DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.SU/Engg./B.Tech./15/2020

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies & recommended by the Dean, Faulty of Science & Technology, the Hon'ble Vice-Chancellor **has accepted revised syllabus of B.Tech. Second Year in accordance with Choice Based Credit & Grading System for all Branches as per guidelines of AICTE** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as enclosed herewith.

Sr.No.	Syllabi as per CBC & GS
[1]	B.Tech. [Civil Engineering],
[2]	B.Tech. [Mechanical Engineering],
[3]	B.Tech. [Plastic and Polymer Engineering],
[4]	B.Tech. [Electronics and Telecommunication Engineering],
[5]	B.Tech. [Electrical Engineering],
[6]	B.Tech. [Computer Science & Engineering].
[7]	B.Tech.[Agricultural Engineering]

This is effective from the Academic Year 2020-21 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.SU/2020/ 21244-52
Date:- 31-10-2020.

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Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.**
2] The Director, University Network & Information Centre, UNIC, with **a request to upload this Circular on University Website.**

Copy to :-

1] The Director, Board of Examinations & Evaluation,
2] The Section Officer, [Engineering Unit] Examination Branch,
3] The Programmer [Computer Unit-1] Examinations,
4] The Programmer [Computer Unit-2] Examinations,
5] The In-charge, [E-Suvidha Kendra],
6] The Public Relation Officer,
7] The Record Keeper,

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Revised Syllabus of Bachelor of Technology

Electronics and Telecommunications Engineering

(III & IV Semester)

Under Choice Based Credit System (CBCS)

Under Faculty of Science and Technology

(Effective from 2020-21 and onwards)

FACULTY OF SCIENCE AND TECHNOLOGY

Syllabus Structure w.e.f. 2020-2021 (Choice Based Credit System)

SY B. Tech. (Electronics and Telecommunication Engineering)

Semester-III

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks							Credits			
		Theory	Practical	Tutorial	MSE-I	MSE-II	TA	ESE	TW	PR/OR	Total	TH	TW/PR	TUT	Total
BSH201	Vector and Partial Differential Equation	3	-	-	15	15	10	60	-	-	100	3	-	-	3
ETC202	Electronic Devices and Circuits	3	-	-	15	15	10	60	-	-	100	3		-	3
ETC203	Analog and Digital Communication	3	-	-	15	15	10	60	-	-	100	3		-	3
ETC204	Digital System Design	3	-	-	15	15	10	60	-	-	100	3		-	3
ETC205	Network and Lines	3	-	-	15	15	10	60	-	-	100	3		-	3
ETC221	Lab I:Electronic Devices and Circuits	-	2	-	-	-	-	-	-	25	25	-	1		1
ETC222	Lab II Analog and Digital Communication	-	2	-	-	-	-	-	-	25	25	-	1	-	1
ETC223	LabIII: Digital System Design	-	2	-	-	-	-	-	-	25	25		1		1
ETC224	Lab IV: Network and Lines	-	2	-	-	-	-	-	25	-	25		1		1
ETC225	Lab V:Development of Skills-III	-	2	-	-	-	-	-	-	25	25		1		1
ETC226	Lab VI:Electronic Workshop	-	2	-	-	-	-	-	25		25		1		1
		15	**12**	**-**	**75**	**75**	**50**	**300**	**50**	**100**	**650**	**15**	**6**	**-**	**21**

Semester-IV

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks							Credits			
		Theory	Practical	Tutorial	MSE-I	MSE-II	TA	ESE	TW	PR/OR	Total	TH	TW/PR	TUT	Total
BSH251	Probability and Random Theory	3	-	-	15	15	10	60	-	-	100	3	-	-	3
ETC252	Signal and System	3	-	-	15	15	10	60	-	-	100	3	-	-	3
ETC253	Power Devices and Machines	3	-	-	15	15	10	60	-	-	100	3	-	-	3
ETC254	Data Structures	3	-	-	15	15	10	60	-	-	100	3	-	-	3
ETC291-ETC293	Professional Elective Courses-I	3	-	-	15	15	10	60	-	-	100	3	-	-	3
ETC271	Lab VII: Signal and System	-	2	-	-	-	-	-	-	25	25	-	1	-	1
ETC272	Lab VIII: Power Devices and Machines		2							25	25		1		1
ETC273	Lab IX: Data Structure		2							25	25		1		1
ETC274A ETC274C	Lab X: Professional Elective Courses-I		2						25	-	25		1		1
BSH275	Lab XI: Development of Skills-IV		2	-	-	-	-	-		25#	25	-	1	-	1
ETC276	Lab XII: Project Based Learning		2						25		25		1		1
BSH803/ BSH 808	Mandatory non-credit course	2													
		17	**12**	**-**	**75**	**75**	**50**	**300**	**50**	**100**	**650**	**15**	**6**	**-**	**21**
		#	Online Examination												

MSE- Mid Semester Exam, ESE- End Semester Exam, TH-Theory, OR- Oral, TA-Teacher Assessment, TW- Term Work, PR- Practical, Tut- Tutorial

Professional Elective Courses-I

Group A	Group B	Group C
ETC291 : Database Management System	ETC292: Sensors and Measurement	ETC293: :Consumer Electronics

Mandatory non-credit audit course

Course code	Course	Offered by Department
BSH803	Employability Skills	Basic Sciences and Humanities
BSH804	Emotional Quotient	Basic Sciences and Humanities
BSH805	Energy Audit	Mechanical Engineering
BSH806	Cyber Security	Computer Science and Engineering

Minor and Honours Scheme is to be introduced from academic year 2020-21

- Every Department to develop and submit 'Minor-Courses-List' of 5-6 Theory courses with Titles and detailed syllabi, separately.
- Every Department to develop and submit a 'Honours-Courses-List' of 5-6 Theory courses with Titles and detailed syllabi. MOOCs are permitted to be part of the list, so also a few PG courses. Multiple Verticals are encouraged.
- The courses from main curriculum should not be in the list of the courses for Minor/Honours.
- Host Department to float the courses from Minor/ Honours-List as One/Two in each Semester (viz. 4^{th},5^{th} ,6^{th},7^{th},8^{th}semester)
- A Student opting for 'Honours' will NOT be ENTITLED to register for 'Minor'.
- As per this scheme students will get Minor Degree and Honours along with Degree (Major) which they are pursuing.
- Regular learners can complete the B. Tech. degree with 168 credits, for Brighter and interested Students opting Honours/Minor scheme, the UG program would be of 168 + 20 = 188 credits.
- The remedial assessment schemes such as Re-examination or summer term will NOT be applicable for Minor or Honors schemes. Student failing in any of the Minor or Honors courses, at any stage will be discontinued from the Scheme.
- Maximum batch size for minor is 30 and for Honour, it is $1/3^{rd}$ of the total intake of the

Sr. No.	Academic Scheme	Description
01	Minor Degree	Students can select courses from other branches. e.g. If Mechanical Engineering student selects courses from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with Minor degree of Civil Engineering.
02	Honours	Students can select advanced courses from their respective branch in which they are perusing the degree. e.g. If Mechanical Engineering student selects advanced courses from same branch under this scheme, he/she will get Major degree along with Honours of Mechanical Engineering.

respective department.

Detailed of this scheme are given below.

Minor Degree Scheme:

- Students can select courses from other branches. E.g. If Mechanical Engineering student selects courses from Civil Engineering under this scheme; he/she will get Major degree of Mechanical Engineering with Minor Degree of Civil Engineering.
- Student from ANY department is ELIGIBLE to apply for Minor degree from ANY OTHER DEPARTMENT.
- Student can select one course per semester from the list of courses of a branch of which he or she want to peruse Minor Degree.
- The Scheme will be started from second year 4th Semester of UG program.
- An applicant must have a minimum CGPA of 6.75 (up to 2nd Semester) and for Second Year Direct Admitted Diploma Students, with CGPA of 6.75 or equivalent.
- Mentor will be allotted from host departments to guide the students during his/her entire curriculum.
- Online courses may be selected from platforms like NPTEL/ edX/ Coursera/ Udacity/ Purdue Next/ Khan Academy/ QEEE/Udemy etc.
- While selecting the online course care must be take that it must be a certification course should be of 4/5 credits each as per the syllabus structure.
- Lab course/Internship/Mini-project is permitted in Minor Scheme.

Honours Scheme:

- Students can select advanced courses from their respective branch in which they are perusing the degree. e. g. If Mechanical Engineering student selects advanced courses from same branch under this scheme, he/she will get Major degree along with Honours in Mechanical Engineering.
- Students from same department are eligible for Honours.
- The Scheme will be started from second year 4thSemester of UG program.
- An applicant must have a minimum CGPA of 6.00 (up to 2nd Semester) and for Second Year Direct Admitted Diploma Students, with CGPA of 6.00 or equivalent.
- Student can select one course per semester from the list of Honor courses of a branch in which they are perusing the degree.

- Mentor will be allotted from host departments to guide the students during his/her entire curriculum.
- Online courses may be selected from platforms like NPTEL/ edX/ Coursera/ Udacity/ Purdue Next/ Khan Academy/ QEEE/Udemy etc.
- While selecting the online course care must be take that it must be a certification course should be of 4/5 credits each as per the syllabus structure.
- Lab course/Internship/Mini -project is permitted in Honours Scheme.

