Shivaji University, Kolhapur
Revised Syllabus Structure of Final Year Engineering (BE) (w. e. f. July 2016)
Electronics and Telecommunication Engineering Course
Scheme of Teaching and Examination
Semester-VII

Sr. No.	Subject	Teaching Scheme (Hrs.)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Satellite Communication	3	1	--	4	100	25	--	--	125
2	Embedded System	4	--	2	6	100	25	50	--	175
3	Computer Communication Networks	4	--	2	6	100	25	--	25	150
4	RF & Microwave Engineering	4	-	2	6	100	25	--	--	125
5	Elective-I	3	1	--	4	100	25	--	--	125
6	Industrial Training	--	--	--	---	--	25*	--	--	25
7	Project Phase-I	--	--	2	2	--	25	--	50	75
		18	**2**	**08**	**28**	**500**	**175**	**50**	**75**	**800**

*** Assessment will be carried out with Project Phase – I By Internal Guide.**

Semester-VIII

Sr. No.	Subject	Teaching Scheme(Hrs.)				Examination Scheme(Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Video Engineering	4	--	2	6	100	25	50	--	175
2	Wireless Mobile Communication	4	--	2	6	100	25	--	--	125
3	Digital Image Processing	4	--	2	6	100	25	--	50	175
4	Elective-II	3	1	--	4	100	25	--	--	125
5	Project Phase – II	--	--	4	4	--	100	--	100	200
		15	**01**	**10**	**26**	**400**	**200**	**50**	**150**	**800**

BE Part-I (Elective-I)	BE Part-II (Elective-II)
1. Robotics	1. Mechatronics
2. Speech processing	2. Artificial Neural Network
3. MEMS	3. Remote Sensing & GPS
4. Radar & Navigation Aids	4. Operating System

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- I (w. e. f. July 2016)
1.Subject: Satellite Communication

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	**Theory :** 100 Marks
Tutorial: 1 hr / week	**TW:** 25 Marks

Course Objectives: The course aims :	
1	To introduce the fundamental concept in the field of satellite communication.
2	To enable the student know how to place satellite in orbit.
3	To know the concept of space subsystem.
4	To analyze, design and evaluate satellite communication subsystem.
5	To examine concept of satellite networking.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Understand Orbital aspects involved in satellite communication.
2	Understand Power budget calculation.
3	Understand Satellite system and services provided.
4	Analyze the performance satellite communication system.

Unit No	Contents	No. of Hours
I	**Introduction of Satellite Communication:** Introduction, basic concept of satellite communication, Orbital Mechanics, Look angle determination, Orbital perturbation, Orbital determination, Launchers and Launch vehicles, Orbital effects in communication system performance.	**07**
II	**Satellite subsystem:** Satellite Subsystem, Attitude and control system(AOCS), Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystem, Satellite antennas, Equipment reliability and space qualification.	**07**
III	**Satellite Link Design:** Introduction, Basic transmission Theory, System Noise Temperature and G/T Ration, Design of Downlinks, Satellite System using Small Earth Stations, Uplink Design, Design of specified C/N : Combining C/N and C/I values in Satellite Links.	**06**

IV	**Satellite Networks**: Reference architecture for satellite networks, basic characteristics of satellite networks, Onboard connectivity with transparent processing, analogue transparent switching, Frame organization, Window organization, On board connectivity with beam scanning.	**06**
V	**Low Earth Orbit and Non Geo-Stationary satellite system:** Introduction, Orbit considerations, Coverage and Frequency Consideration, Delay and Throughput Consideration, Operational NGSO constellation design: Iridium, Teledesic.	**05**
VI	**Satellite Radio and GPS:** C-Band and Ku- Band Home satellite TV, Digital DBS TV, Satellite Radio Broadcasting, Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and codes.	**05**

Text Books:

1	Satellite Communications-Timothy Pratt, Charles Bostian, Jeremy Allnut John Wiley & Sons (II Edition)(For chapters I,II,III,IV,VI)
2	Satellite Communications-Anil k. Maine and Varsha Agaraval, Wiley Publications (All chapters)

Reference Books:

1	Satellite Communications- Dennis Roody McGraw Hill(All Chapters)
2	Satellite Communications- Gerard Maral and Michel Bousquet, Wiley Publication (5^{th} Edition For chapter IV)
3	Satellite Communications systems Engineering, 2^{nd} edition- Wilbur L. Pritchard, Henri G. Suyderhoud and Robert A. Nelson. (Chapter I)

Note:

1. Students, as a part of their term work, should visit satellite earth station and submit a report of visit.
2. Minimum 8 tutorials / assignment based on above syllabus.

Note for question paper setter: 92 marks theory +8 marks problem.

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- I (w. e. f. July 2016)
2.Subject: Embedded Systems

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical: 2 hrs / week	**TW :** 25 Marks **POE:** 50 Marks

Course Objectives:
The course aims to:
1.Study different features of PIC 16F877
2.Study different features of ARM7
3.Understand real time programming using PIC and ARM
4.Basic concepts of RTOS

Course Outcomes:

Course Outcomes:
Upon successful completion of this course, the student will be able to:
1. Apply knowledge of PIC and ARM to develop embedded system designs.
2.Students will understand the advantages of ARM architecture and can use the same knowledge to build their projects.
3.They'll be able to write codes for programs in assembly language for ARM core
4.Students will learn use of concepts of RTOS in developing software

Unit No	Contents	No. of Hours
I	**Architecture of PIC microcontroller family:** CPU Architecture: Harvard architecture & pipelining, program memory considerations Register file structure, Instruction set, addressing modes: Immediate, Direct, Indirect CPU Registers: Status, Word, FSR. INDF, PCLATH, PCL, simple assembly language Programming	**08**
II	**I/O's and Peripherals:** I/O ports &TRIS registers, External Interrupts, Timers, CCP Module: Programmable period scalar, Event Counter, Sleep Mode, PWM mode, ADC: Features, ADC use. Configuration word, Oscillator configuration, Reset alternatives, low power operation, I2C, SPI, Associate registers, [**Note**: Syllabus need to be covered with reference to PIC 16FX]	**08**
III	**Introduction to Embedded Systems** Embedded system (ES) definition, Characteristics of Embedded systems, Components of an Embedded system, Embedded system design issues & Design flow, Design	**08**

	metrics, Introduction to Embedded s/w development process and tools, Linking and Locating s/w, getting Embedded s/w into the target system, Issues in Hardware-Software design and co-design. Introduction to IDE.	
IV	**Embedded Processor:** ARM Architecture Details: RISC architecture design philosophy, register banking, CPSR and SPSR, Pipelining, Exceptions Interrupts & vector Table. ARM data flow model.	**08**
V	**LPC 2148 Microcontroller:** ARM7TDMI-S microcontroller LPC-2148: Architecture details, SFR's, Port structure, Timer, Counter, PWM module, Embedded C programming for interfacing LED's, LCD, Keyboard, ADC.	**08**
VI	**Real Time Operating System (RTOS):** Introduction to RTOS concept, embedded software architectures: Round robin, round robin with interrupts, Function queue scheduling and real time operating system, Tasks and task states, Task scheduling, shared data and reentrancy, semaphores and shared data using semaphores, protecting shared data. Introduction to RTOS programming.	**08**

Text Books:

1	Design with PIC Microcontrollers by John B. Peatman, Pearson.
2	Embedded System Design By Frank Vahid / Tony Givargis, Wiley Publication
3	An Embedded Software Primer, David E. Simon Pearson Education, Asia Publication
4	ARM System Developers Guide Designing & Optimizing System Software By Andrew N., Dominic Sloss, and Chris Wright

Reference books:

1	Embedded systems by Raj Kamal, McGraw Hill
2	Real- Time Systems Design and Analysis by Phillips A. Laplante, Wiley insia Edition.
3	Embedded/ Real-Time Systems: Concepts, Design & Programming By Dr. K V K K Prasad, Dreamtech Press
4.	Embedded Systems(A contemporary design tool) by James K Peckol, Wiley Publication.

