Solapur University, Solapur
B.E. (Electronics Engineering) Part I & II Syllabus
w.e.f. Academic Year 2010-11
B.E. (Electronics Engineering) Part -I

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Power Electronics	4	--	2	6	100	25	50	--	175
2.	Computer Networks	4	--	2	6	100	25	--	25	150
3.	Mobile Technology	4	--	--	4	100	--	--	--	100
4.	Electronic Instrumentation	3	1	2	6	100	25	--	25	150
5.	Elective - I	3	1	--	4	100	25	--	--	125
6.	Project and Seminar	--	--	4	4	--	25	--	--	25
7.	Vocational Training	--	--	--	--	--	25	--	--	25
	Total	**18**	**02**	**10**	**30**	**500**	**150**	**50**	**50**	**750**

B.E. (Electronics Engineering) Part -II

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Advanced Communication Engineering	4	--	2	6	100	25	--	25	150
2.	Audio Video Engineering	4	--	2	6	100	25	--	--	125
3.	Embedded systems	3	1	2	6	100	25	--	25	150
4.	Elective – II	3	1	--	4	100	25	--	--	125
5.	Project	--	--	8	8	--	100	--	100	200
	Total	**14**	**2**	**14**	**30**	**400**	**200**	**--**	**150**	**750**

Elective – I

1. Biomedical Instrumentation
2. Mechatronics
3. Advanced Digital Signal Processing
4. Image Processing
5. Electronic Product Design

Elective – II

1. Broadband Communication
2. Real Time Systems
3. Speech Processing
4. PLC and Industrial Controllers
5. Network Security
6. Digital Signal Processors

Note – 1> Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 7, then a new batch shall be formed.
2> Project group shall not be of more than **Three** students.
3> Minimum student strength for any Elective shall be of 15.
4> Vocational Training (evaluated at B.E. Part-I) of minimum 15 days shall be completed in any vacation after S.E. Part-II but before B.E. Part-I & the report shall be submitted and evaluated in B.E. Part-I
5> Appropriate Elective I & II Subjects may be added when required.

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Power Electronics

Lecture - 4 hours / week
Practical - 2 hours / week

Theory - 100 marks
Term work - 25 marks
POE - 50 marks

Objectives:

1. Analysis and Design of Controlled Rectifiers, choppers, Inverters and cycloconverters.
2. To design the microcontroller/DSP based firing circuit.
3. To analyze the inverter for harmonic reduction and distortion.
4. To understand the different power factor controlling techniques.
5. Application of above Power circuits for AC and DC drives.

Section I

1. Single Phase Controlled Rectifiers: - Overview of Single phase controlled rectifiers, single phase full wave controlled rectifier with R and battery load, RL and battery load, effect of source inductance, dual convertor. **(5)**

2. Three Phase Controlled Rectifiers:- Three phase half wave controlled rectifier with resistive load, three phase half controlled bridge rectifier with R & RL load, three phase full controlled bridge rectifier with R and RL load, calculation of performance parameter **(8)**

3. Triggering Circuits for Phase Controlled Rectifiers: - Microcontroller/DSP based Firing circuit for single phase, three phase controlled rectifiers. **(4)**

4. Choppers: - Types of choppers, single quadrant, two quadrant, four quadrant, control techniques of chopper, series turn off chopper, parallel capacitor turn off chopper, single SCR chopper, Jones and Morgan chopper, step up chopper, multiphase chopper, chopper circuit design. **(6)**

Section-II

5. Inverters: - Classification of inverters, IGBT based single phase half bridge& full bridge inverter, three phase bridge inverters – 120 & 180 degree conduction modes, SCR inverters-series inverter, parallel inverter. Control of inverter output voltage, DSP based PWM generation, harmonic reduction techniques. **(8)**

6. Cycloconverters: - 1 phase to 1 phase, 3 phases to 1 phase, 3 phase to 3 phase cycloconverters, harmonic reduction techniques, circulatory & non-circulatory current mode. **(4)**

7. DC motor control: - DC motor control methods, closed loop control with voltage and current feedback with microcontroller/DSP as a controller flow chart and design flow is expected. **(4)**