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(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: BSH201 Course: Vector and Partial Differential Equation **Teaching Scheme:** Theory: 03 Hrs / week Tutorial: 00 Hrs / week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks Term Work: - 00 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 03 Hrs

Prerequisite	Basic formulae of Trigonometry, Derivatives and Integration, fundamentals of Vector algebra, knowledge of multiple integrals, partial derivatives, evaluation of real integrals and odd and even function.
Objectives	1. To understand basic necessity for the foundation of Engineering & Technology 2. To enhance the mathematical skills and thinking power of students 3. To develop the ability, know the concept of Engineering mathematics and apply these to solve Engineering problem in various field 4. To apply mathematical concepts for solving the practical problem in Engineering and Technology
Unit-I	**Linear Differential Equation (LDE) & Its Applications** Solution of n^{th} order linear differential equation with constant coefficients: Complementary function, Particular integral- short method, method of variation of parameters, Application of LDE to Mechanical systems, Beam and shaft (08Hrs)
Unit-II	**Vector Differentiation** Differentiation of vectors, Scalar and Vector point functions, Gradient of a scalar point function, Directional derivative, Divergence and Curl of vector point function, Irrotational and Solenoidal vector fields (06 Hrs)
Unit-III	**Vector Integration** Line integral, Work done by a force, Surface integral, Green's theorem, Stokes's theorem (04Hrs.)
Unit-IV	**Laplace Transform** Definition, Laplace Transforms of elementary functions, Theorems and properties of Laplace transform (without proof): First shifting and second shifting theorem, Change of scale, Multiplication by t^n, Division by t, Laplace transform of Derivatives, Laplace transform of integral, Evaluation of integrals using Laplace transform, Laplace transform of Unit step function and Dirac's delta function, Inverse Laplace transform: Definition, Inverse Laplace transform using: i. Laplace transform table ii. Theorem and properties of Laplace transform iii. Convolution theorem Application of Laplace transform to solve linear differential equations with given initial conditions (08 Hrs)
Unit-V	**Fourier Transform** Fourier transform and inverse Fourier transform, Fourier sine and cosine transform, Inverse Fourier sine and cosine transform (04Hrs)

Unit-VI	**Z - Transform** Definition, Z-transform of elementary function, properties of Z-transform (without proof), Inverse Z transform: Partial fraction method, inversion integral method (Residue method), Solution of Difference equation by using Z-transform. (06Hrs)				
References	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1.	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley eastern Ltd	10^{th} Edition
	2.	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	11th Edition
	3.	Advanced Engineering Mathematics	C.R. Wylie	McGraw Hill Publications	6th Edition
	4.	Partial Differential Equations	Fritz John	Springer	4th Edition
	5.	Thomas' Calculus	Maurice D. Weir, Joel Hass, Frank R. Giordano	Pearson Education	12th Edition
	6.	Applied Mathematics	P. N. Wartikar & J. N. Wartikar	Pune Vidyarthi Griha Prakashan,Pune	9th Edition
	7.	Higher Engineering Mathematics	Dr.B.S.Grewal	Khanna Publishers	46th Edition
	8.	Advanced Engineering Mathematics	H. K. Dass.	S.Chand And Co.Ltd	18th Edition
	9.	NPTEL, Swyam, edX, Coursera, Khan Academy…etc course related video			

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC202 Course: Electronic Devices and Circuits **Teaching Scheme:** Theory: 03Hrs/week Tutorial: 0Hr/week	Credits: 03-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II:15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration):3Hrs

Prerequisite	Knowledge of Basic Electronics
Objectives	1.To study biasing circuits for different semiconductor devices. 2.To study operation of different amplifiers. 3. To do analysis of an amplifier using h-parameters.
Unit-I	**Transistor biasing and design:** BJT characteristics,DC/AC load line, Need of biasing,types of biasing- fixed bias, collector to base bias and voltage divider bias, and its stability factor analysis & design, bias compensation for different types of biasing circuits for BJT.Numericals based on theory.**(6Hrs)**
Unit-II	**Multistage Amplifiers:** Transistor as an amplifier, frequencyresponse of a single stage Common Emitter amplifier, effect ofemitter bypass capacitor and emitter resistor on frequency response. Performance parameters of an amplifier: voltage gain, current gain, I/O, O/P impedances & Band width. Multistage amplifiers:RCcoupled amplifier, transformer coupled amplifier, frequency response of two stage cascaded CE transistor stage, Numericals based on theory. **(6Hrs.)**
Unit-III	**Power Amplifiers:** Comparison of voltage amplifier and power amplifier, Classification of power amplifiers(class A,B,AB,C,D) , Class A with resistive load,Transformer coupled class A amplifier, Class B Push-pull & their efficiencies, cross over distortion, class AB power amplifier, Complementary symmetry Power Amplifier, Noise and distortion in amplifiers, concept of Total Harmonic Distortion (THD),Numericals based on theory..**(6 Hrs)**
Unit-IV	**Small signal analysis of an amplifier :** Hybrid model of transistor amplifier, Low frequency hybrid parameters, derivation of voltage gain, current gain,input impedance and output impedance using h-parameters Comparison of hybrid parameters of all configurations (CB, CE, CC). Analysis of CS JFET amplifier using small signal hybrid model. Numericals based on theory. **(6 Hrs)**
Unit-V	**MOSFETs:** Types of MOSFETs, non ideal voltage current characteristics viz. Finite output resistance, body effect, sub threshold conduction, breakdown effects and temperature effects. MOSFET Biasing, Introduction to MOSFET as basicVLSI device, Power MOSFET : construction of power MOSFET, VMOSFET drive requirement**(6Hrs)**
Unit-VI	**FET biasing and applications:** An overview of different types of FETs viz. JFET, MOSFET, MESFET,Peculiarities of these types and their application areas. JFET V-I Characteristics, types of biasing-self bias and voltage divider bias, biasing for zero current drift,its Analysis and design.JFET Amplifiers: CS, CD,CG amplifiers,JFET as voltage controlled current

	source. Numericals based on theory.**(6Hrs)**				
Text books	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1	Electronic Devices and Circuits	J. Millman, C.C.Halkias,	TMH.	2 Ed.,1998
	2	Electronic Devices and Circuits	David A. Bell,	Oxford.	5 Ed,
	3	Electronic Devices and Circuits.	S.Salivahanan, N.Suresh Kumar, A.Vallavaraj	TMH.	2 Ed., 2008
Reference book	4	Electronic Devices and Circuits.	R.L. Boylestad and Louis Nashelsky	PEI/PHI	9 Ed., 2006
	5	Electronic devices	Thomas L. Floyd,	Pearson Education,	2002

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC203 Course: Analog and Digital Communication **Teaching Scheme:** Theory: 03 Hrs/week Tutorial: NA	Credits: 03-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II:15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration):3 Hrs

Prerequisite	Basics of Communication System
Course Objectives:	1. To understand methods of Analog transmission and detection techniques used in Analog and Digital communication. 2. To know the function of each block in AM and FM receivers and different parameters of Communication System. 3. To understand the key modules of Digital Communication Systems with emphasis on Digital Modulation Techniques. 4. To get introduced to the concept and basics of Source and Channel Coding /Decoding.
Unit-I	**INTRODUCTION TO ANALOG COMMUNICATION** Block Schematic of Communication System, Need of Modulation, Classification of Modulation, AM, , Frequency Spectrum of A.M Wave, Mathematical Representation of A.M Wave, Modulation Index, Power Relations and Bandwidth , Numerical, Types of AM - DSBFC, DSBSC, SSB, VSB, DSBSC Generation Methods –FET Balanced Modulator, SSB Generation methods – Filter, Phase Shift and Third Method. (6Hrs)
Unit-II	**ANGLE MODULATION** Phase and frequency modulation, Narrow Band and Wide band FM – Mathematical analysis, Modulation index, Spectra, Power relations and Transmission Bandwidth – FM Generation –Direct and Indirect Method, Numerical on F.M Time Division & Frequency Division Multiplexing, Pulse Modulation Techniques**:** Sampling theorem, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Applications. (6Hrs)
Unit-III	**AM AND FM RECEIVERS.** Block Diagram of AM Super Heterodyne Receiver, Performance Characteristics of AM Receiver: Sensitivity, Selectivity, Fidelity, Image frequency and IFRR, Tracking and Double Spotting, FM Receiver Block Diagram. Effect of Noise on AM & FM System. Pre-emphasis & De-emphasis. Noise: Noise Sources & Types, SNR, Noise Figure, Noise Temperature. (6 Hrs)
Unit-IV	**INTRODUCTION TO DIGITAL COMMUNICATION.** Block Diagram of Digital Communication System, Advantages and Disadvantages of Digital Transmission, Significance of Digitization , Base Band System, Formatting Textual Data, Messages, Characters & Symbols, Formatting Analog Information. Quantization, Pulse Code Modulation & Reconstruction, Delta Modulation, Adaptive

	Delta Modulation, ISI .(6 Hrs)				
Unit-V	**DIGITAL MODULATION TECHNIQUES:** Digital Modulation Techniques - Binary Phase Shift Keying (BPSK), Quadrature Phase Shift Keying (QPSK), Binary Frequency Shift Keying (BFSK), Quadrature Amplitude Modulation (QAM)**,** Minimum Shift Keying (MSK). (6Hrs)				
Unit-VI	**SOURCE AND ERROR CONTROL CODING:** Need for Channel Encoding, Concept of Error Detection and Correction , Entropy, Source Encoding Theorem, Introduction to coding , Linear Block Codes, Application of Digital Communication (A Case Study) (6Hrs)				
Text Books	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1	Electronics & Communication System	George Kennedy and Bernard Davis	McGraw Hill Education	**2004**
	2	Principles of Communication Systems"	Taub Schilling	Tata McGraw Hill Fourth Edition.	
	3	Principles of Communication Engineering	Anokh Singh	S.Chand	
References	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1.	Digital Communications	Simon Haykins	Wiley Publications	4th Edition
	2.	Electronic Communication	Roddy & Coolen	PHI	
	3	Analog and Digital Communication	K. Sam Shanmugam	Willey, 2005	

