PROPOSED SCHEME OF EXAMINATION FOR

FIFTH SEMESTER BACHELOR OF ENGINEERING

(ELECTRONICS & COMMUNICATION/ELECTRONICS & TELECOMMUNICATION 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	
BEECE501T/ BEETE501T	Electronics	Antenna & Wave Propagation	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE502T/ BEETE502T	Electronics	Microprocessor & Microcontroller	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE502P/ BEETE502P	Electronics	Microprocessor & Microcontroller	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE503T/ BEETE503T	Electronics	Analog Circuits & Design	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE503P/ BEETE503P	Electronics	Analog Circuits & Design	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE504T/ BEETE504T	Electronics	Communication Electronics	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE504P/ BEETE504P	Electronics	Communication Electronics	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE505T/ BEETE505T	Applied Science & Humanities	Industrial Economics & Enterpreneurship Development	4	0	0	4	4	0	0	4	20	80	0	0	100
Total			**20**	**6**	**4**	**30**	**20**	**3**	**4**	**27**	**100**	**400**	**75**	**75**	**650**

Submitted by

Chairman B.O.S. Electronics Engineering
R.T.M. Nagpur University ,Nagpur.

PROPOSED SCHEME OF EXAMINATION FOR

SIXTH SEMESTER BACHELOR OF ENGINEERING

(ELECTRONICS & COMMUNICATION/ELECTRONICS & TELECOMMUNICATION 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	
BEECE601T/ BEETE601T	Electronics	Telecommunication Switching Systems	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE602T/ BEETE602T	Electronics	Digital Signal processing	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE602P/ BEETE602P	Electronics	Digital Signal processing	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE603T/ BEETE603T	Electrical	Control System Engg.	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE604T/ BEETE604T	Electronics	Digital Communication	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE604P/ BEETE604P	Electronics	Digital Communication	0	2	0	2	0	2	0	2	0	0	25	25	50
BEECE605T/ BEETE605T	Applied Science & Humanities	Functional English	2	0	1	3	2	0	1	3	10	40	0	0	50
BEECE606P/ BEETE606P	Electronics	Electronics Workshop Practice	0	2	0	2	0	2	0	2	0	0	25	25	50
BEECE607P/ BEETE607P	Electronics	Industrial Visit	0	2	0	2	Audit Course			0	0	0	G	0	0
Total			**18**	**8**	**5**	**31**	**18**	**5**	**5**	**28**	**90**	**360**	**75**	**75**	**600**

Submitted by

Chairman B.O.S. Electronics Engineering
R.T.M. Nagpur University ,Nagpur.

B. E. Fifth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg.)

Antenna & Wave Propagation

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

Subject Code: BEECE501T/BEETE501T [4 – 0 – 1 – 5]

Objectives:

1. To study transmission line characteristics.
2. To study the basics of radiating elements and effect of propagation of radio waves in actual environment.
3. To study the antennas, their principle of operation, analysis and their applications.
4. To study the features of Antenna array, Microstrip antenna and reflector antenna.
5. To study designing aspects of Antenna.

Outcome:

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

1. Describe transmission line characteristics.
2. calculate antenna parameters (radiation pattern, beam width, lobes, directivity, gain, impedance, efficiency, polarization)
3. Analyze wire antennas (monopoles, dipoles, and loops).
4. Analyze and design antenna arrays.
5. Describe the operation of broadband and traveling wave antennas.
6. Describe the operation of aperture and reflector antennas.
7. Analyze and design Microstrip antennas.

Unit I: Transmission Lines (12)

Transmission line equations and their solution , transmission line parameters, characteristics impedance, propagation constant, attenuation constant and phase constant, waveform distorion , distortionless transmission lines, loading of transmission lines, reflection coefficent and VSWR, Equivalent circuits of transmission lines, transmission lines at radio frequency, open and short circuited lines,smith chart, stub matching.