8. AC motor control: - AC motor speed control concepts, closed loop control using microcontroller/ DSP as controller. Flow chart and design flow is expected. **(4)**

9. Power Factor Corrector: - Need of power factor corrector and methods of power factor correction **(3)**

- **Term work:**
  Term work consists of minimum eight experiments from below list:

1. To verify performance of single phase half controlled rectifier with R and RL load.
2. To verify performance of single phase fully controlled rectifier with R and RL load.
3. Observe the firing pulses for controlled rectifier using Microcontroller.
4. Observe the firing pulses for controlled rectifier using DSP processor.
5. Find out the duty cycle and value of inductor for step up chopper
6. Observe the performance of Morgan chopper
7. Observe the performance of Jones chopper
8. Observe the output waveform of single phase bridge inverter and find out the distortion.
9. Observe the output voltage of 2/1, 3/1, 4/1 cyclo convertor.
10. Find out the value of capacitance required to maintain power factor of 0.9 with given inductive load.
11. To observe the performance of DC drive.
12. To observe the performance of AC drive.
13. Simulate any two using MATLAB / PSPICE

- **Text Book:**

Power Electronics – M.D. SINGH & K.B. KHANCHANANI Tata Mc Graw-hill

- **Reference Books:**

1. Power Electronics, circuits, devices and applications by M. H. Rashid
   3rd edition, Pearson Education
2. Power Electronics – Vedam Subramanyam. Tata Mc Graw-hill
3. Power Electronics – P.C. Sen. New Age International
4. Thyristerised Power Converters by Dubey, Sinha, Dorald
5. Industrial and Power Electronics – Deodatta Shingare, Electrotech Publication

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Computer Networks

Lectures- 4 hours /week	Theory - 100 marks
Practical- 2 hours/week	Term Work- 25marks
	OE- 25 marks

Objectives:

1. To understand the concepts of data communications.
2. To study the functions of different layers.
3. To introduce IEEE standards employed in computer networking.
4. To get familiarized with different protocols and network components.

Section-I

1. **Data Communication** – Direction of Data flow , Networks – Components and Categories – types of Connections - Topologies , Protocols and Standards – ISO / OSI reference model , Transmission Media , Modems – Types Block study, Serial communication standard RS232- Interfacing sequences. **(8)**

2. **Data Link Layer** – Framing, Error detection and correction – Parity – LRC – CRC – Hamming code , Flow Control - Stop and wait, Sliding window – Go back-N ARQ – Selective repeat – ARQ, Link control protocols- HDLC. Medium Access Control(MAC) **(8)**

3. **LAN standards** – Ethernet IEEE 802.3, IEEE 802.4, IEEE 802.5, IEEE 802.11 **(6)**

Section-II

4. **TCP/IP Reference Model-** layered reference model, TCP & IP header format, encapsulation, IP addressing methods – Subnetting – masking, **(6)**

5. **Network Layer-** Packet switching and Datagram approach, Routing Algorithms – Shortest path, Distance Vector Routing, Link State Routing. **(6)**

6. **Transport Layer**- Multiplexing, Demultiplexing, Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) **(4)**

7. **Networking Devices**- Switches, Hubs, Bridges Routers, Gateways **(2)**

8. **Application Layer** - Domain Name Space (DNS), FTP, TFTP, SMTP **(4)**

- **Term-Work:**
  Term work consists of minimum eight experiments from below list:

1. Inter-computer communication through serial port- character transfer using simplex, full duplex mode
2. File transfer through serial port- (implementation of any flow control mechanism)
3. Interfacing of MODEM using serial communication port
4. Installation of Network operation system (Linux OS) - Ethernet card installation, IP addressing.
5. IEEE 802.3 LAN connection.
6. Networking commands (such as ping …)
7. FTP
8. DNS commands (address translation…..)