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC204 Course: Digital System Design Teaching Scheme**:** Theory: 3 Hrs/week Tutorial: NA	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks Term Work: 25Marks End Semester Examination: 60 Marks End Semester Examination (Duration):3.00 Hrs

Prerequisite	Basic Electronics
Objectives	To Study 1.Number systems with its conversions 2.Boolean laws and its use in logic functions minimization 3.Combinational Circuits 4.Sequential circuits 5.Logic families
Unit-I	**Number system and coding techniques** : Introduction, Number systems: Binary, Octal, Decimal and Hexadecimal, and their Conversion methods, Signed Binary numbers : 1's and 2's complement representation, Binary Arithmetic, Codes: Classification, BCD code, Excess-3 code, Gray code, Alphanumeric code, Error detecting and correcting code. (6 Hrs)
Unit-II	**Logic Gates, Boolean algebra and minimization techniques**: Introduction, Digital Signals, Basic Digital circuits: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR, Karnaugh map representation and minimization of logical functions upto 4-variables, Don't care conditions, Boolean Algebra, De-Morgan's theorems, Simplification using Boolean algebra, Standard representation for logical functions, SOP and POS form. (6Hrs)
Unit-III	**Combinational Logic Circuits:** Code converters: Binary to Gray code converter, Gray to Binary code converter, Design Examples: Arithmetic Circuits, Adders and their use as subtractors, parallel adder , look ahead carry, BCD Adder Block diagram of combinational logic, Multiplexers and their use in combinational logic designs, multiplexer trees, Demultiplexers and their use in combinational logic designs, Demultiplexer trees, decoder, encoder, ALU, Parity generators /checkers, Static and dynamic hazards in digital circuits. (6 Hrs)
Unit-IV	**Sequential Logic Circuits** : 1 Bit Memory Cell, Clocked, SR, JK, Master Slave J-K flip flop, D and T flip-flops, Excitation Table for flip flops, Conversion of flip flops, Application of Flip flops, **Shift Registers**: Introduction, Data formats, Register classification, buffer register, modes of operation of shift register, Bidirectional shift register, universal shift

	register, ring counter, Twisted ring counter, Classification of memories. (6 hrs)
Unit-V	**Counters:** Classification and the design steps, Ripple or asynchronous counter, modulus of counter, introduction to general purpose 74/54 series. Asynchronous ICs , cascading of ripple counter ICs, Synchronous counter, design principals, UP/DOWN counter , Introduction to general purpose 74/54 series synchronous ICs (6 Hrs)
Unit-VI	**Digital Logic Families** : Classification of logic families , Characteristics of digital ICs-Speed of operation , power dissipation, figure of merit, fan in, fan out, current and voltage parameters, noise immunity, operating temperatures and power supply requirements. Tri-State logic, CMOS logic - CMOS inverter, NAND, NOR gates, Comparison table of Characteristics of TTL, CMOS, ECL, RTL, I2L, DCTL (06 Hrs)

References

Sr. No.	Title	Author	Publication	Edition
1	Modern Digital Electronics	R.P.Jain	Tata Mc-Graw hill,	Fourth edition
2	Digital Logic and Computer Design	M. Marris Mano	PHI, New Delhi	2001
3	Digital Principles and Application,	Malvino and Leach,	TMH, New Delhi,	1995 4th edition
4	Fundamentals of Digital Circuits	Anandkumar,	PHI, New Delhi,	Second Edition

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC 205	Credits: 3
Course: Network and Lines	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
Tutorial: NA	Term Work: NA
	End Semester Examination: 60 Marks
	End Semester Examination (Duration): 3 Hrs

Prerequisite	BSH104- Basic Electrical Engineering
Objectives	1. To understand different Network Theorems for analysis of AC networks. 2. To study different types of Networks and Filters. 3. To study various performance parameters/ characteristics of Transmission lines .
Unit-I	**AC Network Theorems :** Revision :Basics of Electrical Circuits Network Theorems: Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorem, Tellegen's Theorem, Duality Concept. (8 Hrs)
Unit-II	**Frequency Selective Network :** Significance of Quality factor. Series Resonance: Circuit Concept, Impedance, Bandwidth, Selectivity, Magnification factor. Parallel resonance: Circuit Concept, Impedance, Bandwidth, Selectivity, Magnification factor. Comparison of series and parallel resonant circuits (4 Hrs)
Unit-III	**Networks :** Networks: Classifications: Symmetrical and Asymmetrical networks. Properties of two port Network: (i) Symmetrical Networks (T and π only). Z0 and γ in terms of circuit components, open and short circuit parameters , Characteristic impedance of symmetrical networks, Properties of symmetrical networks (ii) Asymmetrical Networks: Image Impedance and Iterative Impedance (L-Section only) , Half section (L-section). Attenuators and Equalizers :Brief idea about concepts and its types. (6 Hrs)
Unit-IV	**Filters:** Filter fundamentals, Pass and stop bands, Characteristic impedance, Constant K low pass filter, Constant K high pass filter, m - derived T section, m -π derived Section, Band pass filters , Composite filter (8Hrs)

Unit-V	**Basics of Transmission Line:** Different Types of transmission Lines, Parameters of Transmission lines, Primary and secondary constant and their relation , General solution of transmission lines, Physical significance. Reflection coefficient, Wavelength and velocity propagation, Waveform distortion, Condition for minimum distortion , Distortion less transmission line, Reflection on a line not terminated by Zo, Transfer impedance, Reflection factor and reflection loss, T & π section equivalent to lines. Introduction to modern transmission lines. (6 Hrs)
Unit-VI	**The Line at Radio Frequencies:** Standing waves & standing wave ration on a line, VSWR, Relation between VSWR and voltage reflection coefficient , Quarter wave Line , Concept of smith chart, Stub matching . (4 Hrs)

References

Sr. No.	Title	Author	Publication	Edition
1	Network , Lines and Fields	J.D. Ryder	Prentice Hall of India New Delhi	2003
3	Network Analysis	M. E. Vanvalkanburg	Prentice Hall of India New Delhi	2005
3	Transmission Lines and Networks	Umesh Sinha	Satya Prakashan	5th Edition, 2007
4	Engineering Circuit analysis	W.H. Hayt & Jack E-Kemmerly	Tata McGraw Hill	2002

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC221 Course: LabI –Electronic Devices and circuits **Teaching Scheme:** Practical:02 Hrs/week	Credits: 0-01-0 PR/OR:_25 Marks

Prerequisite	Knowledge of Basic Electronics
Objectives	1.To measure parameters of different semiconductor devices. 2. To plot and analyze the characteristics and frequency response of amplifiers
List of Practicals	1.To plot Input, output and transfer characteristics of CE, CB, CC configuration. 2. To plot DC load line and derive Stability factor of voltage divider biasing circuit 3. To plot Drain characteristics and transfer characteristics of JFET. 4. To plot dc load line of JFET biasing arrangement. 4. To plot frequency responses of CE amplifier with and without emitter bypass resistor & capacitor. 5. To plot frequency response of Class A, B push pull power amplifier. 6. To plot frequency response of Class C power amplifier. 7. To find Av, Ri, and Ro of Common source JFET amplifier. 9. To measure performance parameters of CE configuration in terms of hparameters. 10. Drain characteristics and transfer characteristics of MOSFET. 11. Design test, simulate and build CE transistor circuit using circuit maker.
List of Equipments /Instruments	1. Kit 2.Function Generator 3.Oscilloscope 4. DC Power supply.5.Computer6. Simulation Software

References

Sr. No.	Title	Author	Publication	Edition
1	Electronic Devices and Circuits	J. Millman, .C.Halkias,	TMH.	2 Ed.,1998
2.	Electronic Devices and Circuits	David A. Bell,	Oxford.	5 Ed,
3.	Electronic Devices and Circuits.	S.Salivahanan, N.Suresh Kumar, lavaraj	TMH.	2 Ed., 2008

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC222 Course: Lab -Analog and Digital communication **Teaching Scheme:** Practical:02 Hrs/week	Credits: 0-01-0 PR Exam /Oral Exam :25 Marks

Prerequisite	Basics of Communication
Course Objectives:	1. To Measure different parameters. 2. Analyze the waveforms
Course Outcomes:	**After the completion of the course students should be able to:** CO5. Measure different parameters of Analogue & Digital Modulation and Demodulation using hardware components and communication systems. CO6.Interpret the results to provide valid conclusions for Analogue and Digital Modulation and Demodulation using hardware components and communication systems.
List **of Practical's**	1. To generate Amplitude Modulated waveform and Calculate the Modulation Index. 2. To generate frequency modulated and demodulated signal and analyze the output. 3. Verification of Sampling Theorem, PAM Techniques, (Flat top & Natural sampling), reconstruction of original signal 4. Measurement of Performance Characteristics of Receiver: Sensitivity, Selectivity, Fidelity **5.** To generate PWM and PPM modulated and demodulated signals and observe the output. 6. To generate Pulse Code Modulated and Demodulated signals and observe the output. 7. To perform Delta and Adaptive Delta Modulation and observe the output. 8. Generation and Reception of Amplitude Shift Keying 9. Generation and reception Frequency Shift Keying. 10. To perform TDM and FDM Multiplexing and observe the output. **Note: Visit to Broadcasting Station is desirable.**
List of Equipments /Instruments	1.RF Signal Generator , 2 .Different kits of particular experiment. 3.Function Generator 4.Oscilloscope 5. DC Power supply.