Note for paper setter: 30% programming.

Note: Any 08 experiments/Tutorials based on above syllabus.

List of experiments:

1. Four experiments based on assembly language.
2. Four experiments based on Embedded C language.
3. Two Experiments using ARM Boards.

4. Two Experiments based on Bus communication Protocols.(Use Assemblers, Compilers, Flash Programmers, Debuggers & ARM Boards)

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- I (w. e. f. July 2016)
3. Subject: Computer Communication Networks

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical : 2 hrs / week	**TW :** 25 Marks
	OE : 25 marks

Course Objectives: The course aims to:	
1	Provide an introduction to networking concepts, topologies.
2	Explain Various Transmission Media & Network Devices.
3	Elaborate Concepts of Datalink Layer.
4	Describe various routing algorithms and congestion control mechanism.
5	Comprehend TCP/IP Protocol suite
6	Explain network security mechanism.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Describe and differentiate types of networks such as LAN, WAN, MAN and network topologies like star, bus, ring etc. Explain and distinguish between OSI and TCP/IP reference model.
2	Summarizes guided & unguided transmission media and different networking devices used at physical layer.
3	Explain error detection &correction mechanisms and frame formats at data link layer.
4	Explain various routing algorithms like shortest path, distance vector, link state etc and congestion control algorithms viz. leaky bucket, token bucket used at network layer.
5	Illustrate different TCP/IP protocols like IP,ARP,RARP,TCP,UDP etc.
6	Demonstrate the network Security Mechanisms.

Unit No	Contents	No. of Hours
I	**Introduction to computer networks** Networks definition & requirements, Networks topologies, Types of networks, network software issues, reference models- OSI TCP/IP and Hybrid.	**07**
II	**Physical layer- Transmission media** Guided media-twisted pair, coaxial cable, optical fiber, unguided media-RF allocation, terrestrial microwave, satellite communication, cellular telephone, EIA 232 D interface standard,	**10**

	modem-types, block schematic & standards network device: network connectors, Hubs, Switches, Routers, Bridges, NIC, Fast Ethernet, Gigabit Ethernet.	
III	**Data Link Layer** Design issues, error detection and correction, elementary data link protocols, sliding window protocols, HDLC-types of stations, modes of operation, HLDC frame formats, additional features, Medium access sub layer – channel allocation problem, multiple access protocols, IEEE 802 standards for LANS & WANS	**08**
IV	**Networks Layer** Design issues, Routing algorithms – shortest path, distance vector routing, link state routing, flow based routing, routing for mobile hosts, Congestion control – congestion prevention policies-leaky bucket algorithm, token bucket algorithm, congestion control in virtual circuit subnet and choke packets, RSVP.	**07**
V	**TCP/IP Protocol suit overview** TCP/IP and internet, IP protocol and it's header format, addressing, subnetting, other networks layer protocol – ARP, RARP, ICMP, IGMP, TCP, UDP DHCP, Domain name system (DNS), EMAIL, HTTP, IPV.6	**08**
VI	**Network security** Cryptography, Symmetric-key algorithms, Public- key algorithms, Digital signatures, Managements of publics keys, communications security, Authentication Protocols.	**08**

Text Books:

1	Computer Networks Andrew S. Tanenbaum, Fourth Edition, PEARSON
2	Data Communication and Networking, Fifth Edition, Behrouz A. Forouzan, TMH
3	Computer Networks, S. S. Shinde, New Age International Publication, 2015
4	Computer Networks, Natalia Olifer, Wiley Publication, 2014

Reference Books:

5	Computer Networking with Internet Protocols and Technology, William Stallings, 2008
6	TCP/IP Protocol Suite, Fourth Edition, Behrouz A. Forouzan, MGH
7	Computer Networking A top down approach, James F. Kurose, Person, Fifth Edition

List of Experiments:

Practical No.	Title of Experiment
1	Study of Networking
2	Introduction to Network Simulator
3	Study of LAN
4	Study of Installation of Widows 2003 Server & introduction to DHCP
5	• Character transfer using Simplex method • Character transfer using Full-Duplex method
6	• Simulation and implementation of bit stuffing • Simulation and implementation of CRC
8	Study of Medium Access sub layer protocols and simulate using Network Simulator
9	Simulation and implementation of • Stop-and Wait protocol • Go-Back-N protocol • Selective repeat Protocol
10	Simulation and implementation of a) Distance Vector Routing Algorithm b)Link State Routing algorithm
11	Study of Token Bucket Algorithm
12	Study of TCP/IP Protocol Suite and Simulation Address resolution protocols.

Note: Any 8 experiments.

Instructions to Paper Setter:
Question Paper must contain 90 % theory questions & 10 % problems.

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- I (w. e. f. July 2016)
4.Subject: RF & Microwave Engineering

Teaching Scheme	Examination Scheme
Lectures : 4hrs / week	**Theory :** 100 Marks
Practical : 2 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	To make students aware of the fundamentals of microwave engineering in order to reach the desire industry skills sets.
2	To introduce the students about various microwave amplifiers and oscillators to know their applications in various domains.

3	Aware students about different types of Microwave Hazards.
4	To introduce manufacturing technique of MMIC.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Explain the different types modes propagation in waveguides
2	Select the appropriate component for various applications.
3	Measure the various microwave parameters.
4	Explain the different microwave Hazards.
5	Demonstrate the application of Microwave Engineering to various field.

Unit No	Content	No. of Hours
I	**Microwave Wave Guides:** Rectangular and circular wave guides: TE, TM and TEM modes in wave guides, power transmission in wave guide, power losses in wave guide, excitation modes in wave guide, Characteristics of standard wave guides.	**08**
II	**Microwave Components** Scattering parameters, microwave cavities, microwave hybrid circuits, directional coupler, two hole directional coupler, circulators and isolators, microwave attenuators(fixed and Variable Type), slotted lines, parallel, coplanar & shielded micro strip lines.(Operating principle & S-parameter equations of above mentioned microwave components.)	**09**
III	**Microwave Tubes** **Linear beam:**Klystrons, Reflex Klystrons, TWTs. **Microwave Crossed Field Tubes**: Magnetron, Rising Sun&bootstrap Magnetron, forward wave crossed field amplifier (FWCFA), m-carcinotron oscillator. (Operating principle, construction & analytical treatment of above mentioned microwave tubes.)	**09**
IV	**Microwave Solid State Devices** Microwave tunnel diodes, microwave FETs, Gunn effect diodes, RWH Theory, LSA diodes, InP diodes, CdTe diodes, IMPATT diodes, PIN diodes, HBT, MESFETs and HEMT.(Operating principle, construction & analytical treatment of above mentioned microwave devices.)	**08**
V	**Microwave Measurements and Microwave Applications** Detection of microwave power: measurement of microwave power bridge circuit, thermistor parameters, waveguide thermister mounts, barreters,theory of operation of barreters, directreading barreters bridges, Measurement of wavelengths: single line cavity coupling system, Transmission cavity wavemeter & reaction wavemeter,measurement of VSWR, measurements of	**07**

	attenuation, free space attenuation, **ISM Applications**: Industrial, Scientific, medical, confocal Microwave Tomographic Applications.	
VI	**Monolithic Microwave Integrated Circuits & Hazards** Materials: substrate, conductor dielectric & resistive MMIC growth, thin film formation, hybrid microwave I.C. fabrication Microwave hazards:- HERO , HERF & HERP	**07**

Text Books:

1	Microwave Engineering: Sushrut Das, Oxford Publication
2	Microwave Devices and Circuit – Samul Liao (Prentice hall of India)
3	Microwave Engineering-Annapurna Das ,TMH Publications