- **Text Books :**
  "Data communication and Networking"- Behrouz A. Forouzan, Tata McGraw-Hill,

- **Reference Books:**

1. "Computer Networks"- Andrew S. Tanenbaum, , PHI, Fourth Edition,
2. "Data and Computer Communication"- William Stallings, Sixth Edition, Pearson Education, 2000.
3. "Computer Networking: A Top-Down Approach Featuring the Internet"- James F. Kurose and Keith W. Ross , Pearson Education, 2003
4. "Data Communication"- P.C. Gupta,

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Mobile Technology

Lecture - 4 hours / week Theory - 100 marks

Objectives:

To study basics of

1. Wireless standards
2. Mobile communication
3. Wireless application protocol
4. Digital cellular standards
5. Mobile network and transport layers

Section- I

1. Introduction to Mobile Communication: - Spread spectrum-DSSS, FHSS, coding and error control, wireless medium access-FDMA, TDMA, CDMA, Packet radio. **(7)**

2. Cellular concepts :- Introduction, Frequency reuse, channel assignment strategies, Handoff strategies, interference and system capacity, Trunking and Grade of service, improving coverage and capacity in cellular system, GSM-services and features, system Architecture, radio system, GSM channel types, frame structure, signal processing in GSM. **(8)**

3. CDMA digital cellular standards (IS-95):-Introduction, Frequency and channel specifications, Forward CDMA channel, Reverse CDMA channel. **(8)**

Section-II

4. Wireless LAN: - Infrared radio transmission Vs infrastructure and adhoc networks, IEEE 802.11, HIPER LAN, Bluetooth **(8)**

5. Wireless ATM:-WATM services, Reference Model, Functions, Radio access Layer, handover, Location management, Addressing, Mobile QOS, Access point control protocol **(7)**

6. Mobile Layers:-Mobile Network Layer: Mobile IP, DHCP (Dynamic Host Control Protocol) Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and Selective retransmission and recovery, Transaction oriented TCP **(7)**

- **Term-Work:**
  Term work consists of minimum eight experiments based on above syllabus

- **Text Books:**

1. Mobile Communications: Jachen Schiller (Addison Westy)
2. Wireless communication: Theodore Rappaport (Prentice-Hall of India)
3. Mobile cellular Telecommunication :William Lee (Tata Mc-Graw Hill)

- **Reference Books:**

1. Mobile and Personal Communication systems and services : Raj Pandya (PHI)
2. The CDMA2000 system for mobile communication: Vieri Vanghi

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Electronic Instrumentation

Lectures: -3 Hours / Week
Tutorial: - 1 Hour / Week
Practical: - 2 Hours / Week

Theory: - 100 Marks
Term Work: -25 Marks
OE: - 25 Marks

Objectives:

1. To understand qualities of measurement.
2. To understand working of indicator & display devices.
3. To understand concept of principles of signal generator & analyzers.
4. To understand data acquisition & transmission.

Section-I

1. **Qualities of Measurements: –** Performance characteristics, static & dynamic characteristics, errors & sources. **(2)**

2. **Indicators & Display Devices:–**Analog meters – AC & DC, digital voltage measurement techniques, display devices- LED, LCD etc **(4)**

3. **Electronic Counters: –**Basic measurements – frequency, time, period **(4)**

4. **Signal Generators:–**Audio frequency signal genitors, radio frequency signal generators, function generator, frequency synthesis techniques – direct, indirect, digital, arbitrary waveform generator, synthesized function generator, data generator. **(8)**

Section- II

5. **Signal Analyzers:-**Distortion measuring instruments, spectrum analyzer, FFT analyzer, vector analyzer, logic analyzer **(8)**

6. **Data Acquisition & Transmission:-**Data acquisition system (DAS), single & multi channel DAS, multiplexing, data loggers, hierarchy of instrument communication, field bus & device networks**.** **(8)**

7. **Quality Management: -** Quality, ISO 9000 quality management system overview **(2)**

- **Term Work**:

  Term work consists of

  1. Minimum eight experiments based on above syllabus
  2. Minimum eight practical based on above syllabus

- **Text Books**:

1. Electronic Instrumentation & Instrumentation Technology, M.M.S. Anand, Prentice Hall of India Pvt. Ltd.
2. Electronic Instrumentation, Second Edition, H.S. Kalasi, Tata McGraw-Hill Publishing Company Ltd.