Unit II: Linear wire antennas (12)

Infinitesimal dipole, its radiation field, radiation resistance, radiation sphere, near field, far field directivity, small dipole, finite length dipole, half wave length dipole, linear elements near or on infinite perfect conductors, ground effects and their application, folded dipole

Loop Antenna:

Small loop, comparisons of small loop with magnetic dipole, radiation pattern its parameters and their application

Unit III: Arrays **(10)**

Linear arrays, planer arrays and circular arrays. Array of two isotropic point sources, non – isotropic sources, principle of pattern multiplication, linear arrays of n elements, broadside, End fire, radiation

Pattern, directivity, Beam width and null directions, array factor, Antenna analysis using Dolph-Tschebyscheff, the Log-periodic antenna, the composite Yagi-Uda-Corner-Log-Periodic array

Unit IV: Microstrip antennas **(08)**

Radiation Mechanism of Microstrip antenna, feeding methods, methods of analysis, Multiband Microstrip antenna for Mobile Communication, Circularly Polarized Patch antenna, Rectangular & circular patch, Circular polarization and feed network.

Unit V: Reflector antennas **(06)**

Simple reflectors, the design of a shaped Cylindrical reflector, Radiation patterns of Reflector Antennas, Dual shaped Reflector Systems Plane reflector, Corner reflector, horn antenna, aperture antenna.

Unit VI: Antenna Measurements **(12)**

Reciprocity in antenna Measurements, Near-Field & Far-Field, Co-ordinate System, Sources of Error in antenna measurements, measurement ranges, measurement of different antenna Parameters, antenna ranges, radiation pattern, Gain and directivity, Polarization

Radio Wave Propagation: Atmosphere of Earth, Terrestrial Propagation of Electromagnetic waves, Fading, Noise and interference, Ground wave propagation, Ionospheric propagation

Books:

Text Books:

1. Antenna Theory analysis and design – Costantine A. Balanis, John Wiley publication
2. Antenna and Wave propagation, - K.D. Prasad, Satya Prakashan
3. Electromagnetic – Jordan Balmann, Prentice Hall of India publication
4. Antenna Theory and Design , Robert S. Elliott , Wiley Student Edition
5. Electromagnetic Waves- R. K. Shevgaonkar

Reference Books:

1. Antenna & Wave Propagation , Sisir K Das, Mc Graw Hill
2. Harish A. R., Antenna and wave Propagation, Oxford University Press
3. Antennas and Radio Propagation, R.E. Collins, Mc Graw -Hill

B. E. Fifth Semester

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

MICROPROCESSOR AND MICROCONTROLLERS

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

Subject Code: BEENE502T/ BEECE502T/ BEETE502T [4 – 0 – 1 – 5]

Objectives:

The course objectives are:

1. To study fundamentals of microprocessor and microcontroller systems.
2. To study architecture of microprocessor & to understand the concept of memory organization, stack memory, Assembly language programming.
3. To study different interrupt techniques.
4. To study interfacing of microprocessor & microcontroller with different peripheral devices.

Outcome:

After completing this course students shall be able to:

1. Describe internal organization of 8086/8088 microprocessors & 8051microcontrollers.
2. Describe the concept of addressing modes and timing diagram of Microprocessor.
3. Interface 8086 & 8051 with Keyboard/ Display, ADC/DAC, Stepper motor etc.
4. Demonstrate the concept of interrupts and its use.
5. Demonstrate the concept of Serial & parallel data communication
6. Describe Handshaking concept and interfacing with peripheral devices.
7. Describe the concept of DMA & Pentium.
8. Describe 8087 Numeric coprocessor & its use in practical application.
9. Interface various hardware with microprocessor.

Unit I: Intel 8086/8088 microprocessor & Programming: (09)

8086/8088 microprocessor, Pin diagram, Architecture, features and operating modes, Clock generator 8284, memory organization & interfacing, Addressing modes, complete instruction set.

Unit II: 8086 & Peripheral Interfacing I: (11)

Assembly language programming of 8086,Interrupt structure, I/O interfacing, Interfacing of peripherals like 8255 PPI, multiplexed 7-seg display & matrix keyboard interface using 8255. Programmable Keyboard/Display controller 8279, Organization, Working modes, command words & interfacing.

Unit III: 8086 & Peripheral Interfacing II: (10)

Programmable interval timer/counter 8254; Architecture, working modes, interfacing 8259 PIC, Organization, control words, interfacing, cascading of 8259's. Serial communication, Classification & transmission formats. USART 8251, Pins & block diagram, interfacing with 8086 & programming.

