SCHEME OF EXAMINATION FOR

SIXTH SEMESTER BACHELOR OF ENGINEERING. (ELECTRONICS ENGINEERING)

Sub Code	Board	SUBJECT	Work Load				Credit				Marks				
											Theory		Practical		Total Marks
			L	P	T	Total	L	P	T	Total	Internal	University	Internal	University	
BEENE601T	Electronics	Microwave Engineering	4	0	1	5	4	0	1	5	20	80	0	0	100
BEENE601P	Electronics	Microwave Engineering	0	2	0	2	0	1	0	1	0	0	25	25	50
BEENE602T	Electronics	Digital Signal processing	4	0	1	5	4	0	1	5	20	80	0	0	100
BEENE602P	Electronics	Digital Signal processing	0	2	0	2	0	1	0	1	0	0	25	25	50
BEENE603T	Electrical	Control System Engg.	4	0	1	5	4	0	1	5	20	80	0	0	100
BEENE604T	Electronics	Digital Communication	4	0	1	5	4	0	1	5	20	80	0	0	100

BEENE605T	Applied Science & Humanities	Functional English	2	0	1	3	2	0	1	3	10	40	0	0	50
BEENE606P	Electronics	Electronics Workshop Practice	0	2	0	2	0	2	0	2	0	0	25	25	50
BEENE607P	Electronics	Industrial Visit	0	2	0	2	Audit Course			0	0	0	G	0	0
Total			**18**	**8**	**5**	**31**	**18**	**4**	**5**	**27**	**90**	**360**	**75**	**75**	**600**

B. E. Sixth Semester

(Electronics Engg)

Microwave Engineering

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE601T **[4 – 0 – 1 – 5]**

Objectives:
The Course Objectives are:
1. To study the principles of the advanced microwave engineering.
2. To study the design of passive and active microwave components and microwave circuits including
3. Micro strip line, guided wave device
4. To study Klystron amplifier and oscillator. 4 To study magnetron & other devices.
5. To study the free space communication link and its mathematical analysis.

Outcome:
At the end of the course the students shall be able to:
1. Describe the use of active and passive microwave devices.
2. Analyze different UHF components with the help of scattering parameter. 3. Describe micro strip lines.
3. Demonstrate the use of different Klystrons, magnetron devices.
4. Analyze the different power distribution Tees.
5. Describe the basic communication link design, signal power budget, noise evaluation and link carrier to noise ratio.
6. Describe the transmission and waveguide structures and how they are used as elements in impedance matching and filter circuits.

Unit I: Microwave Active Devices (O-type) **(10)**

Interaction of electron beam with electromagnetic field, power transfer condition. Principles of working of two cavity and Reflex Klystrons, arrival time curve and oscillation conditions in Reflex klystrons, mode-frequency characteristics, Effect of repeller voltage variation on power and frequency of output. Slow wave structures, Principle and working of TWT amplifier & BWO Oscillator.

Unit II: **Microwave Active Devices (M-type)** **(10)**

Principle of working of M-type TWT, Magnetrons, Electron dynamics in planar and cylindrical Magnetrons, Cutoff magnetic field, phase focusing effect, mode operation, Mode separation techniques, Tuning of magnetron

Unit III: Transmission line **(10)**

Input impedance, Standing wave distribution, Quarter Wave and Stub Matching using Smith chart, losses in Transmission lines, Planar Transmission line types, Introduction - Types of MICs and their technology, Fabrication process of MMIC, Hybrid MICs.

Unit IV: Microwave Networks and passive Components **(10)**

Transmission line ports of microwave network, Scattering matrix, Properties of scattering matrix of reciprocal, nonreciprocal, loss-less, Passive networks, Examples of two, three and four port networks, wave guide components like attenuator. Principle of operation and properties of E-plane, H-plane Tee junctions of wave guides, Hybrid T, Directional couplers, Microwave resonators-rectangular, Excitation of wave guide and resonators .Principles of operation of non-reciprocal devices, properties of ferrites, Gyrators ,Isolators ,Circulator and phase shifters.

Unit V: Microwave Measurements **(10)**

Function of Tuning Probes, Detector mounts and Detector diode, Slotted line section and VSWR meter, Measurement of wave-guide impedance at load port by slotted line, Measurement of scattering matrix parameters, High, Medium and low-level power measurement techniques, Characteristics of bolometer, bolometer mounts, Power measurement bridges, Calorimetric method, Microwave frequency measurement techniques, calibrated resonators (transmission and absorption type), Network Analyzer and its use in measurements.