Reference Books:

1	Foundation for Microwave Engg. – R.E.Collin, Wiley Publications
2	Microwave Engineering-David M. Pozer., Wiley Publications
3	Techniques of Microwave Measurement-Carol G. Montgomery
4	Microwave Active Devices vaccum and solid state – M.L. Sisodia
5	Basic laboratory microwave techniques- Manual, Sisodia and Raghuvanshi Wiley
6	Microwave Engineering:Dr.K.T.MathewsWiley Publications

List of Experiments: Any 08 experiments based on above syllabus

Exp. No.	Name of Experiment
1.	Study of Microwave Test Bench.
2.	Study of Characteristics of reflex klystron
3.	Study of measurement of Unknown frequency by direct method (Wavemeter).
4.	Study of measurement of Unknown attenuation.
5.	Study of measurement of wavelength by slotted line method.
6.	Study of measurement of VSWR by using slotted line.
7.	Study of characteristics of variable attenuator.
8.	Study of characteristics of directional coupler.
9.	Study of characteristics of E-Plane Tee and H-Plane Tee.
10	Study of characteristics of Magic Tee.
11	Study of Characteristics of Horn Antenna.
12	Study of Characteristics of Gunn Oscillator.

Note Question Paper: 60% theory and 40% Problems.

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- I (w. e. f. July 2016)
5. Subject: Robotics (Elective I)

Teaching Scheme	Examination Scheme
Lectures : 3hrs / week	**Theory :** 100 Marks
Tutorial : 1 hr/week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	Understand Industrial Atomization, classifications & Robotic technology
2	Understand Implementation of control strategy , Sensors & Electronics devices
3	Develop software which requires for automation
4	Design & Development of Robot for particular applications

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Student can understand basics concept of industrial atomization & Robotic technology
2	Students can able to select different sensors, electronics systems for Robot
3	Student can develop software for particular robotic applications
4	Students will understand robot applications & develop robot for particular applications

Unit no	Contents	No. of Hours
1	**Introduction and Classification of Robots** Automation and robotics, A brief history of Robotics, Robot drive systems, Robotic sensors, Classification by co-ordinate system, Classification by control method	**06**
2	**Robotic Technology** Basic control systems concepts and models, Controllers, Control system analysis, Robot activation and feedback components, Position sensors, Velocity sensors, Actuators, Power transmission systems, Robot joint control design	**08**
3	**Robotic Sensory Devices** Non optical position sensors, Optical position sensors, Velocity sensors, Accelerometers, Proximity sensors, Touch and Slip sensors	**05**
4	**Robot End Effectors** Types of End Effecters, Mechanical grippers, Other types of grippers, Tools as end effecters, Robot/end effecter interface, Consideration in gripper selection and design	**05**
5	**Robot Programming** Method of Robot programming, Leadthrough programming methods, Robot program as a path and space, Motion Interpolation, WAIT, SIGNAL, and DELAY commands, Branching, Capabilities and	**06**

	Limitation of Lead through methods, Textual Robot language, Generation of Robot programming language	
6	**Robot Application** General consideration in robot material handling, Material Transfer Applications, Machine loading and unloading, Spot welding, Spray coating, Other processing operations using robots	**06**

Text books:

1.Industrial Robotics: Technology, programming and applications. Mikell P. groover, tata macgrawth hill
2.Robotic Engineering: An integrated approach Richard D. kalfter, PHI
3.Introduction to robotics analysis, control and applications Saeed B. Niku: willey publication

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- I (w. e. f. July 2016)
5.Subject: Speech Processing (Elective-1)

Teaching Scheme	Examination Scheme
Lectures : 3hrs / week	**Theory :** 100 Marks
Tutorial : 1 hr/week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	Explain acoustic theory and time domain models for speech processing.
2	Understand sampling, quantization and different modulation techniques.
3	Apply STFT analysis , Homomorphic Speech processing and speech synthesis
4	Explain linear predictive coding a well as different techniques to enhance speech quality.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Understand acoustic theory
2	Distinguish time domain modules
3	Analyze and distinguish different modulation techniques
4	Analyze and synthesizespeech using STFT , homomorphic processing .

	Enhance speech quality

Unit No	Contents	No. of Hours
I	**Digital models for the speech signal :** Process of speech production, Acoustic theory of speech production, Lossless tube models, and Digital models for speech signals. **Time domain models for speech processing:** Time dependent processing of speech, Short time energy and average magnitude, Short time average zero crossing rate, Speech vs silence discrimination using energy & zero crossings, Pitch period estimation, Short time autocorrelation function, Short time average magnitude difference function, Pitch period estimation using autocorrelation function, Median smoothing.	**09**
II	**Digital representations of the speech waveform** Sampling speech signals, Instantaneous quantization, Adaptive quantization, Differential quantization, Delta Modulation, Differential PCM, Comparison of systems, direct digital code conversion.	**07**
III	**Short time Fourier analysis:** Linear Filtering interpretation, Filter bank summation method, Overlap addition method, Design of digital filter banks, Implementation using FFT, Spectrographic displays, Pitch detection, Analysis by synthesis, Analysis synthesis systems.	**05**
IV	**Homomorphic speech processing** Homomorphic systems for convolution, complex cepstrum, Pitch detection, Formant estimation, Homomorphic vocoder.	**04**
V	**Linear predictive coding of speech** Basic principles of linear predictive analysis, Solution of LPC equations, Prediction error signal, Frequency domain interpretation, Relation between the various speech parameters, Synthesis of speech from linear predictive parameters, Applications.	**05**
VI	**Speech Enhancement:** Spectral subtraction & filtering, Harmonic filtering, parametric re-synthesis, Adaptive noise cancellation. **Speech Synthesis:** Principles of speech synthesis, Synthesizer methods, Synthesis of intonation, Speech synthesis for different speakers, Speech synthesis in other languages, Evaluation, Practical speech synthesis.	**06**

Text Books:

1. L. R. Rabiner and R. W. Schafer, “Digital Processing of Speech Signals," Pearson Education (Asia) Pte. Ltd., 2004.
2. D. O’Shaughnessy, “Speech Communications: Human and Machine,” Universities Press, 2001
3. L. R. Rabiner and B. Juang, “Fundamentals of Speech Recognition,” Pearson Education (Asia) Pte. Ltd., 2004
4. Z. Li and M.S. Drew, “Fundamentals of Multimedia,” Pearson Education (Asia) Pvt. Ltd., 2004.

Reference Books:

1. C Becchetti & L P Ricotti, “Speech Recognition Theory & C++ Implementation” John Wiley & Sons
2. D. O’Shaughnessy, “Speech Communication Human & Machine”, Universities Press.
3. B. Gold & N. Morgan “Speech & Audio Signal Processing”, John Wiley & Sons.
4. Speech and audio processing by Dr. Shaila D. Apte

Shivaji University, Kolhapur

B.E. (Electronics and Telecommunication) Part- I (w. e. f. July 2016)

5.Subject: Micro Electro Mechanical Systems and Systems on chip (Elective I)

Teaching Scheme	Examination Scheme
Lectures : 3hrs / week	**Theory :** 100 Marks
Tutorial : 1 hr/week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	Provide an introduction and basic understanding of MEMS and types of MEMS.
2	Provide basic understanding of sensors and Actuators.
3	Develop student ability to apply basic design procedure of fabrication steps.
4	Design electronic circuits to meet the desired specifications.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Apply knowledge of mathematics, science, and engineering to design MEMS small systems.