Unit – IV: Numeric Co-processor & DMA Controller: (10)

8086 maximum mode pin diagram, Closely coupled & loosely coupled multiprocessor system, 8087 Numeric coprocessor, architecture, interfacing with 8086, instruction set.DMAC 8237, Architecture, interfacing & programming, Introduction to Pentium.

Unit – V: 8051 microcontroller & programming: (10)

Introduction to 8051 microcontroller; Pin diagram, architecture, features & operation, Ports, memory organization, SFR's, Flags, Counters/Timers, Serial ports. Interfacing of external RAM & ROM with 8051. 8051 Interrupt structure, Interrupt vector table with priorities, enabling & disabling of interrupts

Unit – VI: 8051 microcontroller interfacing: (10)

Instruction set of 8051; data transfer, logical, arithmetic & branching instructions, Addressing modes, Assembly language programming examples, counter/timer programming in various modes. Serial communication, Operating modes, serial port control register, Baud rates. I/O expansion using 8255, Interfacing keyboard, LED display, ADC & DAC interface, stepper motor interface

Books:

Text Books:

1. Programming & Interfacing of 8086/8088, D.V. Hall, TMH.
2. Microprocessor 8086/8088 Family Programme Interfacing: Liu & Gibson
3. M.A. Mazidi & J.G. Mazidi, the 8051 Microcontroller and Embedded system, 3rd Indian reprint, Pearson Eduction
4. The Intel Microprocessor 8086 & 80486 Pentium and Pentium Pro. Architecture Programming and Interfacing – Brey.

Reference Books:

1. Intel Reference Manuals, Microprocessors & Microcontrollers: Intel
2. Microcontrollers – Peatman, Mc Graw Hill.
3. Microprocessors & Microcomputers based system design by Md. Rafiquzzaman.
4. 8086/8088 Microprocessors, Walter Triebel & Avtar Singh
5. Introduction to Microprocessors for Engineers and Scientists, P. K. Ghosh, P. R. Sridhar, PHI Publication.
6. The 8051 Microcontroller & Embeded Systems, Kenneth J. Ayala, Dhanvijay V. Gadre, CENGAGE Learning.

B. E. Fifth Semester

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

MICROPROCESSOR AND MICROCONTROLLERS

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

Subject Code: BEENE502P/ BEECE502P/ BEETE502P [0 – 2 – 0 – 2]

Objectives:

1. To perform a practical based on microprocessor and microcontroller based system.
2. To study assembly language programming skills.
3. Interface different peripherals with microprocessor and microcontroller with its use.

Outcome:

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

1. Demonstrate the concept of Assembly languages structure and programming.
2. Interface various peripherals with 8086 and 8051.
3. Simulate the programs on different software platforms.

Any TEN practicals are to be conducted.

List of Experiments:

1. Study of 8086 microprocessor.
2. Write and execute 8086 assembly Language Programs to multiply two 16 bit numbers.
3. Write and execute 8086 assembly Language Programs to divide 16 bit number by 8 bit number.
4. Write and execute 8086 assembly Language Programs to search a look-up table for a byte (make use of XLAT)
5. Write and execute 8086 assembly Language Programs to compare two strings (use String instructions)
6. Write and execute 8086 assembly Language Programs to arrange the data bytes in ascending/descending order.
7. Write and execute 8086 assembly Language Programs to generate Fibonacci series and store it from memory location 0050H.
8. Write and execute 8051 assembly language program to find smallest byte in a string of bytes.
9. Write and execute 8051 assembly language program to exchange two data strings.
10. Write and execute 8051 assembly language program to generate square wave of 1 KHz (and any other frequency) on one of the pin of output port.
11. Interface 8255 with 8086 microprocessor and write a program to glow the alternate LED's.
12. Interface 8255 with 8086 microprocessor and write a program to rotate the stepper motor.

13. Interface 8253 with 8086 microprocessor and write a program to generate square waveform.

14. Interface 8279 with 8086 microprocessor and write a 8086 instructions to initialize 8279 (for a task as per the user's requirement).