Unit VI: Microwave Solid State Devices and Application **(10)**

PIN diodes-Properties and applications, Microwave detector diodes-detection characteristics, Varactor diodes, Parametric amplifier fundamentals-Manley-Rowe Power relation, MASERS, Transferred electron devices, Gunn effect, Various modes of operation of Gunn oscillator, IMPATT, TRAPATT and BARITT.

Books:

Text Books:

1. Samuel Y. Liao, 'Microwave Devices and Circuits', Pearson Education, 3rd Edition.
2. R. E. Collins: Foundations of Microwave Engineering, 2nd Edition, Wiley Publications.
3. R. Chatterjee, 'Elements of Microwave Engineering', Prentice, September 1986
4. D. M. Pozar: Microwave Engineering, 3rd Edition, Wiley Publications.

Reference Books:

1. Manojit Mitra, 'Microwave engineering', 3rd edition, Dhanpat Rai & Company.
2. Peter A. Rizzi, 'Microwave Engineering Passive Circuits', PHI, 1999.
3. Annapurna Das, Sisir Das, 'Microwave Engineering', April 1987, Tata Mc Graw Hill Publication.
4. Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss , 'Microwave Principles',4th edition, 1998.
5. G. S. Raghuvanshi, 'Microwave Engineering', CENGAGE Learning

B. E. Sixth Semester

(Electronics Engg)

Microwave Engineering

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25 Marks

Subject Code: BEENE601P **[0 – 2 – 0 – 2]**

Objectives:

1. Goal of this course is to understand the practical concept of microwave engineering
2. To Understand different Power distribution Waveguide and Scattering Matrix.
3. To know about Microwave and its Application.
4. To Study different Microwave Filters.

Outcome:

At the end of the course the students shall be able to:

1. Describe working of microwave bench.

2. Measure power & VSWR of microwave component.

3. Analyze the S-parameter of microwave component.

Minimum TEN experiments to be performed

LIST OF EXPERIMENTS:

1. Study the characteristics of Klystron Tube and to determine its electronic tuning range. 2. To determine the frequency and wavelength in a rectangular waveguide working on TE10 mode.
2. To determine the Standing Wave-Ratio and reflection coefficient. 4. To study the V-I characteristics of Gunn Diode.
3. To study the following characteristics of Gunn Diode.
4. To study the following characteristics of Gunn Diode.
    a. Output power and frequency as a function of voltage.
    b. Square wave modulation through PIN diode.
5. Study the function of Magic Tee by measuring the following parameters.
6. Measurement of VSWR at different ports and Measurement of isolation and coupling coefficient.
7. Study the function of Isolator / Circulator by measuring the following parameters.
8. Input VSWR measurement of Isolator / Circulator.
9. Measurement of insertion loss and isolation.
10. Study the function of Attenuator(Fixed and Variable type) by measuring the following parameter
    a. Input VSWR measurement.

b. Measurement of insertion loss and attenuation.

11. To study the function of Multi Hole Directional Coupler by measuring the following parameters.
12. To measure main line and auxiliary line VSWR.
13. To measure the coupling factor and directivity.
14. Study of a network analyzer and measurements using it.
15. Verification of port characteristics of Microwave Tees (E, H, E-H planes)
16. Verification of port characteristics of Directional Coupler, study of Coupling factor, Insertion loss and Directivity.
17. To plot the radiation pattern of Horn Antenna and calculate its Antenna Gain and Beam width.
18. Study of Transmission line Characteristics etc. (Based on Simulation)
19. **Note:** At least four of the following experiments should be simulated with the help of any RF simulation software (EKO / HFSS / IE3D / Microwave Office / Microwave Studio or any other similar software)

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

DIGITAL SIGNAL PROCESSING

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE602T/ BEECE602T/ BEETE602T [4 – 0 – 1 – 5]

Objectives:

1. To study the basic concepts of digital signal processing.
2. To study analysis and processing of signals for different kind of applications and retrieval of information from signals.
3. To understand the physical significance of circular convolution and its relation with linear convolution.
4. To study designing of digital filters and its realization.
5. To study analysis of signals using the discrete Fourier transform (DFT) and Z-Transform.
6. To study behavior of discrete time systems using Z-Transform.