2	Explain basic fabrication steps of fabrication
3	Explain the integration and packaging if MEMS

Unit No	Contents	No. of Hours
I	**Control and Materials of MEMS** Introduction, semiconductors and their processing, Ceramics, silicon micromachining techiniques, Polymers and their synthesis,	**07**
II	**Smart Materials and Systems**.:-Thermo responsive Materials, Piezoelectric Materials, Electrostrictive/Management Materials, Rheological Materials	**04**
I11	**Transducers, Sensors and Actuators** Introduction, Principles of sensing and actuation, Beam and Cantilever, Microplates, Capacitive effects, Flow measurement using Integrated paddle-cantiliver structure, MEMS Gyroscopes. Chemical and Biological Transducers: basic concepts of cellular biology, chemical sensors,molecule-based biosensors, cell-based biosensors	**07**
1V	**Silicon Fabrication Techniques** ASICs micromachining processes: substrates, **lithography**: lithography, Mask formation,Wafer bonding, wet/dry etching processes**, Deposition processes**,: Metallization, CVD of dielectric, Thermal oxidation, film stress, and exotic process.	**06**
V	**Polymeric Fabrication Techniques** **Microsteriolothography**: introduction, MSL by scanning method **Micromolding of polymeric 3D structure**: Micro-injection molding, Micro-photomolding **Polymeric Process**: burnout and sintering, Jet molding, powder injection molding	**06**
VI	**Integration and Packaging** Intgration of MEMS-MEMS First process, MEMS packaging: objective, special issue, types of packaging Packaging Techniques: Flip-chip assembly, ball grid array, embedded overlay	**06**

Text Books:

1	Nitaigour Premchand Mahalik "MEMS" McGraw-Hill.

Reference Books:

1	2 G.K. Anantsuresh, K.J. Vinoy, S. Gopalkrishnan, K.N. Bhat, V.K. Atare, " Micro and Smart Systems" Wiley
2	K.J. Vinoy, S. Gopalkrishnan,Vijay K Varadan "Smart Material systems and MEMS".

NOTE FOR PAPER SETTER: Question paper based on 100% Theory

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- I (w. e. f. July 2016)
5.Subject: Radar & Navigation Aids (Elective-I)

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	**Theory :** 100 Marks
Tutorial: 1 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims :	
1	To gain in depth knowledge about fundamental of radar
2	To study different types of radar and their operations
3	To gain knowledge radar's measurement and tracking
4	To become familiar with radar networking

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Acquired knowledge about radar and radar equation
2	Understanding the working principal of Doppler radar
3	Ability to work for measurement and tracking signal
4	Foster ability to work instrument landing system

Unit No	Contents	No. of Hours
I	**Elementary Concepts-** Fundamental Elements of Radar, Function Performed by Radar, Overall System Considerations, Types of Radar Targets, Radar Waveform, Power and Energy, Some Basic Principles, Some Definitions	**06**
II	**Antennas-** Aperture Antennas, Radiation Intensity Pattern, Pattern Function Relationship, Fundamental Pattern Parameters, Apertures with constant Polarization, Factorable Illumination Function, Sidelobe	**08**

	Control in One-Dimensional Apertures, Cirularly Symmetric Illumations, Some Example Antennas, Of The Reflector, Array Antennas, Rectangular Planner Array, Linear Array	
III	**Radar Equation-** Radar Equation, Important Networks Definition, Incremental Modeling Of Noise Sources, Incremental Modeling Of Noisy Networks, Practical Modeling Of Noisy Sources and Networks	**06**
IV	**Radar Signals and Networks-** Real Radar Signals, Complex Radar Signals, Analytic Radar Signals, Frequency and Bandwidth Of Signals, Transmission Of Signals through Networks, Matched Filter For Nonwhite and white Noise, Ambiguity Function, Examples Of Uncertainty Functions.	**06**
V	**Radar Resolution-** Range Resolution, Doppler Frequency Resolution, Simultaneous Range and Doppler Resolution, Resolution and RMS Uncertainty, Overall Radar and Angle Resolution.	**05**
VI	**Frequency Measurement and Tracking-** Definition Of Optimum Frequency Measurement, Optimum Filter For Doppler Measurement, Some Practical Considerations, Practical Noncoherent Implementation For Doppler, Optimum Coherent Doppler Measurement	**05**

Reference Books:

1	"Radar Principles" By Peyton Z.,Peebles,Jr. Wiley India
2	Introduction of Radar system By Skolnik (McGraw Hill)

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(B.E .(Electronics and Telecommunication) Part- I
6. Subject : Project
w.e.f July 2016

Practical :2 hr s / week **TW : 25 Marks** **OE:50 Marks**

a) The project is to be carried out in two semester of B.E (Electronics and Tele communications) Part-I and Part-II. The practical batch size for project will be of 15 students. The project batch will be preferably divided into groups each consisting of not more than 3 students.

In semester one, group will select a project with the approval of guide and submit the

synopsis of project in the month of August. The group is expected to complete detail system design, layout etc. in semester one, as a part of the term work in the form of joint report. In addition all students of project groups will deliver the seminar on the proposed project only.

Hardcopy of project diary should be maintained GroupWise, where report of every week activity should be maintained. , which should be presented at the time of examination.The format of project diary is attached with syllabus.

b)Guide of the project batch should take presentation and report of industrial training to which students should go after end of the third year. They should consider marks of the same in termwork of project phase-I. and give marks our of 25

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- II (w. e. f. July 2016)
1.Subject: Video Engineering

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical: 2 hrs / week	**TW :** 25 Marks **POE**: 50 Marks

Course Objectives: The course aims to:	
1	Study basics of TV system.
2	Study color TV transmission and reception.
3	Study concept of digital TV system.
4	Study concept of high definition TV.
5	Study advanced TV systems like LCD, plasma, LED, CCTV, etc.
6	Study digital video systems like video conferencing and video phone.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Describe picture and sound transmission and reception.
2	Explain color composite video signal.
3	Describe principle of digital TV system.
4	Explain high definition television system.
5	Describe advanced TV system like LCD, plasma, LED,CCTV, etc.
6	Elaborate concept of video conferencing and videophone.

Unit No	Contents	No. of Hours
I	**Fundamentals of television system** Picture and sound transmission and reception ,aspect ratio, horizontal and vertical resolution, video bandwidth and interlaced scanning , composite video, signal, H & V sync details, CCIR-B standards, VSB transmission and channel bandwidth	**09**

II	**Color signal transmission and reception** Color TV camera , Color Picture Tubes, picture tubes purity & convergence, automatic degaussing , Composite color signals, compatibility considerations, frequency interleaving process, color mixing theory, characteristics of color, color difference signals, chromaticity diagram , color signal transmission- bandwidth and modulation of color difference signals, color TV system :NTSC , PAL – D & SECAM,	**09**
III	**Digital TV Transmission and Reception** Digital system hardware, Signal quantization and encoding, Digital signals and parameters ,Digital Satellite Television, Digital T.V. Receiver system, Merits of Digital TV receiver.	**08**
IV	**High Definition TV** Component coding ,MAC signals ,MAC encoding format ,scanning frequencies D2-MAC Packet Signal , Duo binary Coding ,HDTV Standards & compatibility ,colorimetric characteristics & parameters of HDTV systems	**08**
V	**Digital video system** Video conferencing, Interactive video and multimedia, Videophone, 3D TV	**07**
VI	**Advanced TV systems** LCD TV System :LCD Technology , LCD Matrix types & operations , Plasma TV System : Plasma & conduction of charge ,Plasma TV screen ,Signal processing in Plasma TV, Plasma color Receiver, LED TV, DTH Receiver System ,CCTV, working of block converter,: IR Remote control.	**07**

Reference Books:

1	**Monochrome and Color TV** – R.R. Gulati, 2nd revised edition,New Age International Publication
2	**Modern Television Practice – Principles, Technology and Service** – R.R. Gulati, 4th edition,New Age International Publication
3	**Television and Video Engineering** - A.M. Dhake, 2nd Edition.