15. Interface of ADC using 8255 with 8086 and write a program to convert analog signal input into its equivalent digital value and store it in memory locations.

Note: Few programs should be based on MASM / Simulator. Minimum 4 interfacing experiments should be conducted.

B. E. Fifth Semester

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

ANALOG CIRCUIT AND DESIGN

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

Subject Code: BEENE503T/ BEECE503T/BEETE503T [4 – 0 – 1 – 5]

Objectives:

The course objectives are:

1. To study the basic characteristic, construction, open loop & close loop operations of Op-Amp.
2. To study linear and non linear applications of Op-Amp.
3. To study the design of Electronic Circuits for Oscillator, Multivibrator and Active Filters
4. To enable students to design regulated power supply using regulated ICs

Outcome:

After completing this course students shall be able to:

1. Describe the basic differential Amplifier using transistor and its operation & characteristic.
2. Design linear Op-Amp circuits such as Voltage follower, Summing amplifier, scaling and averaging amplifier, Instrumentation amplifier circuits for various practical applications.
3. Design non-linear Op-Amp such as Comparators, Comparator IC such as LM 339, Schmitt trigger, multivibrator circuits for various practical applications using IC555.
4. Analyze and design amplifier circuits, oscillators, Filter, regulated power supply

Unit I: OP-Amp Fundamentals: **(8)**

Block diagram of OP-Amp (Basic Building Blocks), Basic differential Amplifier using transistor and its operation, OP-Amp parameters, characteristic and Definition, Ideal OP-Amp, Equivalent circuit, Voltage Transfer curve, Inverting and Non-inverting configurations and design, concepts of virtual short and ground.

Unit II: OP-Amp Linear Applications: **(10)**

Voltage follower, Summing amplifier, scaling and averaging amplifier, Instrumentation amplifier and applications, Integrator and differentiators (Practical considerations and design), Peak detector, Log and antilog amplifiers using OP-Amp & Transistor and analog multipliers.

Unit III: OP-Amp Non-Linear Applications: **(12)**

Comparators, Schmitt trigger, Comparator IC such as LM 339, Clipper and Clamper, Precision Rectifier, PLL Multivibrators: Bistable, Monostable, Astable multivibrator circuits using IC 555, Sample/Hold circuits, D/A (R/R) & A/D conversion circuits (Successive Approximation Method), design of ADC using 0804 ICs.

Unit IV: Design of Power supply system: (09)

Unregulated D.C. power supply system with rectifiers and filters, Design of series voltage regulators, Design of regulators using IC 78×× and 79××, protection circuits for regulators, Design of SMPS (Buck & Boost)

Unit V: Design of sinusoidal oscillators & Function generator: (09)

OPAMP based Wein Bridge and Phase Shift oscillators, Transistorized Hartley, Colpitts oscillator, and Crystal oscillators, Evaluation of figure of merit for all above oscillator circuits. Design of function generators.

Unit VI: Design of Filters & Drivers: (12)

Advantages of active filters, Design of Butterworth Active Filter, Design of Active filter of LPF, HPF, BPF of 1^{st} order, 2^{nd} and higher order (up to 6^{th} order) Butterworth filter.

Design of Relay driver circuit, Design of stepper motor control circuit, Design of Dc servo motor control circuit

Books:

Text Books:

1. Operational Amplifier and Applications: R. Gayakwad.
2. Monograph on Electronic circuit Design: Goyal & Khetan.
3. Franco: Designing with Op-Amps (McGraw Hill).

Reference Books:

1. Linear Integrated Circuits Mannal I, II, and III: National Semiconductor.
2. Linear Applications Handbook National Semiconductors.
3. Dailey: Operational Amplifier (Tata McGraw Hill).
4. Regulated Power supply Handbook. Texas Instruments.
5. Electronics: BJT's, FETS and Microcircuits – Anielo.
6. Operational Amplifier Design and Applications Tobey, Graham, Huelsman McGraw Hill.

B. E. Fifth Semester

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

ANALOG CIRCUIT AND DESIGN

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

Subject Code: BEENE503P/ BEECE503P/BEETE503P **[0 – 2 – 0– 2]**

Objectives:

1. To learn about various types of analog systems.
2. To study the practical aspects of linear and non-linear applications of OP-AMP.
3. To design the oscillators using OP-AMP and Transistors.
4. To study frequency response of different circuits based on operational amplifier.

