system

8EX4-01: DIGITAL COMMUNICATION AND INFORMATION THEORY

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**PCM & DELTA Modulation Systems:**PCM and delta modulation, quantization noise in PCM and delta modulation. Signal-to-noise ratio in PCM and delta modulation,T1 Carrier System, Comparison of PCM and DM. Adaptive delta Modulation. Bit, word and frame synchronization, Matched filter detection.	08
3	**Digital Modulation Techniques:** Various techniques of phase shift, amplitude shift and frequency shift keying. Minimum shift keying. Modulation & Demodulation.	07
4	**Error Probability in Digital Modulation:** Calculation of error probabilities for PSK, ASK, FSK & MSK techniques.	08
5	**Information Theory:**Amount of Information, Average Information, Entropy, Information rate, Increase in Average information per bit by coding, Shannon's Theorem and Shannon's bound Capacity of a Gaussian Channel, BW-S/N trade off, Orthogonal signal transmission.	08
6	**Coding:** Coding of Information, Hamming code, Single Parity-Bit Code, Linear Block code, cyclic code &convolution code.	08
	TOTAL	40

Text/Reference Books	
1	Sklar: Digital Communication, Pearson Education. 2009
2	R. N. Mutagi: Digital Communication, 2nd ed., Oxford. 2013
3	P. Ramakrishna Rao: Communication Systems, MGH. 2013
4	H. Taub & D.L. Schilling: Principles of Communication Systems, MGH. 2008
5	Proakis: Digital Communication, MGH. 2008
6	P. Chakrabarti: Principles of Digital Communications, Danpatrai & Sons. 1999
7	K. Sam Shanmugam: Digital and Analog Communication System, John Wiley Sons. 2006
8	Lathi, B. P.: Modern Digital &Analog Communication System, Oxford Press. 2009

8EX4-21: EMBEDDED SYSTEM LAB

Credit: 1 **Max. Marks: 50(IA:30, ETE:20)**

0L+0T+2P

SN	Contents
1	Introduction to Embedded Systems and their working.
2	Data transfer instructions using different addressing modes and block transfer.
3	Write a program for Arithmetic operations in binary and BCD-addition, subtraction, multiplication and division and display.
4	Interfacing D/A converter & Write a program for generation of simple waveforms such as triangular, ramp, Square etc.
5	Write a program to interfacing IR sensor to realize obstacle detector.
6	Write a program to implement temperature measurement and displaying the same on an LCD display.
7	Write a program for interfacing GAS sensor and perform GAS leakage detection.
8	Write a program to design the Traffic Light System and implement the same using suitable hardware.
9	Write a program for interfacing finger print sensor.
10	Write a program for Master Slave Communication between using suitable hardware and using SPI
11	Write a program for variable frequency square wave generation using with suitable hardware.
12	Write a program to implement a PWM based speed controller for 12 V/24V DC Motor incorporating a suitable potentiometer to provide the set point.