Reference Books

1	**Digital Video Processing**-A. Murat Tekalp, Prentice Hall Signal Processing Series, BS publications.
2	**Audio-Video Engineering** – R.C.Jaiswal.
3	**Consumer Electronics –**S P Bali,Pearson

Note: Any 10 experiments based on above syllabus.

List of experiments	
1	To Study H sync and V sync details.
2	To Study color composite video signal.
3	To Study RF tuner section
4	To Study horizontal section of color TV receiver.
5	To Study vertical section of color TV receiver.
6	To Study chroma section of color TV receiver.
7	To Study VIF section of color TV receiver.
8	To Study SIF section of color TV receiver.
9	To Study sync separator.
10	To Study digital TV receiver.
11	To Study CCTV.
12	To Study theory of LCD, LED, and Plasma technology.

Note for paper setter: Paper should be based on as per weight-age given in the syllabus.

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- II (w. e. f. July 2016)
2. Subject: Wireless Mobile Communication

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical: 2 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	Focus on basic fundamentals of wireless communication.
2	Explain large & small scale radio wave propagation
3	Understand basic mobile communication and its multiple access techniques.
4	Understand mobile network and its connectivity.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	List basic fundamentals of wireless communication
2	Analyze large & small scale radio wave propagation
3	Apply multiple access techniques to mobile communication.
4	Create mobile network.

Unit No	Contents	No. of Hours
I	**Mobile Radio Propagation.** Large Scale Path Loss: Introduction to Radio Wave propagation, Free Space propagation model, Relating Power to Electric Field, The three Basic Propagation Mechanisms, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering, Practical Link Budget Design Using Path Loss Models, Outdoor	**08**

	Propagation Models, Indoor Propagation Models, Signal Penetration into Buildings, Ray Tracing And Site Specific Modeling,	
II	**Mobile Radio Propagation** Small-Scale Fading and Multipath : Small-Scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of small-Scale Fading, Rayleigh and Ricean Distributions, Statistical Models for Multipath Fading Channels.	**08**
III	**Wireless Networking: Introduction to wireless Networks** Difference Between Wireless and Fixed Telephone Networks, Development of Wireless Networks, Fixed Network Transmission Hierarchy, Traffic Routing in Wireless Networks, Wireless Data Services, Common Channel Signaling (CCS), Architecture of B-ISDN & services, Signaling System No. 7 (SS7), An Example of SS7-Global Cellular Network Interoperability,	**09**
IV	**Introduction to Mobile Communication & Multiple Access Technique** Mobile and Personal Communication, mobile and wireless devices, Specialized packet and mobile radio networks, circuit switched data services on cellular networks, packet switched data services on cellular networks, Multiple Access Technique-FDMA, TDMA, SDMA, CDMA, spread spectrum multiple access	**08**
V	**Wireless LAN** Introduction, Infrared radio transmission infrastructure and ad-hoc networks, Detailed study of IEEE 802.11, HIPER LAN, Bluetooth, Wireless ATM	**07**
VI	**Mobile Network & Transport Layer** Mobile IP, DHCP (Dynamic Host Control Protocol), Mobile ad hoc networks, Bluetooth & Wi-Fi network Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and Selective retransmission and recovery, Transaction oriented TCP, TCP over 2.5/3G wireless networks.	**08**

Text Books:

1	Wireless Communications Principals & Practice- Theodore S. Rappaport, (P.E.)
2	Mobile Communications: Jachen Schiller (Addison Westy)

Reference Books:

1	Wireless Networks by P. Nicopolitidis, M. S. Obaidat, G. I. Papadimitriou, A. S. Pomportsis; Wiley Pub.
2	Wireless Communication & Networks by William Stallings(Pearson Edition)

3	Wireless communication and Networks by Upena Dalal(Oxford)
4	Wireless and Mobile network by Manvi (Wiley India)

List of Experiments: (Any 8 Experiments)

1.	ISDN Trainer kit Hardware & Software Setup
2.	Study of Architecture of ISDN kit
3.	Analog & Digital Subscriber Link establishment using ISDN trainer kit
4.	Study of numbering plans in ISDN trainer kit
5.	Establishment point to point & Multidraft Links using ISDN
6.	Study of Protocol Analysis (based on any protocol)
7.	Study of Mobile Communication Set up (Study of Link Mobile Trainer Kit , Handset)
8.	Study of Multiple Access Techniques (Any one)
9.	Visit to Mobile Company Like BSNL , AIRTEL , Idea
10.	Implementation of outdoor propagation Model (Any one) using Matlab.
11.	Implementation of Free Space propagation model using Matlab

Note for Paper Setter: 92 marks Theory + 8 Marks Problem.

Shivaji University, Kolhapur

B.E. (Electronics and Telecommunication) Part- II (w. e. f. July 2016)

3. Subject: Digital Image Processing

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical: 2hrs/week	**TW :** 25 Marks **OE :** 50 **Marks**

Course Objectives: The course aims to:	
1	Explain fundamentals of Digital Image Processing.
2	Understand and apply different image transforms as well as filtering techniques.
3	Understand different morphological operations and segmentation techniques.
4	Explain different color image processing techniques.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	List fundamental steps involved in Digital Image Processing.
2	Apply different image transforms and filtering techniques on an image.
3	Apply and analyze image enhancement techniques.
4	Demonstrate an application based on image processing.
5	Perform operations on color image processing.

Unit No	Contents	No. of Hours
I	**Digital Image Fundamentals.** Fundamentals steps in DIP, Components of image processing system, Elements of Visual Perception, Image sensing and acquisition, image sampling and quantization, basic relations between pixels.	**08**
II	**Image Transforms** Basic intensity transformation: image negation, Log transformation, power law transformation, Piecewise linear transformation functions, arithmetic and Logic operation, Histogram processing (equalization and matching) , sine cosine, Hadamard, Haar, Slant transform .	**08**
III	**Image filtering** Fundamentals of spatial filtering, smoothening and Sharpening in spatial domain, smoothening and Sharpening in frequency domain.	**07**
IV	**Morphological image processing** Dilation & erosion, opening and closing operation, Hit- or –miss transformation. Basic morphological algorithms: Boundary extraction, region filling, thinning and thickening, skeletons.	**08**
V	**Image segmentation** Detection of discontinuities: Point detection, line detection, edge detection, (Sobel, Prewitt, Laplacian), global and adaptive thresholding, Region based segmentation (region growing, region splitting and merging).	**08**
VI	**Image Compression** Fundamentals, Coding redundancy , interpixel redundancy, fidelity criteria , image compression model, lossless predictive coding, Lossy predictive coding **Color Image Processing** Color fundamentals, Color models , psudocolor, image processing, full color image processing, Color transformations	**09**

Text Books:

1	Digital image processing : Rafael C Gonzalez , Richard E. Woods: Pearson Publication Image
2	Digital image processing and Analysis- B. Chanda , D. Datta , majnudar
3	Fundamentals of digital Image Processing- Anil K.Jain.