Outcome:

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

1. Gain a sound understanding of the operation, analysis and design of analog electronic circuits and systems
2. Design linear and nonlinear applications of operational amplifier.
3. Design the oscillators and other complex circuits using op amp ICs.
4. Demonstrate the gain-bandwidth concept and frequency response of basic amplifiers.

Any TEN practicals are to be conducted

LIST OF EXPERIMENTS

1. (A)Design Non-Inverting OP-AMP and measure the gain and plot the input/output waveforms.

   (B)Design Inverting OP-AMP and measure the gain and plot the input/output waveforms.
2. Plot the Frequency response of Inverting and Non-inverting amplifiers.
3. Implementation of Op-Amp as adder & subtractor.
4. To design OP-AMP as Integrator and Differentiator and plot its input/output waveforms.
5. To design OP-AMP as Schmitt trigger for generating a waveform of specific pulse width.
6. To design OP-AMP as peak detector.
7. To design OP-AMP as Precision rectifier and plot the waveforms.
8. To Verify Op-amp parameters (1) CMRR (2) Slew Rate.
9. To Verify and simulate Clipper circuit using IC 741.
10. Design and verify Multivibrator circuits using IC 555.

11. To study Phase Lock Loop using IC 565.
12. To study OP-AMP as Clippers & Clampers.
13. Design RC oscillator using OP-AMP and calculate its frequency.
14. Design transistorized LC oscillator and calculate its frequency.
15. Design first & second order low pass Butterworth filer.
16. Design first & second order high pass Butterworth filer.
17. Design of series voltage regulators.
18. Design of Driver Circuit for DC servomotor/Relays.
19. Design of control circuit for stepper motor.

Note: Simulate results using simulation software for at least four experiments.

B. E. Fifth Semester

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

COMMUNICATION ELECTRONICS

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

Subject Code: BEENE504T/ BEECE504T/BEETE504T [4 – 0 – 1 – 5]

Objectives:

The course objectives are:

1. To study the basic concept of communication and different modulation system based on basic parameters.
2. To study the concept of noise, properties & its effects.
3. To study the AM, FM, PM process & compute modulation Index.
4. To study the fundamentals of AM and FM Receivers.
5. To develop knowledge about fundamentals of Broadband Communication Systems.

Outcome:

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

1. Demonstrate a basic understanding of the term bandwidth and its application in communications.
2. Describe quantizing and PCM signals, bandwidth and bit rate calculations, study amplitude and angle modulation and demodulation of analog signals etc.
3. Solve the problems involving bandwidth calculation, representation & Generation of an AM sine wave
4. Compare different modulation techniques of Generation of FM (Direct & Indirect Method)
5. Identify, formulate & solve communication engineering problems.

Unit I: Amplitude (Linear) Modulation (08)

Base band & Carrier communication, Introduction of amplitude modulation, Equation of AM, Generation of AM (DSBFC) and its spectrum, Modulation Index , Power relations applied to sinusoidal signals, DSBSC – multiplier modulator, Non linear generation, switching modulator, Ring modulator & its spectrum, SSBSC, ISB & VSB, their generation methods & Comparison, AM Broadcast technical standards.

Unit II: Angle Modulation (12)

Concept of Angle modulation, Types of Angle Modulation, frequency spectrum, Narrow band & wide band FM, Modulation index, Bandwidth, Phase Modulation, Bessel's Function and its mathematical analysis, Generation of FM (Direct & Indirect Method), Comparison of FM and PM.

Unit III: Pulse Modulation (10)

Band limited & time limited signals, Narrowband signals and systems, Sampling theorem in time domain, Nyquist criteria, Types of sampling- ideal, natural, flat top, Aliasing & Aperture effect.

Pulse Analog modulation: PAM PWM & PPM.

PCM – Generation & reconstruction, Bandwidth requirement of PCM.Differential PCM, Delta Modulation & Adaptive DM. (Only Block diagram treatment).