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC223 Course: Digital System Design **Teaching Scheme:** Practical: 2 Hr/week	Credits: 0-1-0 Term Work: NA PR/OR: 25 Marks

Prerequisite	Basic Electronics
Objectives	To Study • Number systems with its conversions • Boolean laws and its use in logic functions minimization • Combinational Circuits • Sequential circuits • Logic families
List of Practicals	1. Verification of logic gates by truth table. 2. Realization of half and full adder using gates. 3. Realization of half and full subtractor using gates. 4. Design and realization of Binary to Gray code converter. 5. Design and realization of Gray to Binary code converter. 6. Design and implementation of BCD to seven segment decoder. 7. Study and Verification of multiplexer 8. Study and Verification of demultiplexer. 9. Study and verification of J-K, T and D Flip-flop. 10. Design and implementation of Asynchronous counter using IC's
List of Equipments /Instruments	1.D.E. Kits, 2.IC's 3.Connecting wires. 4. Multimeter

References

Sr. No.	Title	Author	Publication	Edition
1	Modern Digital Electronics	R.P.Jain	Tata Mc-Graw hill,	Fourth edition
2	Digital Logic and Computer Design,	M. Marris Mano,	PHI,New Delhi,	2001
3	Digital Principles and Application,	Malvino and Leach,	TMH, New Delhi,	1995 4th edition
4	Fundamentals of Digital Circuits	Anandkumar,	PHI, New Delhi,	Second Edition

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC 224 Course: Lab IV: Network and Lines **Teaching Scheme:** Theory: NA Tutorial: NA Practical : 2 Hrs/ week	Credits: 0-1-0 Term Work: 25 Marks PR/OR: NA

Prerequisite	BSH104- Basic Electrical Engineering
Objectives	1. To perform practical by applying knowledge of different laws/ Network Theorems and interpret the data. 2. To perform practical by applying knowledge of resonance and interpret the data. 3. To perform practical by applying knowledge of transmission networks / Transmission Lines and interpret the data.
List of Practical	1. To Verify Superposition Theorem 2. To Verify Thevenins and Norton' Theorem. 3. To Verify Maximum Power Transfer theorem. 4. To plot Frequency response of series resonance circuit. 5. To plot Frequency response of parallel resonance circuit 6. To plot Frequency response of Low Pass filter. (Active/Passive) 7. To plot Frequency response of High Pass filter. (Active/Passive) 8. To measure input Impedance of Transmission Line. 9. To measure attenuation of Transmission Line. 10. To Calculate Phase displacement between the current & voltage at input of Transmission line.
List of Equipments /Instruments	Bread Board, Active and passive components, Cathode Ray Oscilloscope, Function Generators, CRO Probes, patch chords, Power supply, Multimeter, Ammeter, Voltmeter , single stand wire/ multistand wire , Filter Circuitry, Transmission Line Kit..

References

Sr. No.	Title	Author	Publication	Edition
1	Network , Lines and Fields	J.D. Ryder	Prentice Hall of India New Delhi	2003
2	Network Analysis	M. E. Vanvalkanburg	Prentice Hall of India New Delhi	2005
3	Transmission Lines and Networks	Umesh Sinha	Satya Prakashan	5th Edition, 2007
4	Engineering Circuit analysis	W.H. Hayt & Jack E-Kemmerly	Tata McGraw Hill	2002

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC225 Course: Lab V : Development of Skills-III **Teaching Scheme:** Theory: NA Tutorial: NA Practical : 2 Hrs/ week	Credits: 0-1-0 Term Work: NA PR/OR: 25 Marks

Prerequisite	Basic Knowledge of Mathematics and Programming Skills.
Objectives	To develop skills in Data Analytics using Lab view and Python.
List of Practicals	**Part A: <u>Data Logging using LabVIEW</u>** 1. To learn LabVIEW Environment (tools Palette, controls Palette, functions palette). 2. To explore different operations using LabVIEW (for loop, while loop, case structure, array, strings, clusters). 3. To perform Arithmetic and Boolean operations for statistical data analysis using LabVIEW. 4. To build data acquisition of any sensor using Arduino in LabVIEW. 5. To develop a system for data Logging of any sensors using LabVIEW. **Part B : <u>Data Analytics Using Python</u>** 6. To study Data Analytics and Python Fundamentals. 7. To perform Data Visualization and Data Wrangling using Python. 8. To perform Statistical Data Analysis. 9. To explore Data Analysis by various methods. 10. Model Development like regression, Visualization, Pipelines, Prediction and Decision Making.
List of Equipments /Instruments	Software: NI- LabVIEW, Pycharm / any available software. Hardware: Windows based i3 and 3 GB and more RAM configured Computer. Arduino, Sensors, Microphone, camera, etc.

References

Sr. No.	Title	Author	Publication	Edition
1	LabVIEW for Engineers	RONALD W. LARSEN	Prentice Hall	2009
2	LabVIEW Advanced Programming Techniques	Rick Bitter, Taqi Mohiuddin, Matt Nawrocki	CRC Press	Second
3	Python Data Science Handbook: Essential Tools for Working with Data	Jake Vander Plas and O‟Reilly,	Google Books	2016
4	Python for Data Analysis	Wes McKinney and O‟Reilly,	Kindle	2nd Edition.

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Course Code: ETC226 Course: Electronics Workshop-I **Teaching Scheme:** Practical: 02 Hrs/week	Credits: 0-1-0 Term Work: 25 Marks

Prerequisite	Basic Electronics
Objectives	• This course gives the basic introduction of electronic components, hardware systems. • To provide hands-on training with familiarization, identification, testing, assembling, dismantling, fabrication and repairing such systems by making use of the various tools and instruments available in the Electronics Workshop.
List of Practicals	**List of Exercises / Experiments** 1. Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. [Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Heat sink etc.) 2. Familiarization/Identification of electronic components with specification (Functionality, pin identification, type, size, color coding, package, symbol, datasheet etc. [Active, Transistor, ICs etc.) 3. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools, Interpret data sheets of discrete components and IC's, Estimation and costing. 4. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Power supply etc.] [Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Crimping tool, Hot air soldering and de- soldering station etc.] 5. Familiarization/Application of testing instruments CRO and Function Generator 6. Testing of passive electronic components 7. Testing of active electronic components 8. Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.] 9. Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.] 10. Circuit Simulation, Assembling of electronic circuit/system on general purpose PCB, test and show the functioning(**Any Four circuits)** 1. Fixed voltage power supply with transformer, rectifier diode, capacitor

<table>
<tr><td></td><td colspan="5">filter, zener/IC regulator.
2. LED blinking circuit using a stable multi-vibrator with transistor BC 107.
3. Square wave generation using IC 555 timer in IC base.
4. Sine wave generation using IC 741 OP-AMP in IC base.
5. RC coupled amplifier with transistor BC 107.
6. AND and NAND gates in diode transistor logic.</td></tr>
<tr><td>Course Outcome</td><td colspan="5">After the completion of the course student should be able to
CO1: Identify the active and passive electronic components and
CO2: Use of the various tools and instruments for the testing, assembling, dismantling, fabrication and repairing of the electronic systems.</td></tr>
<tr><td>List of Equipments /Instruments</td><td colspan="5">CRO, Function Generator, Power Supply, Multimeter, Ammeter, Voltmeter, Zero PCB, Breadboard, Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Crimping tool, Hot air soldering and de- soldering station , Electronic active and passive components, Single multi strand wire, Relay, Single sided PCB, Etching solution FeCl3, PCB Drill machine, PCB cutter</td></tr>
<tr><td rowspan="4">References</td><td>Sr. No.</td><td>Title</td><td>Author</td><td>Publication</td><td>Edition</td></tr>
<tr><td>1</td><td>Integrated Electronics</td><td>Miliman, Halkies</td><td>TataMc-Graw Hill, New Delhi</td><td></td></tr>
<tr><td>2</td><td>Electronics and Electrical Measurement and instrumentation</td><td>A.K.Sawhney</td><td>Dhanpat Rai & sons</td><td></td></tr>
<tr><td>3</td><td>Applied Electronics</td><td>R.S. Sedha</td><td>S.Chand& Co , New Delhi</td><td></td></tr>
</table>

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Syllabus of S. Y. B. Tech.