Reference Books:

1	Digital image processing- S. Jayraman, S Esakkiarajan , Veerakumar:MGH
2	Digital image processing and Analysis- B. Chanda , D. Datta, majnudar:PHI
3	Digital image processing using Matlab- Rafael C Gonzalez.
4	Fundamentals of Digital Image Processing-S.Annadurai, R. Shanmugalaxmi : Pearson Publication
5	Digital Image Processing- S.Shridhar
6	Digital Image Processing – Pratt

Practical based on MATLAB programs: Any 8experiments based on above syllabus

1	Reading and Displaying of image (Various image file format)
2	Simple gray level transformation
3	Histogram processing
4	Image smoothening operation
5	Edge detection
6	Morphological operation
7	Segmentation using thresholding
8	Based on image compression
9	Image transforms
10	Color image Processing

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Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- II (w. e. f. July 2016)
4. Subject: Mechatronics (Elective II)

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	**Theory :** 100 Marks
Tutorial: 1hr/week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	Study of different Mechanical operations & Processes
2	Study of different Mechanical, Electrical, Chemical Actuators used for mechanical operations.
3	To understand PLC & its applications
4	To study of different types of CNC, DNC machines & its Design

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Student can learn Basic mechanical operations & Processes
2	Students can understand & implement actuators according to need
3	Student can learn understand PLC , its requirements & development of PLC software
4	Students can Design & Develop Electro-mechanical System

Unit No	Contents	No. of Hours
I	**Introduction to mechatronics** What is mechtronics, design of process, systems, measurement of system, Control system, Programmable logic controllers.	**06**
II	**Actuators and Mechanisms** Introduction, Actuators Types and Application Areas, ,Electro-mechanical Actuators ,DC motor, AC motor, Piezoelectric Actuators, Chemical Actuator, Bearings, Gears.	**07**
III	**Process Controllers :** Controller Principles, Two position controller(ON/OFF controller), Proportional controller ,Integral controller, Derivative controller, Pneumatic controllers ,PID controller tuning	**06**
IV	**Programmable Logic Controllers:** Introduction to PLC, Basic structure of a PLC, Principle of Operation ,PLCs versus computer ,PLC programming.	**06**
V	**Introduction to CNC machines:** CNC machines, NC machines, CNC machines, DNC machines, machine structure,, Robotics.	**06**
VI	**Design of Mechatronics system:** Introduction, Mechtronics approach into design, Case Examples, Future Trends-smart homes. .	**05**

Books:

1.Mechtronics principles,Concepts and application Nitaigour Preamchand Mahalik MCGraw hill 2nd edition
2.Mechatronics Integrated mechanical electronic system,K.P Ramachandan,G.K Vijayaraghavan Willey India
3.Mechatronics-W Bolton,Pearson
4.Programmable logical controller, Reis Webb, Prentice Hall
5.Mechatronics – Appu Kuttam, Oxford publications

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- II (w. e. f. July 2016)
4. Subject: Artificial Neural Networks (Elective-II)

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	**Theory :** 100 Marks
Tutorial : 1 hr/week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	To understand basic concept of human neurons.
2	Important Terminology of Neural Network
3	Various Learning algorithm of Neural Network.
4	Know the use of ANN for classification

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Use analogy of human neural network for understanding of artificial learning algorithms
2	The student will show skills for using back propagation algorithm.
3	The student will exhibit the knowledge of radial basis function network
4	The student will show understanding of self organizing maps.

Unit No	Contents	No. of Hours
I	**Introduction to Artificial Neural Network** Neural Networks, fundamental concept, Evaluation & Basic models of Neural Networks, Important terminology of ANN, McCulloch-Pitts Neurons, Hebb Network	**06**
II	**Supervised Learning Network** Introduction, Perceptron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neutrons	**06**
III	**Back –Propogation Network** Theory, Architecture, Flowchart, Training Algorithm, Learning Factors of Back propogation Network **Radial Basis Function Network** Theory, Architecture,Flowchart for training Process, Training Algorithm	**07**
IV	**Associative Memory Network** Introduction, Training Algorithms for pattern Association, Memry Network : Hetroassociative, Bidirectional. Hopfield Network: Discrete, Continuous**.**	**07**
V	**Unsupervised Learning Networks:** Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Learning Vector Quantisation, Counterpropagation Networks, Adaptive Resonance Theory Network	**07**

VI	**Application Of ANN** Introduction, Direct Application, Application Areas	**03**

Text Books:

1	**Principles Of Soft Computing**, Second Edition, S.N.Sivanandam, S.N. Deepa, Wiley Publication
2	**Artificial Neural Networks**, B. Yegnanarayana, PHI publication

Reference Books:

1	**Artificial Intelligence**, Third Edition, Elaine Rich, Kevin Knight,
2	**Introduction to Artificial Neural Systems** Jacek M. Zurada, JAICO Publishing House .
3	**Introduction to Neural Networks** Using MATLAB, Sivanndam, Deepa, TMH publication

Shivaji University, Kolhapur

B.E. (Electronics and Telecommunication) Part- II (w. e. f. July 2016)

4. Subject: Remote Sensing & GPS (Elective-II)

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	**Theory :** 100 Marks
Tutorial : 1 hr/week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	To provide exposure to students in gaining knowledge on concepts and applications leading to modelling of earth resources management using Remote Sensing.
2	To acquire skills in storing, managing digital data for planning and development
3	To acquire skills in advance techniques such as hyper spectral, thermal and LiDAR scanning for mapping, modelling and monitoring

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Fully equipped with concepts, methodologies and applications of Remote Sensing Technology.
2	Prepare the candidates for National and Global Employability
3	Acquire skills in handling instruments, tools, techniques and modeling while using Remote Sensing Technology
4	It empowers the candidate with confidence and leadership qualities.

Unit No	Contents	No. of Hours
I	**Concept Of Remote Sensing-** Introduction, Definition, Remote Sensing Process, Energy Source and radiation Principle, Data Acquisition and Interpretation ,Reference data ,Characteristics ,advantages, Application, Limitation	**08**
II	**Types Of Remote Sensing-** Classification based on platform, Classification Based on Energy Source, Classification based on Imaging Media, Radar Development, Side looking, Radar System Operation, Geometric characteristics Of Radar Imagery, Transmission characteristics Of Radar System	**08**
III	**Microwave Remote Sensing-** Introduction, Passive microwave Sensing, Active microwave Remote Sensing, Radar Imaging, Radar System	**06**
IV	**Data Integration, Analysis and Presentation-** Introduction, Multi-approach of Remote Sensing, Integration with ground truth and other acillary data, Transformed data, Integration with GIS, Process of remote sensing data, Limitation of remote sensing Data analysis.	**05**
V	**Application Of Remote Sensing-** Introduction, Land Cover and use, Agriculture forestry ,Geology	**03**
VI	**Global Positioning System-** Global Navigation, Satellite System, Satellite Based Navigation, Positioning systems , Functional segment of GPS, Working Principle of GPS , GPS signal ,error in GPS, Positioning methods, Differentition GPS,GPS receiver, Application of GNSS	**06**

Text Books:

1	Remote sensing & GIS, Second edition Oxford publication, - Basudev Bhatta
2	Text Book on remote sensing -Agrawal & gerg
3	Basics of remote sensing and GIS – Dr F Kumar

Reference Books

1	Remote sensing and image interpretation-lelli sand& keifer
2	Remoter sensing for environment- genson

Shivaji University, Kolhapur
B.E. (Electronics and Telecommunication) Part- II (w. e. f. July 2016)
4. Subject: Operating System (Elective-II)

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	**Theory :** 100 Marks
Tutorial: 1 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	To understand the concept of operating systems
2	To use knowledge of Operating systems in Hardware systems
3	To understand memory & I/o issues in OS
4	To compare different OS environments

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Know the architecture of operating system
2	Understand Processes & Threading environment in operating systems
3	Know the memory & I/O issues in OS
4	Compare different operating systems