Unit IV: Noise **(10)**

Sources of Noise, Types of Noise, White Noise, Thermal noise, shot noise, partition noise, Low frequency or flicker noise, burst noise, avalanche noise, Signal to Noise Ratio, SNR of tandem Connection, Noise Figure, Noise Temperature, Friss formula for Noise Figure, Noise Bandwidth.

Unit V: AM and FM Receivers **(10)**

Communication Receiver, Block Diagram & special Features

Block diagram of AM and FM Receivers, Super heterodyne Receiver, Performance characteristics: Sensitivity, Selectivity, Fidelity, Image Frequency Rejection, Pre-emphasis, De-emphasis

AM Detection: Rectifier detection, Envelope detection, Demodulation of DSBSC: Synchronous detection, Demodulation of SSBSC.

FM Detection: Foster Seelay FM Detector & FM detection using PLL

Unit VI: Broadband Communication Links & Multiplexing: **(10)**

Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing.

Short and Medium Haul Systems: Coaxial Cables, Fiber optic links, Microwave Links, Tropospheric scatter Links.
Long Haul Systems: Submarine cables.

Books:

Text Books:

1. Kennedy & Devis : Electronic Communication Systems , Tata McGraw Hills Publication(Fourth Edition)
2. Dennis Roddy & Coolen - Electronic Communication, PHI (Fourth Edition)
3. B. P. Lathi: Modern Digital and Analog. Communication Systems: Oxford Press Publication (Third Edition)

Reference Books:

1. Simon Haykin: Communication Systems, John Wiley & Sons (Fourth Edition)
2. Taub & Schilling: Principles of Communication Systems, Tata McGraw-Hill
3. Leon W.Couch, II: Digital and Analog Communication Systems, Pearson Education (Seventh Edition)
4. Electronic Communication Systems, Roy Blake, CENGAGE Learning.

B. E. Fifth Semester

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

COMMUNICATION ELECTRONICS

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

Subject Code: BEENE504P/ BEECE504P/BEETE504P **[0 – 2 – 0 – 2]**

Objectives:

1. To perform practical based on analog and digital modulation techniques.
2. To study the analysis of AM and FM receivers.
3. To study ASK, FSK and PSK techniques.
4. To perform Matlab based practical for different modulation techniques.

Outcome:

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

1. Demonstrate different modulation techniques used in electronic communication system.
2. Use the modulation techniques and modern communication tools necessary for various engineering applications.
3. Evaluate fundamental communication system parameters, such as bandwidth power, signal to quantization noise ratio, data rate etc.

Any TEN practicals are to be conducted

List of Experiments:

1. To generate Amplitude Modulated wave using different techniques and plot its waveform.
2. To study different AM detection techniques.
3. To measure Noise Figure.
4. To generate Frequency Modulated wave using different techniques and plot its waveform.
5. To study different FM Detection Techniques.
6. To generate Pulse Amplitude Modulation (PAM) and plot the waveforms. Observe the demodulated output.
7. To generate Pulse Width modulated signal and study PWM demodulation.
8. To generate Pulse Position modulated signal and study Pulse Position Demodulation.
9. To study Single side band (SSB) Transmission & Reception
10. To study Double Side Band (DSB) Transmission & Reception
11. To study generation of SSB-SC using balanced modulator
12. To study generation of DSB-SC signal.
13. To study DTMF Encoder Decoder

14. To perform Spectrum Analysis of AM & FM signals
15. To perform Time Division Multiplexing (TDM).
16. To study Pre-Emphasis and De-Emphasis
17. To study Super heterodyne Receiver
18. To study FM radio receiver circuit.
19. Simulation of Analog modulation techniques using MATLAB.
20. Simulation of Frequency modulation techniques using MATLAB.
21. To perform Pulse Code Modulation (PCM) using Simulation in MATLAB.

B. E. Sixth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

TELECOMMUNICATION SWITCHING SYSTEMS

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

Subject Code: BEECE601T/ BEETE601T **[4 – 0 – 1 – 5]**

Objectives:
The course objectives are:
1. To study the latest development of Telecommunication systems.
2. To study the architecture and major design issues related to switching systems.

Outcome:

After completing this course students shall able to:
1. Describe the need for switching systems and their evolution from analogue to digital.
2. Describe the Public Switched Telephone Network.
3. Describe private networks.
4. Describe integrated networks.