(**All Branches**) Semester-IV

Course Code: BSH251 Course: **Probability and Random Theory** **Teaching Scheme:** Theory: 04 Hrs/week Tutorial: 01 Hrs/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks Term Work: 00 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 03 Hrs

Prerequisite	Students requires sufficient amount of knowledge of certain topics related to probability, random theory and statistics.
Objectives	1. To provide necessary basic concepts of probability, statistics, various discrete and continuous probability distributions and random theory 2. To provide basic ideas of probability, statistics including measures of central tendency, correlation and regression and random processes for applications engineering which can describe real life phenomenon. 3. To help the students develop the ability to solve problems using probability and statistics. 4. To connect probability and statistics to other fields both within and without mathematics.
Unit-I	**Basic Probability** Introduction to probability, Sets, Fields, Events, Theorem of total probability, Conditional probability, independent events, Bayes' theorem, Statistical independence and models of probability. (07Hrs)
Unit-II	**Probability Distribution** Binomial distribution, Poisson distribution and Normal distribution, Evaluation of statistical parameters for these distributions. (05Hrs)
Unit-III	**Statistics-I** Measures of central tendency: Mean Median, Quartiles and Mode. Measures of dispersion: Quartile deviation, Mean deviation, Standard deviation, Coefficient of variation, Moments, Skewness and Kurtosis. (06 Hrs)
Unit- IV	**Statistics-II** Curve fitting: Principle of least squares, Fitting of linear curve, Parabola, exponential curve, correlation and regression. (05 Hrs)
Unit-V	**Random variables** Definition of random variables, discrete and continuous random variables, probability distribution function, density function and cumulative distribution function, Properties of probability and cumulative distribution function. (06Hrs)

Unit-VI	**Sampling Distributions** Definitions of population, sampling, parameters and statistics, Types of sampling, sampling distribution : Chi-square distribution, t distribution, F distribution, Standard error, sampling distribution of mean and sampling distribution of variance (07 Hrs)				
References	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1	Probability and statistics for engineers and scientists	Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye	Pearson Publications.	9th Edition
	2	Probability and Statistics for Engineers	Miller and Freund's	Pearson Educations	8th Edition
	3	A First Course in Probability	S. Ross	Pearson Education India, 2002.	6th Edition
	4	Statistical Method	S. P. Gupta	S. Chand and sons	37th Edition
	5	Higher Engineering Mathematics	Dr. B.S. Ramana	Khanna Publication	37th Edition
	6	A text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	8th Edition
	7	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley eastern Ltd	10th Edition
	8	Advanced Engineering Mathematics	C.R. Wylie	McGraw Hill Publications	6th Edition
	9	Advanced Engineering Mathematics.	H. K. Dass	S.Chand And Co.Ltd	18th Edition
	10	Applied Mathematics	P. N. Wartikar & J. N. Wartikar	Pune Vidyarthi Griha Prakashan,Pune	9th Edition
	11	NPTEL, Swyam, edX, Coursera, Khan Academy…etc course related video			

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC252 Course: Signals & Systems **Teaching Scheme:** Theory: 03 Hrs/week Tutorial:---	Credits: 03-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 03 Hrs

Prerequisite	Basics of mathematical operations
Course Objectives:	• To describe basic signals mathematically and understand mathematical operations on signals. • To understand systems classification, properties & apply skills to solve problems. • To understand the Transforms for representation of periodic and aperiodic signals. • To analyze systems in time & frequency domain by applying knowledge of Fourier and Z-Transforms.
Unit-I	**An introduction to Signals and Systems:** **Introduction to Signals:** Definitions of Signals, Continuous time signals & discrete time, Analog & Digital signals, Basic CT & DT signals: unit impulse, unit step, unit ramp, complex exponential & sinusoidal, sinc, rectangular, triangular and signum, Operations on signals: Time Scaling and Folding, Time Shifting, Amplitude Scaling, Addition, Multiplication, Classification of Signals: even & odd signals, periodic & non-periodic, energy & power, deterministic & non-deterministic **Introduction to Systems:** Definitions of Systems, System Representation, continuous time Systems & discrete Systems, system with and without memory (static and dynamic), causal and non-causal system, linear and non- linear system, Time-invariant and time-variant system, Stable and Unstable system, Invertible Systems. **(7Hrs)**
Unit-II	**LTI Systems And Convolution:** **Linear time-invariant systems:** The representation of signals in term of impulses, discrete time LTI systems, continuous time-LTI systems, properties of CT- LTI and DT-LTI systems, Convolution: Convolution integral & its properties, convolution sum& its properties, Systems described by differential, difference equations, block diagram representation of LTI systems described by differential difference equations **(5Hrs)**
Unit-III	**Correlation & Spectral Density:** Autocorrelation and Cross-correlation of CT and DT signals, Correlation properties, Energy Spectral Density (ESD), Power Spectral Density(PSD), ESD and PSD Properties, Relation of ESD and PSD to Autocorrelation. **(5 Hrs)**

Unit-IV	**Fourier Transform:** Continuous time Fourier Transform: Fourier Transform of arbitrary signals and standard signals. Properties of Fourier transform: linearity, time shifting, frequency scaling, time scaling, time reversal, duality, differentiation in time domain, convolution, multiplication and Parseval's relation **(6 Hrs)**
Unit-V	**Z- transform:** Introduction of Z-transform, Relation between Laplace and Z-transform, ROC, properties of ROC, Unilateral Z-transform, properties of Z transform: linearity, time shifting, time reversal, time scaling, convolution, differentiation, multiplication, Parseval's theorem, initial value & final value theorem. Inverse Z-transform: long division method, Partial Fraction Expansion method. (**7 Hrs)**
Unit-VI	**Solution of Linear Constant Coefficient Difference Equation**: DT-LTI system representation using difference equation, Difference equation solving methods, Direct method, Solution of LCCDE by homogeneous solution and particular solution, Determination Impulse response, Transfer function (Poles & Zeros), Comment on stability and causality. **(5Hrs)**

	Sr. No.	**Title**	**Author**	**Publication**	**Edition**
Text Books	1	Signals and Systems	A.V. Oppenheim, A.S. Wilsky, S.H. Nawab	Prentice Hall, Publications, 1997	2nd
	2	Signals and Systems	Simon Haykin, Barry Van Veen	Wiley Publications 2004	2nd
Reference Books	1.	Signals and Systems	Ramesh Babu	SciTech Publications	5th
	2.	Signals and Systems	S. L. Nalbalwar, A. M. Kulkarni and S. P. Sheth	Oxford Publications 2010	2nd
	3.	Signals and Systems	Nagoor Kani	Tata McGraw Hill Publications 2011	3rd

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC253 Course: Power devices and Machines **Teaching Scheme:** Theory: Hrs/week 3 Tutorial: ---	Credits: 3-0-0 Mid Semester Examination-I: _15_ Marks Mid Semester Examination-II: _15_ Marks Teacher Assessment: _10_ Marks Term Work: _0_Marks End Semester Examination: _60_ Marks End Semester Examination (Duration): 03 Hrs

Prerequisite	Basic Electronics, Physics
Objectives	1. Understand power devices with their application. 2. Understand concept of Thyristor triggering and commutation. 3. Understand the principles of operation of power electronic converters. 4. Understand operation of AC and DC machines
Unit-I	**Power Electronic Devices**: Construction, Principle of operation - Static and dynamic characteristics of Power diodes, SCR, TRIAC, DIAC, GTO, power BJT, power MOSFET and IGBT. (6 Hrs)
Unit-II	**Thyristor firing and Commutation Circuits:** Thyristor firing Circuits: Main features of firing circuits, Resistance and Resistance-Capacitance firing circuits, UJT relaxation oscillator. **Thyristor Commutation Circuits:** Class A Commutation : Load commutation, Class B Commutation : Resonant pulse commutation, Class C Commutation : Complementary commutation, Class D Commutation : Impulse commutation, Class E Commutation : External pulse commutation, Class F Commutation : Line commutation. (6 Hrs)
Unit-III	**Power Converters:** **Controlled Rectifier:** Single phase full and semi converters with R and RL loads operations along with waveforms.(no mathematical analysis) **Choppers:** Step down chopper operation with R load and motor load, output equation, step up chopper operation. **Inverters:** Basic operation of series Inverter and bridge inverters **Cycloconverter :** single phase to single phase and single phase to three phase (6 Hrs)
Unit-IV	**DC Generator**: Operating principal and Types, Construction, EMF equation, Armature reaction and Commutation, Characteristics, Losses, application, Power stages, Efficiency. **DC Motor**: Types, Back EMF, Voltage Equation, Torque equation, Characteristics, Starting and Speed control, application, Power stages, Efficiency, (Numerical treatment) (6Hrs)

Unit-V	**Induction Motor** - Three phase Induction Motor-Operating principle, Construction, Squirrel cage and Slip ring type, Torque equation, Power stages, Speed control, Starting Methods ,efficiency.(Numerical Treatment) **Single phase Induction Motor** - Construction, Double field revolving theory, Types – Capacitor start, Capacitor start-capacitor run, Shaded pole, split phase (6Hrs)
Unit-VI	**Special Machines**: Working principle and application of Servomotor (DC and AC), Stepper motor (Variable reluctance type, permanent magnet type and Hybrid type). **Transformer:** Working Principle and Construction of Three phase Transformer- Various transformer connections (Y/Y, Y/Δ ,Δ/Y, Δ/Δ) (Only theoretical treatment) (6Hrs)

References

Sr. No.	Title	Author	Publication	Edition
1	An Introduction to Thyristor and their application	M Ramamurthy	PHI	**2nd Edition**
2	Power Electronics	P.C.Sen	Tata Mc-Graw-Hill Publishing Company Limited.	**3rd Edition**
3	Power Electronics circuits, devices and applications	M.H. Rashid	PHI	**3rd Edition**
4	Power Electronics	DR. R .S. Bhimbra	Khanna Publication	**3rd Edition**
5	Electrical Machine Education.	D. P. Kothari, I. J. Nagrath.	Tata McGraw-Hill	**5th Edition**
6	Electrical Machine -	S. K. Bhattacharya,	Tata McGraw - Hill Education, New Delhi;	**4th Edition**
7	Electrical Technology	B.L.Theraja	S. Chand	**3rd Edition**

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC254 Course: Data Structure **Teaching Scheme:** Theory: 03Hrs/week Tutorial:NA	Credits:3 -0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks Term Work: 25 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 3 Hrs