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Outcome:

By the end of the course the students shall be able to:

1. Represent discrete-time signals analytically and visualize them in the time domain.
2. Meet the requirement of theoretical and practical aspects of DSP with regard to sampling and reconstruction.
3. Design and implement digital filter for various applications.
4. Describe various transforms for analysis of signals and systems.
5. Describe the concept of multi rate signal processing and how to apply it for the wavelet transform.

Unit I: Introduction: (08)

Basic elements of DSP and its requirement, Advantages of Digital over analog signal processing, sampling theorem, sampling process and reconstruction of sampling data.

Discrete time signals & systems: Discrete time signals & systems, classification of discrete time signals and systems, LTI systems, linear convolution, Cross Correlation, Autocorrelation.

Unit II: Z- Transforms: (08)

The Z-transform: Definition, properties of the region of convergence for the Z-transform, Z-transform properties, Inverse Z-transform, Parseval's theorem, unilateral Z-transform.

Unit III: Discrete and Fast Fourier Transforms (12)

Definition and properties of DFT, IDFT**, R**elation between DFT and Z–Transform, Radix- 2 FFT algorithms, Linear filtering methods based on DFT, circular convolution, Frequency analysis of discrete time signals using DFT, Gortzel algorithm.

Unit IV: IIR Filter Design & Realization (12)

Filter design methods – Approximation of derivatives, Impulse invariance, bilinear transformation, characteristics & designing of Butterworth, Chebyshev filters, frequency transformations, IIR filter structures-Direct form I-II, transpose form, parallel form, cascade, Lattice and Lattice-ladder structures.

Unit V: FIR Filter Design & Realization (12)

Symmetric and antisymmetric FIR filters, Linear phase FIR filter, design of FIR filters using windows (Rectangular, Bartlett, Hanning, Hamming & Blakman), frequency sampling method, FIR differentiators, FIR filter structures.

Unit VI: Multirate DSP (08)

Introduction, Decimation by factor D, Interpolation by factor I, Sampling rate conversion by rational factor I/D, Sub band coding of speech signals and its applications, introduction to wavelet & wavelet transform, Introduction to DSP architecture TMS 320.

Books:

Text Books:

1. J.G. Proakis, D.G. Manolakis "Digital Signal Processing: Principles, algorithms and applications, Pearson Education.
2. A.V. Oppenheim, R.W. Schafer, "Discrete Time Signal Processing", Pearson Education.
3. Rabiner Gold " Theory and Application of DSP", PHI
4. Texas Instruments and Analog Devices DSP Chip Manuals.

Reference books:

1. Digital signal processing- A practical approach Second Edition, 2002. **.E**. C. Ifeachar, B. W. Jarvis Pearson Education
2. Sanjit K. Mitra , 'Digital Signal Processing – A Computer based approach'

3 .S. salivahanan, A Vallavaraj, C. Gnanapriya , 'Digital Signal Processing', 2nd Edition McGraw Hill.

4. A. Nagoor Kani, 'Digital Signal Processing', 2nd Edition McGraw Hill.

5. P. Ramesh Babu, 'Digital Signal Processing' Scitech

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

DIGITAL SIGNAL PROCESSING

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25 Marks

Subject Code: BEENE602P/ BEECE602P/ BEETE602P [0 – 2 – 0 – 2]

Objectives:

1. To understand principle & working of digital signal processing for various applications.
2. To understand Z transforms and discrete time Fourier transforms for the analysis of digital signals a nd systems.
3. To design and implement FIR & IIR filter and analysis of their frequency response

Outcome:

At the end of the course the students shall be able to:

1. Analyze and process the signals in the discrete domain.
2. Design the filters to suit requirements of specific applications.
3. Apply the techniques, skills, and modern engineering tools like MATLAB and digital processors.

Any TEN practicals are to be conducted

LIST OF EXPERIMENTS

1. To plot and represent following basic discrete time signals using MATLAB functions. : Unit impulse, unit step, ramp, real and complex exponential and its representations.
2. To plot linear convolution of discrete signals using MATLAB functions.
3. Write a program to compute cross-correlation and auto-correlation of the given sequences with corresponding plot.
4. Write a program to test stability of given discrete- time system.
5. To find Z transform of discrete time signal and its ROC with corresponding plot.
6. To find inverse Z transform of given discrete time signal.
7. Write a program to find frequency response of given system.
8. To compute DFT and IDFT of discrete time signals.
9. Write a program to find FFT and IFFT of given sequences.
10. Compute linear and circular convolution using DFT / IDFT method.