Unit 1: Telecommunication Switching Systems **(10)**

Principles of manual switching system, electronic telephone, local and central battery system, trunk exchange, junction working. Automatic telephony: strowger exchange, line switches and selectors, ringing and tone circuit, subscriber uniselector circuit, trunking diagram, cross bar switching system

Message switching, Circuit switching, manual switching and Electronic Switching. Digital switching: Switching functions, space division switching, time division switching, two dimensional switching, digital cross connect systems, digital switching in an analog environment.

Unit 2: Telecommunication Traffic **(10)**

Unit of Traffic, Traffic measurement, a mathematical model, Lost- call systems: Theory, traffic performance, loss systems in tandem. Queuing systems: Erlang Distribution, probability of delay, Finite queue capacity, systems with a single server, Queues in tandem, delay tables and application of Delay formulae. Analysis: Traffic Characteristics: Arrival Distributions, Holding time Distribution. Loss Systems: Lost calls cleared, lost calls returning, lost calls Held, lost calls cleared.

Unit 3: Switching Networks **(12)**

Single Stage Networks, Gradings: Principle, Design of progressive grading, other gradings, Traffic capacity of gradings, Applications of gradings. Link Systems: General, Two stage networks, three stage networks.Grades of service of link systems: General, Two stage networks, three stage networks, Call packing, Rearrangeable networks, Strict sense non blocking networks, Sectionalized switching networks Control of Switching Systems: Call processing Functions: Sequence f operations, Signal exchanges, State transition diagrams. Common Control, Reliability, Availability and Security.

Unit 4: Network Synchronization and Management **(08)**

Timing: Timing Recovery, Clock Instability, Elastic Stores, Jitter measurements, systematic jitter. Timing Inaccuracy: Slips, Asynchronous Multiplexing, Waiting time jitter. Network Synchronization: Plesiochronous, pulse stuffing, mutual synchronization, Network master, Master – Slave synchronization, Hierarchical synchronization Processes. Network management: Routing control, Flow control.

Unit 5: Networks **(10)**

Data Networks: Data Transmission in PSTN, Data Communication Architecture, Link to link layers, End to End layers, Satellite based Data networks, LANs, MANs, Fiber optic networks, Data network Standards, Protocol stacks, Interworking. Integrated Services Digital Networks: ISDN, Network and protocol Architecture, Transmission Channels, User network interfaces, signaling, Numbering and Addressing, ISDN Standards, Broadband ISDN, Voice Data Integration

Unit 6: Cellular Telephone Concepts **(10)**

Mobile telephone services, cellular telephone, Frequency reuse, Interference, Cellular System topology, Roaming and handoffs, Cellular telephone network components, Cellular telephone calls processing. Cellular Telephone systems: Digital cellular telephone

Books:

Textbooks:

1. J. E. Flood, “Telecommunications Switching, Traffic and Networks”, Pearson Education
2. John C. Bellamy, “Digital Telephony”, Third Edition; Wiley Publications
3. Thiagarajan Vishwanathan, “Telecommunication Switching Systems and Networks”; PHI Publications
4. Wayne Tomasi, “Electronic Communications Systems”; 5th Edition; Pearson Education

Reference Books:

1. P.Gnanasivam,”Telecommunication Switching and Networks.
2. Rappaport,”Wireless communication”
3. Tannenbaum”Data communication and networks” 4th Edition,TMH

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.

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 the 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 and 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.
3. To study controllers & compensators.
4. To study the basics of stability analysis of the system.

Outcome:

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

1. Analyze various control systems.
2. Represent the mathematical model of a system.
3. Determine the response of different order systems for various step inputs.
4. Analyze the stability of the system using Root locus. Bode plot, Nyquist plot.
5. Obtain transfer function of systems using signal flow graph.
6. 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 Education)

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 Education.

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-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

B. E. Sixth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

DIGITAL COMMUNICATION

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

Subject Code: BEECE604P/ BEETE604P **[0 – 2 – 0 – 2]**

Objectives:

1. To study the concept of communication based on RF-AF in digital domain.
2. To study the role of sampling factor for analyzes the digital communication systems.
3. To study & Design the digital communication systems.
4. To study line coding and its application.