Prerequisite	Computer Fundamental and programming
Objectives	1. To understand importance of data structures in implementing efficient programs. 2. To implement basic data structures- stack, queue, linked list. 3. To understand various searching and sorting technique.
Unit-I	**Introduction to Data structures and Algorithm** Concept of data, Data object, Data structure, Abstract Data Types (ADT), Concept of Primitive and non primitive, linear and Non-linear, static and dynamic, persistent and ephemeral data structures. Concept of Algorithm, Complexity of algorithm, Structure and Union, pointers. (6 Hrs)
Unit-II	**Linear data structures –Array ,Stack ,Queue** Concept of sequential organization, Concept of Linear data structures, Storage representations such as row major, column major and their address calculation. Stack ,Queue and its implementation (6 Hrs)
Unit-III	**Linear data structures using linked organization** Concept of linked organization, Comparison with sequential organization, Types of Linked List- singly linked list, doubly linked list, circular linked List and its implementation (6 Hrs)
Unit-IV	**Non-linear data structure** Concept of non-linear data structure, Trees and binary trees-concept and terminology , Binary Search Tree, Tree traversal techniques, Graph-concept and terminology, graph traversal Techniques (6Hrs)
Unit-V	**Sorting techniques** Sorting methods : Bubble, insertion, selection, merge, quick, bucket, heap Time complexity of each sorting algorithm. (6Hrs)
Unit-VI	**Searching** Searching methods: Linear and binary search, Hashing, B-tree and B+tree , AVL – tree. (6Hrs)

References

Sr. No.	**Title**	**Author**	**Publication**	**Edition**
1	Data Structures using C and C++	Augensteinand Tenenbaum Langsam	Prentice Hall of India	Second Edition (2007)
2	Data Structures and Program Design in C”	Robert L. Kruse , Bruce P. Leung	Printice Hall	Second Edition (1996)

	3	Data Structures through C	Yashvant P. Kanetkar	BPB publication	Second Edition (2003)
	4	Data Structures	Seymour Lipschutz	McGraw Hill Education	Revised First Edition (2014)
	5	Fundamentals of Data Structures in C	E. Horowitz, S. Sahani and S.Anderson- Freed	University Press	2 Edition

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC 291 Course: Professional Elective Courses I: Data Base Management System **Teaching Scheme:** Theory: 3 Hrs/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 3 Hrs

Prerequisite	Data Structures
Objectives	1. Understand and list fundamental concepts of Database Management 2. Design methodology for databases and verifying their Structural Correctness. 3. Identify and list various components of Database Management. 4. Understand issues of Concurrency, Transactions, RDBMS.
Unit-I	**Introduction:** Database, Management Systems, Comparison with File Systems. Advantages and Disadvantages of Database Management Systems, Applications. Database Architecture: Components of DBMS and Overall structure of DBMS; Various types of databases. (4 Hrs)
Unit-II	**Data Modelling:** Need of Data Modelling, Types of Data Models. Entity Relationship Model: Entities, Attributes, Relationships- types, Constraints, Keys, Design Process, ER-Model, ER Diagram. Converting ER models to Database Tables. • Case Study- Design ER Model for Railway Reservation System, convert it to Database tables. (6 Hrs)
Unit-III	**Structures Query Language:** Introduction, SQL Data Types and Literals, DDL, DML, DCL, TCL. SQL Operators, Tables: Creating, Modifying, Deleting. Views: Creating, Dropping, Updating using Views, Indexes. SQL DML Queries: SELECT Query and clauses, Set Operations, Joins, Tuple Variables, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries. Basics of PL/SQL**:** Concept of Stored Procedures & Functions, Cursors, Triggers, Assertions, roles, and privileges. (8 Hrs)
Unit-IV	**Relational Databases:** Relational Model: Basic concepts, Attributes and Domains, CODD's Rules. Relational Integrity: Domain, Referential Integrities, Enterprise Constraints, Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, 2NF, 3NF, BCNF. (6 Hrs)

<table>
<tr><td>Unit-V</td><td colspan="5">Database Transactions:
Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Concurrency Control: Need, Locking Methods, Deadlocks, Timestamping Methods
(6 Hrs)</td></tr>
<tr><td>Unit-VI</td><td colspan="5">Case Studies:
• Comparative Study of SQL and NoSQL
• Advantages of MongoDB
• Issues in unstructured data from Social Media.
(6 Hrs)</td></tr>
<tr><td rowspan="5">References</td><td>Sr. No.</td><td>Title</td><td>Author</td><td>Publication</td><td>Edition</td></tr>
<tr><td>1</td><td>Database System Concepts</td><td>Silberschatz A., Korth H., Sudarshan S.</td><td>McGraw Hill Publishers, ISBN 0-07-120413-X</td><td>6th Edition</td></tr>
<tr><td>2</td><td>Database Systems</td><td>Connally T, Begg C.</td><td>Pearson Education, ISBN 81-7808-861-4</td><td>4th Edition</td></tr>
<tr><td>3</td><td>Fundamental Database Systems</td><td>Ramez Elmasri, Shamkant B. Navathe</td><td>Pearson Education, 2003, ISBN 978-0321204486.</td><td>3rd Edition</td></tr>
<tr><td>4</td><td>Database Management System</td><td>Raghu Ramkrishnan, Johannes Gehrke</td><td>McGraw Hill International Editions, ISBN 978-0072465631</td><td>2nd Edition</td></tr>
</table>

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC292 Course: : Professional Elective Courses I: Sensors and Measurement **Teaching Scheme:** Theory: 3 Hrs/week Tutorial: 0 Hr/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks Term Work:25 Marks End Semester Examination: 60 Marks End Semester Examination (Duration):3 Hrs

Prerequisite	: Knowledge of physical measurement quantities and electronic parameters
Objectives	1. To study types of sensors (transducers) working principles, applications of sensing systems. 2. To understand theory & applications on measurements of electronic systems.
Unit-I	MEASUREMENT SYSTEM: Generalized Measurement System, Basic methods of measurement, Performance Characteristics, Static Characteristics, Dynamic Characteristics, Errors, Classification of errors, error analysis, Statistical methods, Calibration, system of Units and standards. (6 Hrs)
Unit-II	SENSORS: Motion Sensors – Potentiometers, Resolver, Encoders – Optical, Magnetic Synchro Accelerometer, GPS, Bluetooth, Range Sensors – RF beacons, Ultrasonic Ranging, Reflective beacons, Laser Range Sensor, Load Cell. (6 Hrs)
Unit-III	DISPLACEMENT, PRESSURE, TEMPERATURE SENSORS: Strain Gauge, Gauge factor, types of strain gauge, capacitive transducer, inductive transducer, LVDT, RVDT, Passive types: RTD materials & range, Active type: Thermocouple, Types of thermocouples, IR temperature sensor. (6 Hrs)
Unit-IV	MEASURING INSTRUMENTS: Stroboscope, Q-meter, RX Meter, Phase Meter, Digital encoder, Introduction to acoustic transducers. (6 Hrs)
Unit-V	MEASUREMENT OF CURRENT, VOLTAGE, POWER: DC Ammeter, Aryton Shunt meter, basic meter, DC voltmeter, Power measurement Voltmeter ammeter method, electrodynamic wattmeter. (6 Hrs)
Unit-VI	SIGNAL CONDITIONING: AC and DC Bridges – Wheatstone Bridge, Maxwell Bridge, Schering Bridge, and Wien Bridge, Pre-amplifier, impedance matching circuits. (6 Hrs)

	Sr. No.	Title	Author	Publication	Edition
References	1	A Course in Electrical and Electronics Measurements and Instrumentation	Sawhney A. K.	Dhanpat Rai & Company Private Limited	18th
	2	Electrical Measurements and Measuring Instruments	Golding. E. W, and Widdis F.C	A. H. Wheeler & Company	5th
	3	Electronic Instrumentation	Kalsi H. S	Tata McGraw Hill Company	2nd
	4	Measurement systems, Application and Design	Ernest o Doebelin and Dhanesh N Manik	McGraw-Hill	5th

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering)

Semester-IV

Course Code: ETC293 Course: : Professional Elective Courses I: Consumer Electronics **Teaching Scheme:** Theory: 3 Hrs/week Tutorial: 0 Hr/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks Term Work: 25Marks End Semester Examination: 60 Marks End Semester Examination (Duration):3.00 Hrs

Prerequisite	Knowledge of electronics components and devices.
Objectives	1. To acquaint students with the knowledge of modern electronic system employed for audio video and domestic applications. 2. Knowledge of Consumer electronic systems and products and introduce the latest trends and technologies. 3. Understanding of different product compliance safety standards and techniques.
Unit-I	**Introduction to Communication devices**: block Diagram and working of Mobile handsets, introduction to mobile generations like 2G, 3G and 4G and their features, block diagram of EPABX, introduction of Wi-Fi, Li-Fi. (6 Hrs)
Unit-II	**Mass Communication devices**: block diagram of Color Television, Antenna, HDTV, LCD TV, LED TV, 3D Technology In TV, DTH TV, Plasma TV, and their principle of operations, Video conferencing Tools, Applications and Comparison, Gesture Technology In TV. (6 Hrs)
Unit-III	**Household electronics devices**: block diagram of Washing Machine, Microwave Oven, Types Applications, Electronics Weighing Balance, Air Conditioner, Vacuum Cleaner (6 Hrs)
Unit-IV	**Printing and recording devices**: Block diagram working principles of LASER printer, Inkjet Printers, thermal printer, 3D printer Photocopiers, Scanner, (6 hrs)
Unit-V	**Special purpose machines**: Electronic Voting Machine, Automatic Sanitization Machines, types, Solar Lamps, Security devices: Biometric Attendance Monitoring System, working of Biometric Sensors, (6 hrs)
Unit-VI	**Compliance** : Product safety and liability issues; standards related to electrical safety and standards related to fire hazards, e.g., UL and VDE. EMI/EMC requirements and design techniques for compliance, e.g. ESD, RF interference and immunity, line current harmonics and mains voltage surge. (6 Hrs)