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Elective-I-Biomedical Instrumentation

Lecture - 3 hours / week
Tutorial - 1 hour / week

Theory - 100 marks
Term work - 25 marks

Objectives:

1. To understand physiological system of body
2. To understand various criteria in selection of transducers for body parameters measurements.
3. Study of different instruments used for diagnostic measurement.
4. To understand Human safety considerations.

Section – I

1. Introduction to Biomedical Instrumentation: -Biometrics, basic design specifications of biomedical instrumentation system in terms of range, linearity, hysteresis, frequency response, accuracy, signal to noise ratio, stability isolation, simplicity, physiological system of body: biochemical system, cardiovascular system, respiratory system, nervous system. Source of bioelectric potential resting and action potential, propagation of action potential **(06)**

2. Electrodes and Transducers: - Microelectrodes, skin surface electrode, needle electrode, electrodes and lead for EEG, ECG, EMG. Transducer for biomedical applications, factors governing the selection of transducer, pressure, temperature, flow, biomedical ultrasonic transducer **(05)**

3. Bio Signal Amplifiers: - Signal conditioner, amplifier used in biomedical instrumentation, requirement of amplifier, input isolation, DC amplifier, power amplifier, differential amplifier carrier amplifier, instrumentation amplifier. Introduction to biomedical telemetry **(05)**

4. Electrophysiology and Cell Structure: - Bioelectric signal generated by muscles of heart, neuronal activity of brain, muscle activity. Block study of ECG, EEG and EMG. Electrodes and leads for ECG, EEG & EMG **(04)**

Section - II

5. Cardiovascular Instrumentation: - Measurement of blood pressure, blood flow, and heart sound, cardiography, Phonocardiography, vector cardiography, Echocardiography pacemaker, defibrillators, Ventilator. **(05)**

6. Imaging Systems: - Ultrasonic imaging system, basic pulse – echo system, block study of a mode scan equipment, X-ray machine, CT scanner. **(04)**

7. Patient Care Monitoring: -Elements of intensive care unit, diagnosis, calibration and reparability of patient monitoring equipment, instrumentation for monitoring patient, pacemakers, defibrillator and computer patient monitoring system. **(04)**

8. Electrical Safety of Medical Instruments: - Physiological effects of electric current, shock hazards from electric equipment and methods of accident prevention. **(03)**

9. Signal Processing Medical Applications: -Noise removal, filtering of evoked potentials, heart rate variability analysis, ECG data compression, QRS detection **(04)**

- **Term Work**:
  Term work consists of minimum eight tutorials based on above syllabus

- **Text Books:**

1. Biomedical Instrumentation & Measurement – By Leaslie Cromwell, Fred Weibell, Erich A Pfeiffer (PHI)
2. Handbook of Biomedical Instrumentation – By R.S.Khandpur (TMH)
3. A text book of Medical Instruments – By S. Ananthi, New Age International
4. Bioelectronic Measurement – By Dean A Dmane, David Michaels (Prentice Hall)
5. Medicine and Clinical Engineering – By Jacobson and Webster, (PHI)
6. Introduction to Biomedical Equipment Design – Carr and Brown, John Wiley
7. Biomedical Digital Signal Processing – By Tompkins.

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Elective-I- Mechatronics

Lectures: 3 Hours / week
Tutorial: 1 Hour / week

Theory : 100 marks.
Term Work: 25 marks

Objectives:

1. To understand Concept of PID Controllers, electromechanical drives
2. To study PLC controller and programmable motion controllers
3. To study Micro sensors and micro actuators
4. To study Robot End Effecters, sensors & its peripherals

Section - I

1. Introduction: - Definition, Trends, Control Systems, Microprocessor/Micro controller based controllers, PC based controllers, proportional/Integral/Differential controllers, PID Controllers, Digital Controllers, and Adaptive Controller. **(8)**

2. Electromechanical Drives: -DC Servo motors, 4-quadrant servo drives, braking methods, bipolar drives, MOSFET Drivers, SCR Drives, variable frequency drives. **(5)**

3. PLC Controllers: -Ladder diagram, FSD structured programming, Interfacing of Sensors and Actuators to PLC. **(4)**

4. Programmable Motion Controllers: -Interpolation: point-to-point, Linear Circular, B-S plane, Home, Record position. **(3)**