Outcome:

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

1. Describe the concept of the digital communication based design for testing and analyze the circuits.
2. Design and conduct experiments for testing digital communication circuits and systems.
3. Analyze the different coding technique for design and modeling of digital communication Identify, formulate and solve digital communication circuits and systems problems.

Any TEN practicals are to be conducted

LIST OF EXPERIMENTS

1. To Study and perform Error Detection and Correction codes.
2. To study the performance of adaptive Delta modulator/De-modulator circuits.
3. To Study and observe the effect of signal Distortion using EYE-Diagram.
4. To study generation & reception of BPSK & perform its spectral analysis.
5. To study generation & reception of FSK & perform its spectral analysis.
6. To study generation & reception of QPSK & perform its spectral analysis.
7. To study generation & reception of MSK & perform its spectral analysis.
8. To study generation & reception of DPSK & perform its spectral analysis.
9. To study Detection of digital baseband signal using matched filter in the presence of noise.

10. To study Frequency Hop spread spectrum Transmission & Reception.

11. To write and execute Matlab code for Convolutional Encoder and Decoder.

12. Write and execute Matlab code for generation of BPSK / Prepare Simulink Model for BPSK.

13. Write and execute Matlab code for generation of FSK / Prepare Simulink Model for FSK.

14. Write and execute Matlab code for generation of QPSK / Prepare Simulink Model for QPSK.

Note: Use DSO, Spectrum Analyzer, Logic Analyzer wherever necessary.

BEPOE606T (BEME606T): Functional English Total Credits: 03

Teaching Scheme Examination Scheme

Theory: 2 hrs per week + 1 tutorial T (University): 40 marks Duration of University Exams :2 hrs T (Internal): 10 marks

Objective: At the end of the semester, students will have enough confidence to face competitive examinations(IELTES/ TOEFL/CAT/ MAT/ XAT/SNAP/GMAT/GATE etc.)to pursue masters degree. They will also acquire language skills required to write their Reviews/Projects/Reports. They will be able to organize their thoughts in English and hence face job interviews more confidently.

Scope: The Curriculum designed is student –centered and it is guidance for their career

Course Structure

Unit I. Functional Grammar: (4 periods) (3+3+2+2=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 periods) 3+3+2+2=10 or (10X1=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 (8 periods) (10X1=10)

Business Letters, Technical Report Writing, Writing Resumes, e-mail etiquettes

[Orders, Complaints , Enquiries, Job applications & Resume Writing ,Writing Memoranda]

(B) Analytical comprehension: [Four fictional & four non-fictional unseen texts]

Unit IV. Technical & Scientific Writing: **(4 periods) (10X1=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. Oxford Learners' Dictionary of Current English
2. Business Communication - KK Sinha, Galgotia Publishers
3. Developing Communication skills- Krishna Mohan & Meera Banerjee
4. Effective technical Communication –Barun K Mitra
5. Effective Business Communication – Herta A Murphy, Habert Hidebrandt, Jane P Thomas

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. Q No.	Unit No	Que.type	No. of Questions	Weightage
1 or 2	I	objective	2 bunches of 4 questions each	**(3+3+2+2)=10)**
3 or 4	II	Objective	2 bunch of 4 questions each	**(3+3+2+2)=10 or (10X1=10)**
5 or 6	III	subjective	1 out of 2	**(10X1=10)**
7 or 8	IV	Subjective	1 out of 2	**(10X1=**

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, 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 Hrs.)

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

Practical 3: Printed Circuit Boards (PCB): (4 Hrs.)

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 (2 Hrs.)

Practical 5: Hardware Mini Project (14 Hrs.)

- Hardware Mini project should consist of Circuit design, PCB fabrication, assembling & testing of small digital or analog **application circuit**.
- Mini Project work should be carried out by a group of maximum **three** students.
- Student should use standard software available for drawing circuit schematic, simulating the design and PCB (**single/double sided**) layout of circuit.
- Project report should consist of details of work carried out including **layouts, circuits, datasheets, list of components, cost** .

Reference Books:

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 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: 25Marks
University Assessment: 25 Marks

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.