11. Designing of Digital IIR filter using MATLAB functions.
12. Designing of Digital FIR filter using window.
13. Designing of Digital FIR filter using GUI tool box.
14. To Study DSP Processor using TMS 5416 and TMS 6713 starter kits.
15. To perform linear convolution and circular convolution on Processor kit.
16. To designing and implementation of High pass filter on DSP processor.

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

CONTROL SYSTEM ENGINEERING

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE603T/ BEECE603T/ BEETE603T [4 – 0 – 1 – 5]

Objectives:

The Course Objectives are:

1. To study the fundamental concepts of Control systems and mathematical modeling of the system. 2. To study the concept of time response and frequency response of the system.
2. To study controllers & compensators.
3. To study the basics of stability analysis of the system.

Outcome:

1. At the end of the course the students shall be able to:
2. Analyze various control systems.
3. Represent the mathematical model of a system.
4. Determine the response of different order systems for various step inputs.
5. Analyze the stability of the system using Root locus. Bode plot, Nyquist plot.
6. Obtain transfer function of systems using signal flow graph.
7. Apply the state variable approach in design.

Unit I: Introduction and Modeling of control system (11)

Introduction to need for automation and automatic control, use of feedback, Broad spectrum of system application. Mathematical modeling, Differential equations, transfer functions, block diagram, signal flow graphs, Effect of feedback on parameter variation, disturbance signal, servomechanisms. Control system components, Electrical, Electromechanical. Their functional analysis and input, output representation.

UNIT-II: Time Domain analysis (09)

Time response of the system, first order & second order system, (standard inputs) concept of gain & time constant, steady state error, type of control system, approximate method for higher order system. Principles of P,PI,PD,PID controllers.

UNIT-III: Stability & Root Locus method **(11)**

Stability: Stability of control systems, conditions of stability, characteristic equation, Routh Hurwitz criterion, special cases for determining relative stability.

Root Locus method: Root location and its effect on time response, elementary idea of Root Locus, effect of adding pole and zero and proximity of imaginary axis.

UNIT-IV: Frequency response analysis **(11)**

Frequency response method of analysing linear system, Nyquist & Bode Plot, stability & accuracy analysis from frequency response, open loop & closed loop frequency response.

Nyquist criteria, effect of variation of gain & addition of poles & zeros on response plot, stability margin in frequency response.

UNIT-V: Compensators **(08)**

Needs of compensations, lead compensations, Lag compensations, Lead-Lag compensations (theoretical concepts) Overview of various transducers with their signal conditioning systems.

UNIT-VI: State variable approach **(10)**

State variable method of analysis, state choice of state representation of vector matrix differential equation, standard form, relation between transfer function and state variable.

Books:

Text Books:

1. Control Systems Engineering, I.J. Nagrath, M. Gopal
2. Modern Control system (II Edition) – Katsuhiko Ogata
3. Control systems by Smarajit Ghosh (second Edition, Pearson)

Reference Book:

1. Automatic Control system (II Edition) – Benjamin C, Kuo, PHI
2. Modern Control System, Drof, Bishop, Wesly Publication
3. Control system Engineering, S.K. Bhattacharya, Pearson Edu.

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

DIGITAL COMMUNICATION

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE604T/ BEECE604T/ BEETE604T [4 – 0 – 1 – 5]

Objectives:

The Course Objectives are:

1. To study basic components of digital communication systems.
2. To understand the designing aspects of optimum receivers for digital modulation techniques.
3. To study the analysis of error performance of digital modulation techniques.
4. To study the designing of digital communication systems under given power, spectral and error performance constraint

Outcome:

After completing this course students shall be able to:

1. Explain the working principles of basic building blocks of a digital communication system.
2. Describe a random process in terms of its mean and correlation functions and characterize special Gaussian and Rayleigh distributions.
3. Explain receiver techniques for detection of a signal in AWGN channel
4. Describe digital modulation techniques.
5. Demonstrate the concept of coding and decoding techniques.
6. Model digital communication systems using appropriate mathematical techniques.
7. Describe spread spectrum analysis.