Section - II

5. Precision Mechanical Actuation: -Pneumatic Actuators, Electro-pneumatic Actuators, hydraulic Actuators, Electro hydraulic Actuators, Types of motions, Kinematics, Inverse Kinematics, Timing Belts, Ball Screw and Nut, Linear motion Guides, Linear Bearings, Harmonic Transmission, motor/Drive selection. **(7)**

6. MEMS: -Overview of MEMS & Microsystems, Typical MEMS & Micro system, products and applications. Micro sensors and micro actuators: Phototransistors, pressure sensors, thermal sensors, micro grippers, micro motors, micro valves, Micro pumps.
Micro Manufacturing: Bulk Manufacturing, Surface Manufacturing, LIGA Process. **(4)**

7. Design of Mechatronic Systems: -The design process, traditional and Mechatronic designs. A few case studies like piece counting system pick and place manipulator, simple assembly involving a few parts, part loading, Unloading system, automatic tool and pallet changers etc. **(5)**

8. Robot & its Peripherals: -End Effecters – Types, Mechanical Electromagnetic, Pneumatic Grippers, Tool as End effecter, Robot End effecter interface, Sensors – Sensors in Robotics, Tactile Sensors, proximity and Range Sensors, Sensor based systems and uses, Robot programming. **(4)**

- **Term Work:**
  Term work consists of tutorials from below list

1. Interfacing and control of DC Servo motor with Microcontroller for position, speed and direction control.
2. PLC Programming in ladder, FBD, Structured.
3. Study of graphical PID tuning for X-Y position, Study of Rotary and Conveyor.
4. Pneumatic and Hydraulic actuators.
5. Robot programming.
6. CNC Programming.

- **Text & Reference Books:**

1. Mechatronics 2nd Edition – W.Bolton Addison Wesley – 981-235-874-9
2. Mechatronics Integrated Mechanical Electronic Systems- K.P. Ramachandran, G. K. Vijayaraghavan, M.S. Balsundaram (Wiley India Pvt Limited)
3. Mechatronics Principles, Concepts and Applications – N.P. Mahalik -TMH– 0-07-0483744.
4. Mechatronics – Dan Necsulescu -Pearson Education – 81-7808-676-X.
5. Computer Control of Manufacturing systems-Yoram Koren.-McGraw Hill 0-07-066379-3
6. MEMS and Microsystems Design and Manufacture – Tai – Ran Hsu – TMH 0-07-048709
7. Robot Technology (Fundamentals)- James G. Keramas (DELMAR CENGAGE learning)
8. Industrial Robotics: Technology, Programming and Applications –Grover, Weiss, Nagel, Ordey (McGraw Hill)
9. Robotics: Controls, Sensing, Vision and Intelligence – Fu, Gonzalez, Lee (McGraw Hill)
10. Robotics Technology and Flexible Automation – S.R.Deb (TMH)

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Elective-I- Advanced Digital Signal Processing

Lectures: 3 Hours / Week — Theory: 100 Marks
Tutorial: 1 Hour / Week — Term Work: 25 Marks

Objectives:

1. To provide students with an understanding of a variety of DSP algorithms, their underlying theory, and implementation for various applications.

2. To establish fundamental concepts of signal processing on multirate DSP, linear prediction theory, modern spectral estimation, adaptive filters and high-resolution techniques.

Section – I

1. **Linear filtering methods based on DFT**: Use of DFT in linear filtering, frequency analysis of signals using DFT. FFT, Linear filtering approach to computation of DFT, the Gortzel algorithm, the chirp-Z algorithm. **(7)**

2. **Linear prediction & optimal linear filters**: Forward and backward linear prediction. The optimum reflection coefficient for the forward and backward predictors. Relationship of an AR process to linear prediction. The Levinson Durbin algorithm. The Schur algorithm. **(6)**

3. **Power spectrum estimation**: Estimation of spectra from finite duration observation of signals. Computation of energy density function, Estimation of auto-correlation and power spectrum of random signals, the period gram. The use of DFT in power spectrum estimation. Parametric methods for power spectrum estimation. ARMA modeling **(6)**