References	Sr. No.	Title	Author	Publication	Edition
	1	"Television & Video Engineering"- TMH Publication	A. M. Dhake,	TMH Publication	First ed.
	2	Audio & Video Systems	R.G.Gupta,	TMH Publication	First ed.
	3	Refrigeration and Air conditioning	Arora C.P.,	Tata McGraw-Hill, New Delhi,	1994
	4	Consumer Electronics	S.P.Bali,	Pearson Education	First ed
	5	Colour TV Theory & Practice	S.P.Bali,	TMG Hill Publication	First ed
	6	Mobile communications	Yi Bing Lin	Jon Wiley Publication.	First ed

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC271 Course: Lab –Signals & Systems **Teaching Scheme:** Practical:02 Hrs/week	Credits: 0-01-0 PR Exam /Oral Exam :_25 Marks

Prerequisite	Basics of Signals & Systems
Course Objectives:	1. To learn basics of MATLAB/SCILAB tool 2. Analyze signals & systems through software tool.
List of Practical's	1. Study of different MATLAB/SCILAB commands used for signals and systems 2. Write a program to plot various continuous time signals 3.Write a program to plot various discrete time signals 4. Write a program to perform addition, subtraction and multiplication of signals. 5. Write a program to find even and odd parts of the Signals. 6. Write a program to find convolution of two DT signals using ' conv ' command 7. Write a program to calculate autocorrelation and cross-correlation between two 8. Write a program to calculate correlation of DT signals by using 'xcorr ' command. 9. Write a program to plot poles and zeros of transfer function of system. 10.Write a program to plot magnitude and phase response of second order system. 11.Generation of Simple GUI
List of Equipments /Instruments	Software Tools: MATLAB/SCILAB

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC272 Course: Power Devices and Machines **Teaching Scheme:** Practical:2 Hrs	Credits: 0-1-0 Term Work: 0Marks PR/OR:__25__Marks

Prerequisite	Knowledge of all power devices ,Basic Electronics.
Objectives	1. Understand power devices with their practical working. 2. Understand the practical concept of DC and Induction motors.
List of Practicals	1. To plot V-I Characteristics of SCR/DIAC/TRIAC/MOSFET 2. To study SCR Triggering, Commutation circuits and observes the output. 3. To study Single phase controlled rectifier on various loads and observe the output. 4. To study chopper and observe the output. 5. To study inverter and observe the output. 6. Three point starter for DC Shunt motor. 7. Speed reversal of DC Shunt motor 8. Speed control of dc shunt motor . 9. Study of star -delta starter for 3 phase IM. 10. Speed reversal of three phase induction motor.
List of Equipments /Instruments	1. Function Generator, 2. Cathode Ray Oscilloscope, 3. Regulated Power Supply, 4. Digital Multimeter 5. Experimental boards

References

Sr. No.	Title	Author	Publication	Edition
1	An Introduction to Thyristor and their application	M Ramamurthy	PHI	**2nd Edition**
2	Power Electronics	P.C.Sen	Tata Mc-Graw-Hill Publishing Company Limited.	**3rd Edition**
3	Power Electronics circuits, devices and applications	M.H. Rashid	PHI	**3rd Edition**
4	Power Electronics	DR. R .S. Bhimbra	Khanna Publication	**3rd Edition**
5	Electrical Machine Education.	D. P. Kothari, I. J. Nagrath.	Tata McGraw-Hill	**5th Edition**

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC273 Course: Lab Data Structures **Teaching Scheme:** Theory: 03Hrs/week Tutorial: --Hr/week	Credits: 0-1-0 Term Work: 25 Marks PR/OR:--Marks

Prerequisite	C Programming Language for implementation
Objectives	1.To implement basic data structures 2. To implement sorting and searching techniques
List of Practicals	1. Program for Structure 2. Program for Union 3. Program for array implementation of stack. 4. Program for array implementation of queue. 5. Program for single linked list. 6. Program to implement tree. 7. Program for bubble sort. 8. Program for quick /merge sort. 9. Program for Linear search. 10. Program for Binary Search.
List of Equipments /Instruments	1. C compiler

References

Sr. No.	Title	Author	Publication	Edition
1	Data Structures using C and C++	Augensteinand Tenenbaum Langsam	Prentice Hall of India	Second Edition (2007)
2	Data Structures and Program Design in C"	Robert L. Kruse , Bruce P. Leung	Printice Hall	Second Edition(1996)
3	Data Structures through C	Yashvant P. Kanetkar	BPB publication	Second Edition(2003)
4	Data Structures	Seymour Lipschutz	McGraw Hill Education	Revised First Edition(2014)

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC274A Course: Lab X: Professional Elective Courses-I: Database Management System **Teaching Scheme:** Tutorial: 2 Hr/week	Credits: 0-1-0 Term Work: 25 Marks

Prerequisite	Concept of Data Structures
Objectives	1. Develop ER models for given scenario. 2. Implement SQL queries on given database.
List of Practical	1. Prepare ER Model for given scenario. 2. Take an ER Model and convert it to database. 3. Set up environment for SQL and perform SQL queries to Create, update, drop table. 4. Write simple SQL Queries on the given schema 5. Write SQL queries using aggregates, grouping, and ordering statements for given scenario. 6. Write SQL queries for given schema using Nested Subqueries and SQL Updates 7. Apply PL/SQL- Stored Procedures and Functions. 8. Apply PL/SQL- Triggers and Cursors 9. Select any real time problem for database implementation. Draw an ER diagram for the Given. Normalize the database up to appropriate normal form 10. Mini Project- Select Problem, Develop ER Model, prepare database schema, execute queries to retrieve data.
List of Software	1. Any ERD Design Tool (like dbdiagram.io.,draw.io.,Lucidchart. 2. Any SQL interface (like Oracle, MySQL, Postgres., etc).

References

Sr. No.	Title	Author	Publication	Edition
1	SQL, PL/SQL the Programming Language of Oracle	Ivan Bayross	BPB Publications	4th Edition
2	Learning SQL: Master SQL Fundamentals	Alan Beaulieu	O'reilly	2nd Edition

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC274B Course: Lab IX: : Professional Elective Courses-I Sensors and Measurement **Teaching Scheme:** Practical: 2 Hrs/week	Credits: 0-1-0 Term Work: 25 Marks PR/OR: Marks

Prerequisite	Knowledge of physical measurement quantities and electronic parameters.
Objectives	1. Understanding working of different sensors. 2. Creating awareness about measurement and its techniques.
List of Practical	1. Measurement of temperature using temperature sensors. 2. Measurement of displacement using LVDT. 3. Measurement of Q using Q meter. 4. Measurement of pressure using sensors. 5. Measurement of flow using different flow meters. 6. Measurement of resistance using whetstones bridge. 7. Measurement of capacitance using Schering bridge. 8. Measurement of inductance using Maxwell bridge. 9. Measurement of frequency using Wien bridge. 10. Measurement of voltage and current using DC voltmeter and DC Ammeter.
List of Equipments /Instruments	1. Cathode Ray Oscilloscope. 2. DC voltmeter and DC ammeter

References

Sr. No.	Title	Author	Publication	Edition
1	Modern Electronic Instrumentation and Measurement Techniques	Copper. W.D and Hlefrick A.D.	Prentice Hall of India	**5th**
2	Transducers and Instrumentation	Murthy.D.V.S	Prentice Hall of India	
3	Principles of Measurement Systems	John. P, Bentley	Pearson Education	**3rd**
4	Measurement Systems – Applications and Design	Doebelin. E.A,	Tata McGraw Hill	

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Syllabus of Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering)

Semester-IV

Course Code: ETC273-C Course: Professional Elective Courses-I Consumer Electronics **Teaching Scheme:** Theory: 3 Hrs/week Tutorial:0 Hr/week Practical: 2 Hr/week	Credits: 0-2-0 Term Work: 25 Marks PR/OR: 00 Marks

Prerequisite	Basic Electronics
Objectives	To Study • TV with the different basic concept. • To get analysis of the different online tools used for the Video conferencing • To understand the Mechanism of EVM. • To understand the operation of 3D printer and its applications. • To get awareness of Electrical Safety parameters.
List of Practicals	1. Study of Color TV and working of different sections. 2. Case study of Different online Video Conferencing Tools and their analysis. 3. Design and testing of the touch free Hand sanitizer machine 4. study of Weighing Machine with its specification, Calibration steps. 5. Study of Microwave oven 6. Case study of Electronics Voting Machine. 7. Study of Mobile by using trainer kit. 8. Installation of CCTV camera and case study. 9. Study of Electrical Safety Parameters. 10. Study and operation of 3D printer.
List of Equipments /Instruments	1. TV trainer Kits. 2. component and devices specified in the experiment. 3. CRO, function generator. 4. Multimeter

References

Sr. No.	Title	Author	Publication	Edition
1	"Television & Video Engineering"- TMH Publication	A. M. Dhake,	TMH Publication	First ed.
2	Audio & Video Systems	R.G.Gupta,	TMH Publication	First ed.
3	Refrigeration and Air conditioning	Arora C.P.,	Tata McGraw-	1994

				Hill, New Delhi,	
	4	Consumer Electronics	S.P.Bali,	Pearson Education	First ed
	5	Colour TV Theory & Practice	S.P.Bali,	TMG Hill Publication	First ed
	6	Mobile communications	Yi Bing Lin	Jon Wiley Publication.	First ed

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Syllabus of S. Y. B. Tech. (All) Semester - IV.