UNIT-I:-Digital Communication Concept (10)

Review of Random variables, PDFs & CDFs, Central limit Theorem. Model of digital communication system, Gram Schmitt Orthogonalization procedure, signal space concept, Geometric interpretation of signals, probability of error, correlation receiver, matched filter receiver.

UNIT-II: - Source & Waveform Coding Methods (10)

Source coding Theorem, Huffman Coding, L-Z encoding algorithm, rate distortion theory for optimum quantization, scalar & vector quantization,.

Waveform coding methods: ADPCM, Adaptive Sub-Band & Transform coding, LP & CELP coding.

UNIT-III:-Digital Modulation Techniques (10)

Coherent Binary: QPSK, MSK, Gaussian MSK, DPSK, Memory less modulation methods, linear modulation with memory, nonlinear modulation methods with memory: CPFSK, CPM.

UNIT-IV:-Channel Coding (PART-1) (10)

Introduction to Galois field, Construction of Galois field GF (2 m) & its basic properties. Types of error control: Forward error correction (FEC), Automatic repeat request system (ARQ). Convolution encoding and decoding distance properties, Viterbi algorithm and Fano algorithm.

UNIT-V: - Channel Coding (PART-II) (10)

Trellis coded modulation, Introduction to Turbo coding, & Reed Solomon Codes: encoding & decoding, Low density parity check coding (LDPC)

UNIT-VI: (10)

Spread - Spectrum methods: - Study of PN sequences, direct sequence methods, Frequency hop methods, slow and fast frequency hop, performance analysis, synchronization methods for spread spectrum. Application of spread spectrum, CDMA, Introduction to OFDM

Books:

Text Books:

1. Digital communication: John G Prokis (TMG)

2. Digital communication: Simon Haykin (WEP)

Reference Books:

1. Lathi B.P. - Modern Digital and Analog communications systems - PRISM Indian Ed.

2. Digital Communication: J.S.Chitode

3. Digital Communication (Fundamentals & applications): Bernard Scalr

4. Introduction to Error Control Codes: Salvatore Gravano

5. OFDM For wireless communication systems: Ramjee Prasad

6. Modern Communication systems (Principles and application): Leon W. Couch II (PHI)

7. Error Control Coding: Shu Lin & Daniel J.Costello

R.T.M.N.U Nagpur

B.E 6th Semester ,

Electronics Engineering

BEENE605T **Functional English**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	*Practical*	*Tutorial*	*Total Hrs/Week*	*Lecture*	*Practical*	*Tutorial*	Total	*Sessional*	*University*	*Sessional*	*University*	Total Marks
1	BEENE605T	Functional English	2	-	1	3	2	-	1	3	10	40	-	-	50

Syllabus:

Unit 1. Functional Grammar: (4 Hours) (3+3+4=10)

Common errors , Transformation of Sentences, Phrases, Idioms & Proverbs. [50 sentences of common errors, 50 examples of Transformation of Sentences, (5 each type), 50 noun/prepositional phrases, 50 idioms/proverbs)

Unit II. English for Competitive Exams & Interview Techniques: (6 Hours) (3+3+4=10)

IPA (vowel & consonant phonemes), Word building [English words /phrases derived from other languages), Technical Jargons, Synonyms/Antonyms, Analogies, Give one word for, Types & Techniques of Interview Assignment :[25 Words for teaching IPA, 25 words/phrases of foreign origin, 25 technical jargons, 25 words for Synonyms/ Antonyms, 25 words for Analogies, 50 examples of give one word for]

Unit III

(A) Formal Correspondence (4 Hours) (5X2=10)

Business Letters, Technical Report Writing, Writing Resumes, e-mail etiquettes
[Orders, Complaints, Enquiries, Job applications & Resume Writing, Writing Memoranda]

(B) Analytical comprehension: (4 Hours)

[Four fictional & four non-fictional unseen texts]

Unit 1V. Technical & Scientific Writing: **(4 Hours) (5X2=10)**

Writing Reviews, Features of Technical Writing, Writing Scientific Projects, Writing Research papers. Assignment: (Any one project/review as assignment)

Total number of periods required = 22 for each Branch of Engineering

Reference Books:

1. Effective technical Communication by Barun K. Mitra, Oxford University Press,
2. *Technical Communication-Principles and Practice* by Meenakshi Raman & Sharma, Oxford University Press, 2011, ISBN-13-978-0-19-806529-
3. *The Cambridge Encyclopedia of the English Language* by David Crystal , Cambridge University Press
4. *Contemporary Business Communication* by Scot Ober , Published by Biztantra,
5. *BCOM- A South-Asian Perspective* by C.Lehman, D. DuFrene & M. Sinha, Cenage Learning Pvt. Ltd.2012
6. *Business English*, by Dept of English, University of Delhi, Published by Dorling Kindersley (India), Pvt .Ltd.,2009, ISBN 978 81 317 2077 6
7. *How to Prepare a Research Proposal*: Guidelines for Funding and Dissertations in the Social and Behavioral Sciences by Krathwohl & R David
8. *Technical Writing- Process and Product* by Sharon J. Gerson & Steven M. Gerson, 3rd edition, Pearson Education Asia, 2000
9. *Developing Communication* skills by Krishna Mohan & Meera Banerjee

EVALUATION PATTERN:

Internal Examination: Weightage = 10 marks

Written Examination: 05 marks

Project Seminar : 05 marks

External Examination: Weightage = 40 marks

Question pattern for end semester examination

Unit No	Q. No	Question type	No. of Questions	Weightage
Unit 1	1(A) 1(B) 1(C)	objective objective objective	3 out of 5 3 out of 5 4 out of 6	3+3+4=10
Unit 2	2 (A) 2(B) 2(C)	objective objective subjective	3 out of 5 3 out of 5 1 (no choice)	3+3+4=10
Unit 3 & Unit4	3 (A) 3(B)	Subjective subjective	1 set (out of 2 sets) 1(no choice)	5 5
Unit 5	4(A) 4(B)	subjective subjective	1 out of 2 1 out of 2	5 5

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

Electronics Workshop Practice

Duration: 2 Hrs.
College Assessment: 25Marks
University Assessment: 25 Marks

Subject Code: BEECE606P/ BEETE606P/ BEENE606P [0 – 2 – 0 – 2]

Objectives:

1. To make students familiar with measuring instruments like CRO, DSO and Signal Generator.
2. To make students familiar with Interfacing Peripheral with computer.
3. To understand PCB Designing process
4. To enable students to design & fabricate their own Hardware.

Outcome:

At the end of the course the students shall be able to:
1. Use DSO and Spectrum Analyzer.
2. Interface peripherals with computer.
3. Design PCB using PCB designing software.
4. Design & fabricate mini project.

Practical 1: Study of Functioning of Spectrum Analyzer and Digital Storage oscilloscope. (2

Practical 2: Study of different Electronic components. (2hrs)

Practical 3: Printed Circuit Boards (PCB): (4hrs)

Types, Layout procedure, artwork, Fabrication (In this, fabrications of small circuit Using discrete component on single side PCB is expected).

Practical 4: Interfacing of displays (LCD, LED, 7 Segment) with PCs (2hrs)

Practical 5: Hardware Mini Project (14hrs)

1) Hardware Mini project should consist of Circuit design, PCB fabrication, assembling & testing
   a. of small digital or analog applicationcircuit.
2) Mini Project work should be carried out by a group of maximum three students.
3) Student should use standard software available for drawing circuit schematic, simulating the design and PCB (single/double sided) layout of circuit.

4) Project report should consist of details of work carried out including layouts, circuits, datasheets, list of components, cost .

Reference Books:

1) 1 Electronic Instruments and Instrumentation Technology
2) A course in Electrical and Electronics Measurements and Instrumentation - A.K. Sawhney - Dhanpat Rai & Co.
3) Electronic Components and Materials - Dr. Madhuri A. Joshi - Shroff Publications Third Edition
4) Electrical and Electronic Measurements –Banerjee,PHI
5) Introduction to Measurements and Instrumentation, 4th edition- Ghosh
6) PHI 6. Electronic Instrumentation and Measurement Techniques, W.D. Copper,PHI **Web Resources:** Refer online datasheets

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

Industrial Visit

Duration: 2 Hrs.
College Assessment: G (Grade)

Subject Code: BEENE607P /BEECE607P/ BEETE607P **[0 – 2 – 0 – 2]**

Objectives:
To provide industry exposure to students.

Outcome:
The students shall be able to apply this knowledge during their project and may be useful in future.

In industrial visit it is expected that

1. Student should visit the industry.
2. Based on their interaction, experience during this Industrial visit they should prepare technical report with photograph and certificate from industry.