Section – II

4. **Multirate DSP**: Multirate digital signal processing: Basic multirate operation (up sampling, down sampling), Efficient structures for decimation and interpolation, Decimation and interpolation with poly-phase filters, Non-integer sampling rate conversion , Efficient multirate filtering Applications, Oversampled A/D and D/A converter. **(6)**

5. **Adaptive filtering**: Principles of Adaptive filtering, LMS and RMS Algorithms, Applications in noise and echo cancellation. **(6)**

6. **Multi resolution** : Signal analysis, Decompositions, transforms , Sub-bands and wavelets, Orthogonal transforms : Cosine , sine , Hermite Walsh Fourier, Theory of sub-band decomposition , decimation , interpolation , Design of QMF filter banks ,Wavelet transforms **(6)**

7. **Applications**: International Standards for speech, image and video compression for personnel communication, Digital broadcasting and multimedia systems. **(4)**

- **Term Work**:
  Term work consists of minimum eight tutorials based on above syllabus

- **Text & Reference Books:** -

1. Digital signal processing: - Principles, algorithms and application. John. G Proakis, PHI Publication.
2. Advanced DSP: - Proakis, Rade, Ling. Macmillan publication.
3. Discrete time signal processing: -A.V. Oppenheim and R.W. Schafer.
4. Theory and application of digital signal processing: -I.R. Rabiner and Gold.
5. Introduction to digital signal processing: -Johnny R Johnson.
6. Introduction to DSP: -Roman Kuc. McGraw Hill Publication.
7. Digital Signal Processing by Dr Shaila D. Apte. Wiley, India

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Elective-I- Image Processing

Lectures: 3 Hours / week
Tutorial: 1 Hour / week

Theory: 100 Marks
Term Work: 25 Marks

Objectives:

1. To understand fundamental of digital image processing.
2. To study different image processing operation in spatial & frequency domain.

Section-I

1. **Fundamentals of Digital Image Processing: -**Fields of use of Digital Image Processing, Fundamental steps in Digital Image Processing, Sampling & quantization, representation, spatial & intensity resolution, neighbourhood, connectivity of pixels, distance measurement, matrix operations, spatial operations, basics of transform domain, color models & conversion **(7)**

2. **Image Transforms: -**Discrete Fourier transform, Hadamard transform, Walsh transform, Discrete Cosine transform, Hotelling transform **(6)**

3. **Image Pre Processing: -**Pixel brightness transformations, Geometric transformations, Local pre processing, Pre processing in frequency domain, detection of maximally stable regions, image restoration in spatial domain & frequency domain **(7)**

Section-II

4. **Image Analysis: -**Edge detection, Line detection, Corner detection, Boundary detection, Hough transform, thresholding, Edge based segmentation, Region based segmentation-splitting, merging, matching **(8)**

5. **Image Representation & Description: -**Chain code, Polygon approximation, Signature, skeleton, Shape number, Fourier descriptor, Regional descriptors, Texture, Statistical texture description **(8)**

6. **Image Compression : -**Transforms for image compressions, Predictive compression, Vector quantization, Hierarchical & progressive compression, Coding, JPEG & MPEG **(4)**

- **Term Work :**
  Term work shall be based on Tutorials covering Matlab implementation of above concepts.

- **Text & Reference Books :**
  1. R.C. Gonzalez, R.E. Woods, "Digital Image Processing", Pearson Education, Second Edition.- Chapter 2, 3, 4, 5
  2. R.C. Gonzalez, R.E. Woods, "Digital Image Processing", Pearson Education, Third Edition. – Chapter 1
  3. Milman Sonka, Vaclav Hlavac, Roger Boyle, "Digital Image Processing & Computer Vision", Cengage Learning – Chapter 3, 4, 5, 6
  4. Madhuri A. Joshi, "Digital Image Processing – An Algorithmic Approach", Prentice Hall of India Pvt. Ltd. – Chapter 2,

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Elective-I- Electronic Product Design

Lecture: 3 Hours / week
Tutorial: 1 Hour / week

Theory : 100 Marks
Term Work: 25 Marks

Objectives:

To understand

1. Important considerations in developing a particular electronic product.
2. Hardware Designing & Testing for products.
3. Software Designing & Testing for products
4. Documentation for product development & testing.