Code No.: BSH275
Course : Development of Skills – IV
Teaching Scheme: **Term-work / Practical Assessment: 25 Marks**
(Online Examination)
Practical : 2 Hrs / Week **Credits: 0-1-0**

Course Objectives :

1. Students will be able to communicate in English accurately and effectively.
2. Students will be able to enhance employability skills.
3. Students will be able to participate in debate and group discussion in English effectively.
4. Students will be able to enhance verbal ability.
5. Students will be able to face interview effectively.

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Sr. No.	Contents	Duration Hrs
Unit-I	**Common Errors in English Communication** • Grammatical • Spelling • Pronunciation	02hrs
Unit-II	**Enhancing Employability skills** • Job application • Resume / CV • Essay • Reading Comprehension	06 hrs
Unit-III	**Debate and Group Discussion** • Communication • Body language • Appearance • Knowledge of the topic • Preparation	04 hrs
Unit-IV	**Verbal Ability** • Synonyms • Antonyms • Idioms and Phrases • One word substitution • Word analogy • Verbal reasoning	04 hrs
Unit-V	**Presentation Skills** • Body language • Grooming • Group dynamics • Preparation: power point, Prezi, vizme, etc.	02 hrs
Unit-VI	**Interview Skills** • Body language • Grooming • Preparation	02 hrs

List of Reference Books :

Sr. No.	Title	Author	Publication
1	Verbal and Non-Verbal Reasoning	R.S. Agrawal	S. Chand Publication
3	Effective Technical Communication	Anne Eisenberge	Mc Graw Hill International Editors
4	Professional Communication Skills	A. K. Jain, Pravin, S. R. Bhatia, A. M. Sheikh	S. Chand & Company Ltd.
5	Business Communication	Urmila Rai, S. M. Rai	Himalaya Publishing House
7	Better English Pronunciation	J.D.O'Connor.	Cambridge University Press
8	Grammar of Spoken and Written English	Dauglas Biber, Geoffrey Leech	Longman
11	Technical Communication- Principles and Practice	Meenakshi Raman & Sangeeta Sharma	Oxford University Press
12	A course in Phonetics & Spoken English	J.Sethi ,P.V.Dhamija	PHI publication
13	Communication Skills for Engineers	Sunita Mishra, C. Murli Krishna	Pearson Education
14	Soft Skills: Enhancing Employability: Connecting Campus with Corporate	M.S. Rao	I.K. International
15	Technical Communication A Reader Centred Approach	Paul V. Anderson	Thomson Publication
16	Grammar of Spoken and Written English	Dauglas Biber, Geoffrey Leech	Longman
17	Oxford English Grammar	Sydney Greenbaum	Oxford University Press

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: ETC276	Credits: 0-1-0
Course: Project Based Learning	Term Work: 25 Marks
Teaching Scheme:	
Practical: 02 Hrs/week	

Preamble:

The current educational approach in engineering education needs substantive change in order to provide students with attributes which they require in professional practice. In the project-based learning approach, students build up and direct their own learning, develop their creativity, prefer to solve problems they face in cooperation and life is brought to the classroom. In brief, the project-based learning is an approach based on students' working alone or in small groups with the aim of producing real products. Rapid development in engineering and technology requires adopting a teaching approach that would assist students not only in developing a core set of industry relevant skills, but also enable them to adapt to changes in their professional career. PBL is an approach to design Electronic Systems Curricula for making electronics more appealing to students. Since electronics is an important grounding for other disciplines (computer science, signal processing, and communications), this approach proposes the development of multidisciplinary projects using the PBL strategy for increasing the attractiveness of the curriculum. Promoting electronics as grounding for other disciplines can be done by defining a new curriculum that includes practical courses (laboratories) in which the students develop whole systems involving multidisciplinary knowledge.

Course Objectives:

On completion of the course, learner will be able to –

- To emphasize project based learning activities those are long-term, interdisciplinary and student-centric.
- To inculcate independent and group learning by solving real world problem with the help of available resources.
- To be able to develop application based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.
- To get practical experience in all steps in the life cycle of the development of electronic systems: specification, design, implementation, and testing.
- To be able to select and utilize appropriate hardware and software tools to design and analyze the proposed system.
- To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professionalism.

Course Outcome:

- CO1: Identify the real-world problem through a literature survey and formulate / set relevant aim and objectives.

- CO2: Propose a suitable solution based on the fundamentals of electronics and telecommunication engineering by possibly the integration of previously acquired knowledge.

Group Structure:

Working in supervisor/mentor –monitored groups. The students plan, manage and complete a task/project/activity which addresses the stated problem.

1. Create groups of 2(two) to 3(three) students in each class
2. A supervisor/mentor teacher assigned to 3-4 groups or one batch

Problem Identification:

Survey through journals, patents or field visit (A problem can be theoretical, practical, social, technical, symbolic, cultural and/or scientific), check the feasibility of solution, analyze the problem, design and find the values of components.

There are no commonly shared criteria for what constitutes an acceptable project. Projects vary greatly in the depth of the questions explored, the clarity of the learning goals, the content and structure of the activity.

The problem-based project oriented model for learning is recommended. The model begins with the identifying of a problem, often growing out of a question or "wondering". This formulated problem then stands as the starting point for learning. A problem can be theoretical, practical, social, technical, symbolic, cultural and/or scientific and grows out of students‟ wondering within different disciplines and professional environments. As stated in the preamble as electronics is an important grounding for other disciplines (computer science, signal processing, and communications), the project topic can be Interdisciplinary in nature. However the chosen problem must involve the application of electronics and communication engineering fundamentals. Out of the total developed system setup, the project must involve minimum 40% electronic components. Although in a genuine case 100% software based project topic may be allowed.

Ethical Practices, team work and project management:

Use IEEE standards for project manufacturing, respect the time of others, attend the reviews, poster presentation and model exhibitions, strictly follow the deadline of project completion, comply with all legislation requirements that govern workplace health and safety practices.

Effective Documentation:

In order to make our engineering graduates capable to prepare effective documentation, it is required for the students to learn the effective writing skills. The PBL final report is expected to consist of the Literature Survey, Problem Statement, Aim and Objectives, System Block Diagram, System Implementation Details, Discussion and Analysis of Results, Conclusion, System Limitations and Future Scope. Many freely available software tools (for instance Medley (Elsevier), Grammerly) are expected to be used during the preparation of PBL synopsis and final report. It is expected that the PBL guides/mentors shall teach students about utilizing valid sources of information (such as reference papers, books, magazines, etc) related to their PBL topic.

Evaluation & Continuous Assessment:

The institution/head/mentor is committed to assessing and evaluating both student performance and program effectiveness. Progress of PBL is monitored regularly on weekly basis. Weekly review of the work is necessary. During process of monitoring and continuous assessment and evaluation the

individual and team performance is to be measured. PBL is monitored and continuous assessment is done by supervisor /mentor and authorities. Students must maintain an institutional culture of authentic collaboration, self-motivation, peer-learning and personal responsibility. The institution/department should support students in this regard through guidance/orientation programs and the provision of appropriate resources and services. Supervisor/mentor and Students must actively participate in assessment and evaluation processes.

It is recommended that the all activities are required to be recorded regularly. A regular assessment of PBL work is required to be maintained at the department in PBL log book by students. It is expected that the PBL log book must include following:

1. Weekly monitoring by the PBL guide,
2. Assessment sheet for PBL work review by PBL guide and Internal Project Monitoring Committee.

The Internal Project Monitoring Committee structure shall consist of Head of the department, 1/2 senior faculties of the department and one industry expert (optional). Continuous Assessment Sheet is to be maintained by the department.

Recommended parameters for assessment, evaluation and weightage:

1. Idea Inception (kind of survey). (10%)
2. Outcome (Participation/ publication, copyright, patent, product in market). (50%)
3. Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and final report, other documents). (15%)
4. Attended reviews, poster presentation and model exhibition. (10%)
5. Demonstration (Poster Presentation, Model Exhibition etc). (10%).
6. Awareness /Consideration of - Environment/ Social /Ethics/ Safety measures/Legal aspects. (5%)

<table>
<tr><td rowspan="5">Reference Books/ Research Articles:</td><td>Sr. No.</td><td>Title</td><td>Author</td></tr>
<tr><td>01</td><td>Setting the Standard for Project Based Learning</td><td>John Larmer, John R. Mergendoller, and Suzie Boss</td></tr>
<tr><td>02</td><td>Project Based Teaching: How to Create Rigorous and Engaging Learning Experiences</td><td>John Larmer and Suzie Boss</td></tr>
<tr><td>03</td><td colspan="2">“Hacking Project Based Learning: 10 Easy Steps to PBL and Inquiry”. M. Krašna, "Project based learning (PBL) in the teachers' education,"39th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), Opatija, 2016, pp. 852-856, doi: 10.1109/MIPRO.2016.7522258. Erin M. Murphy and Ross Cooper S.Chand& Co , New Delhi</td></tr>
<tr><td>04</td><td colspan="2">J. Macias- Guarasa, J.M. Montero, R. San-Segundo, A. Araujo and O. Nieto-Taladriz, "A project based learning approach to design electronic systems curricula", IEEE transactions on Education, vol.49, no. 3, pp. 389-397, Aug. 2006, doi: 10.1109/TE.2006.879784</td></tr>
<tr><td>Web</td><td>01</td><td colspan="2">• Project-Based Learning, Edutopia, March 14, 2016.</td></tr>
</table>

Resources:		• What is PBL? Buck Institute for Education. • http://www.cdio.org/knowledge-library/project-based-learning • www.howstuffworks.com • www.wikipedia.org