Unit No	Contents	No. of Hours
I	**Introduction To Operating System:** Introduction, Operating System: Need, Evolution, Types, Architecture : bootloader , kernel root file system ; Hardware Support for Operating System	**06**
II	**Process & Threads:** Fundamentals Of Process , Process Scheduling, Process Communication And Synchronization, , Threads usage , Implementing threads in user space & kernel space , Multi threading,	**07**
III	**Process Management :** Concurrency and race conditions, mutual exclusion requirements , s/w and h/w solutions, semaphores, monitors, classical IPC problem and solutions, Dead locks - characterization , detection ,recovery, avoidance and prevention.	**06**
IV	**Memory Management:** Memory partitioning , swapping, paging, segmentation, virtual memory - Concepts, Overlays, Demand paging, Performance of demand paging , page replacement algorithm, Allocation algorithms	**05**
V	**I/O SYSTEMS** Principles of I/O hardware - I/O devices - device controller - direct memory access Principles of I/O software – Goals -	**06**

	interrupt handlers - device drivers- device independent I/O software Secondary-storage structure - Disk structure - Disk scheduling - Disk Management - Swap-space management - Disk reliability - Stable storage implementation File concept File support- Access methods- Allocation methods- Directory systems- File Protection	
VI	**Advanced Operating Systems** Distributed OS, Multiprocessor OS, Mobile OS, RTOS , Multimedia OS Case Study : Linux , Windows , Android	**06**

Text Books:

1	Silberschatz , Galvin & Gagne ,**" Operating System Concepts",**VII th Wiley 2010 .
2	William Stallings ,**"Operating System: Internals & Design Principles'**, Pearson ISBN 9789332518803
3	Andrew S.Tanenbaum "Modern Operating Systems " III Edition 2009 Pearson
Reference Books	
1	Flynn /McHoes," Operating Ststems" Cengage Learning (India Edition)
2	Naresh Chauhan ,**"Principles of Operating Systems"** Oxford
3	Haldar & Arvind ," **Operating Systems "** II edition Pearson ISBN 9789332500303
4	P.balkrishna Prasad," Operating Systems" II nd Edition,Scitech Publication

Note: Minimum 8 tutorials based on above syllabus covering all units.

Instruction to paper setter : 100 % theory

Shivaji university, kolhapur

(B.E .(Electronics and Telecommunication) Part- II
5.Subject : Project
w.e.f July 2015

Practical : 8 hrs / week **TW : 100 Marks**
OE: 100 Marks

The project group of semester one will continue the project work in semester two and complete the project in all respect (assembly, testing, fabrication, tabulation, test results etc) .Hardcopy of project diary should be maintained GroupWise ,where report of every week activity should be maintained ,which should be presented at the time of examination
The project work along with project report should be submitted as part of Semester two on or before the last day of the semester -II.

College logo

Name of the college

PROJECT WORK DIARY

Academic Year: Semester: Department:

Title of project:

Name of students:

1. ph.No. Email ID
2. ph.No. Email ID
3. ph.No. Email ID

Student Photographs(ID size,separate)

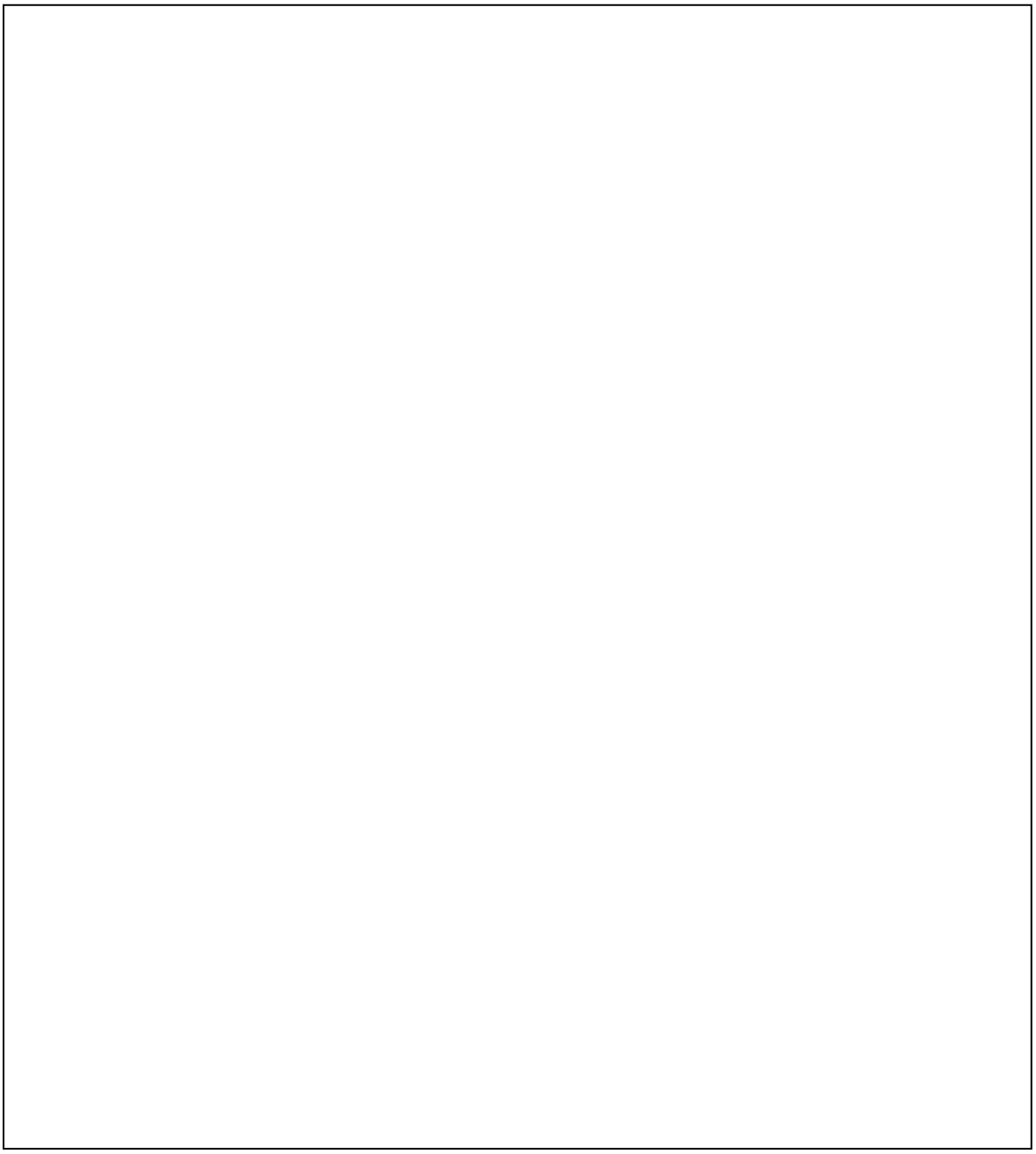
Name of the Guide:

Project Photo with Guide & Students:

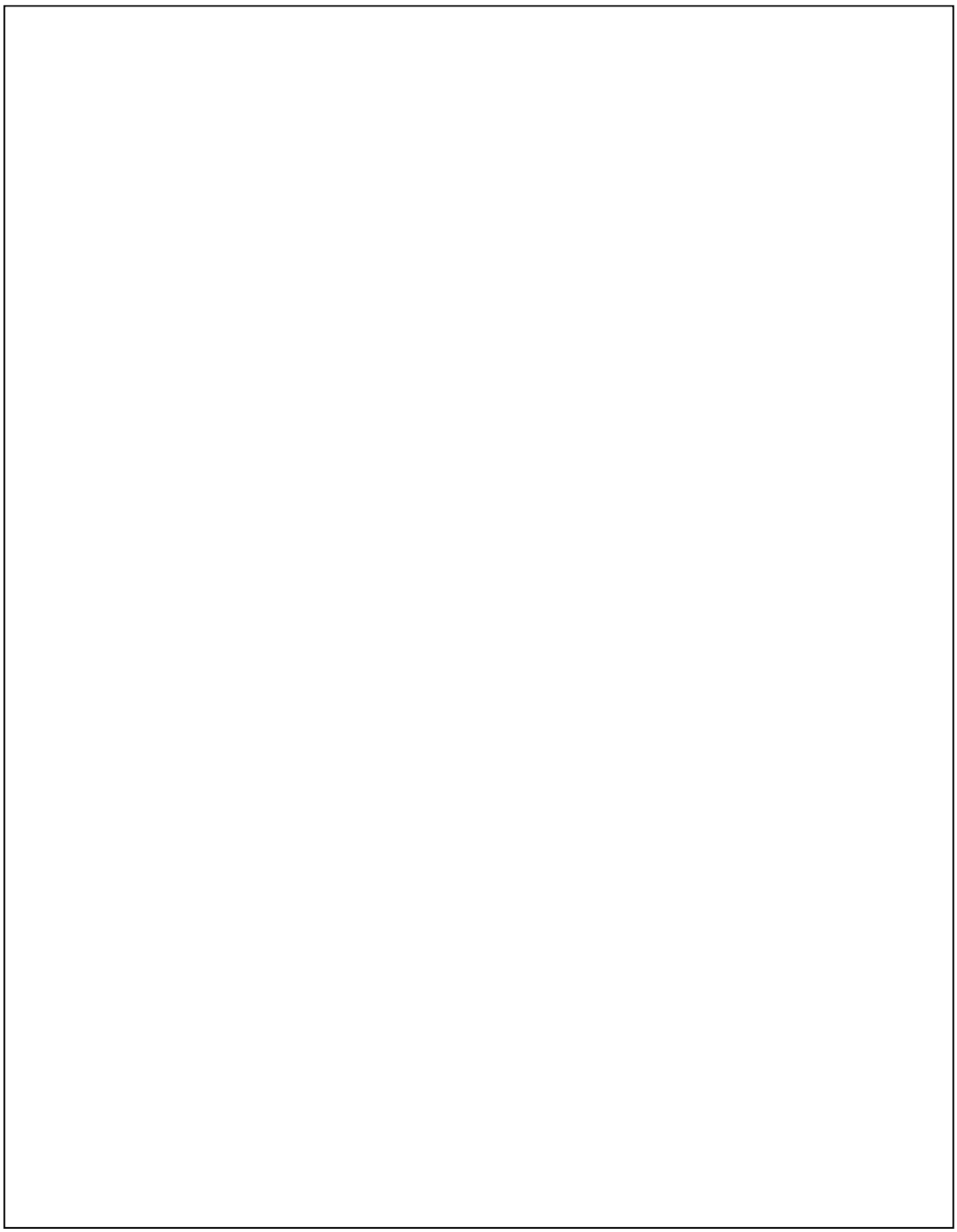
Sign of Guide Sign of H.O.D

Conceptual Design of the Project

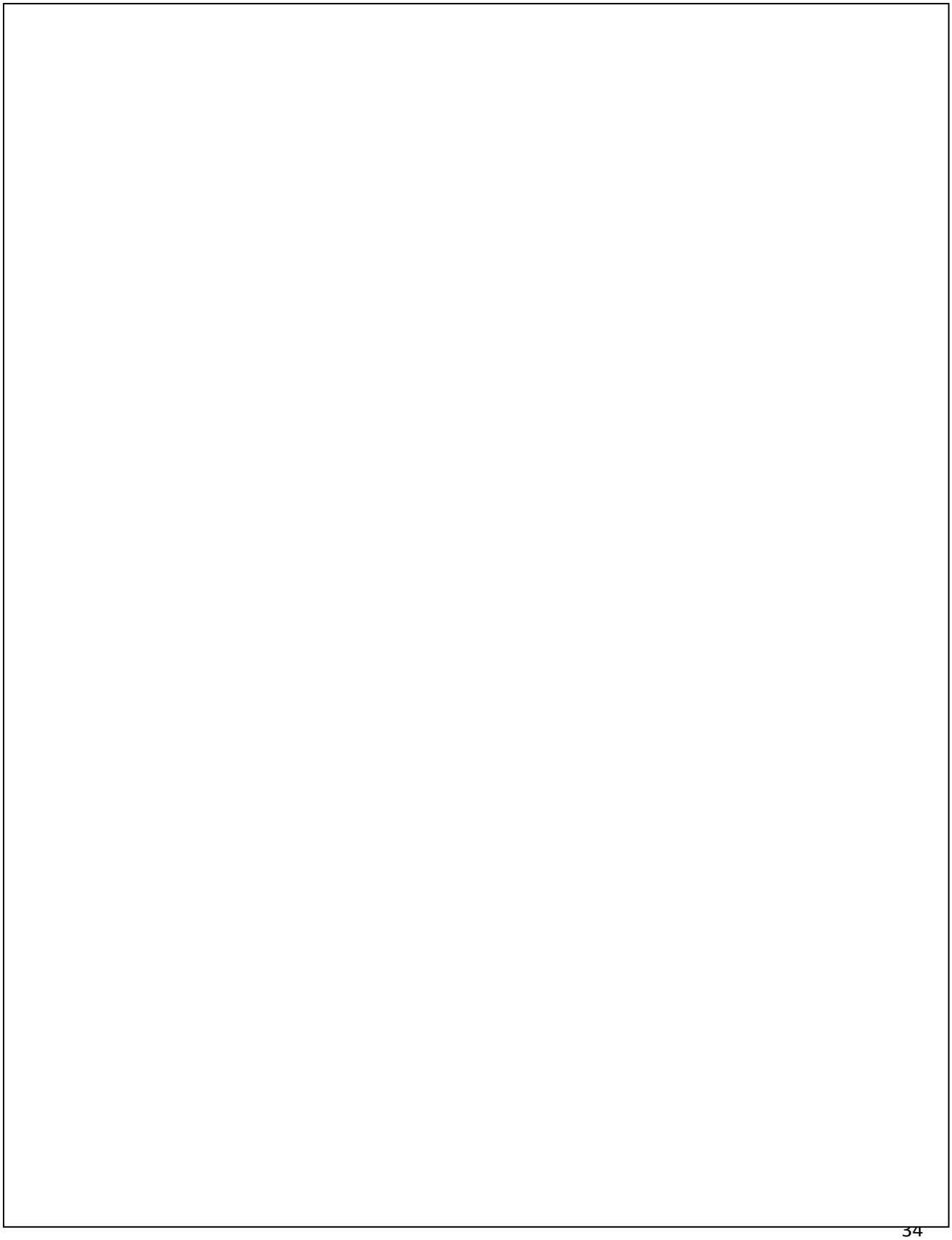
Block Diagram:



Circuit Diagram



Flow Diagram of the project



Weekly Project Progress Report (Separate page for each week)

- Date:
- Work Done:

- People Visited:

- Project Notes Prepared:

- Sign of Students:

- Sign of Guide:

Distribution of Project Term Work Marks:

	Round-I						Round-II						
Roll number	Circuit Diagram (5)	Component Details (5)	Flow Diagram (5)	Programming (5)	Hardware (5)	Total (25)	Continuous Progress (10)	Involve-ment (10)	Project Report (10)	% of Working (15)	Exposure Of project (5)	Total (50)	Industrial Training (25)
	SEM-I												
	SEM-II												

Note: Above table can be taken as reference for giving marks for projects

1.For project-I -75 marks of two rounds should be converted to 25 and give training 25 marks as it is.

2.For Project –II -75 marks of two rounds should be converted to 100. There are no training marks in second sem.

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Shivaji University, Kolhapur

Revised Syllabus Structure of Final Year Engineering (BE) (w. e. f. 2015)

Electronics and Telecommunication Engineering Course

Subject Equivalence

Serial Number	New Subject	Old Subject
1	Satellite Communication	Satellite Communication
2	Embedded System	Embedded System
3	Computer Communication Networks	Computer Communication Networks
4	RF & Microwave Engineering	Microwave Engineering
5	Elective-I	Elective-I
6	Industrial Training	
7	Project Phase-I	
8	Video Engineering	Audio &Video Engineering
9	Wireless Mobile Communication	New
10	Digital Image Processing	Image Processing
11	Elective-II	
12	Project Phase – II	