Section-I

1. **Analysis of Electronics System:** Product development stages & constraints. System specifications. Study of techno-commercial feasibility of specifications. Functional requirements, Environmental constraints. Commercial, industrial & military standards, Ergonomic & aesthetic design considerations, Thermal management, Packaging & storage, Quality Assurance (QA). **(7)**

2. **Hardware Modeling & Testing :** Modeling of switching power device, analog device, small signal amplifier, digital device, gates, current swings, charging-discharging constraints, timing issues in hardware circuits, voltage swing analysis, HC-MOS power dissipation, Power Supply protection devices, Testing Methods **(7)**

3. **Noise:** Noise & Interference, noise reduction & interference eliminating methods, grounding & shielding techniques, ground loops; High Speed & EMI, EMC, ESD considerations, Design rules for analog & digital PCBs. **(7)**

Section-II

4. **Reliability:** Introduction, Considerations, reliability & quality, definition & related terms like MTBF, MTTR etc. availability, maintainability, bath tub curve, assessment of reliability, reliability expression, Reliability Assessment, Reliability design considerations. **(7)**

5. **Software Modeling:** Object oriented design, software design methodology, fundamental, abstractions, refinement modularity, Design information flow, Entity relationship diagram, Design process considerations, transform flow, transaction flow, data flow diagram, control flow diagram. **(5)**

6. **Product Testing & Documentation :** Environmental Testing, EMI/EMC Testing, Bare Board Testing, PCB Documentation, Product Testing Documentation, Software Documentation, Cost estimation. **(7)**

- **Term Work:**
  Term work consists of minimum eight tutorials based on above syllabus.

- **Text Books:**

1. The Art of Electronics- Paul Horowitz. Hill – Cambridge Publication
2. Software Engineering - Roger S. Pressman - McGraw Hill
3. Electronics Instrument Design - Kim Fowler- Oxford Publication
4. Electronic Product Design – Technical Publications- V.S. Bagad

- **Reference Books:**

1. Noise reduction techniques in electronics circuits- Henry Ott - Wiley Publication
2. Reliability Engineering: - E. Balguruswamy
3. Electronics Engineers Reference Book -E F.F.Mazda , , Butterworth Publication

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Project and Seminar

Practical - 4 hours / week Term work - 25 marks

Objectives:

1. To expose student to different Project life cycle phase
2. To impart hands on experience for design & development of project
3. To enhance team working skills
4. To enhance presentation and technical documentation skills.

The project work is carried out in two semesters of B.E. (Electronics). The practical batch for the project will be of 15 years students. The batch will be divided into groups each consisting of not more than 3 students.

In semester –I, group will select a project with the approval of guide and submit the synopsis of the project. The group is expected to complete detail system design, high level design and low level design of project in first semester as a part of term work.

Each student shall deliver a seminar (presentation) preferably on the topic related to project area.

Solapur University, Solapur
BE (Electronics Engineering) Part-I
Vocational Training

Term work - 25 marks

Objectives:

1. To expose student to industrial environment & different industrial practices
2. To cultivate basic management skills
3. To enhance team working skills and other soft skills
4. To enhance technical documentation skills.

Each student must complete minimum 15 days vocational training in any industry / organization in any vacation after S.E. Part II but before B.E. Part I and the report prepared and submitted by the student will be evaluated in B.E. Part I. This report evaluation will be done by the respective project guide of the student. Report shall include – certification from the industry / organization about completion of the training, profile of the industry / organization, details of the training, technical skills / soft skills gained, learning from training.

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Advanced Communication Engineering

Lecture - 4 hours / week
Practical - 2 hours / week

Theory - 100 marks
Term work - 25 marks
OE -25 marks.

Objectives:

To study basics of concept of

1. Microwave communication
2. RADAR communication
3. Satellite communication
4. Optical communication

Section - I

1. **Microwave Techniques: -**Introduction to microwave Fundamentals, microwave frequencies and microwave devices, Microwave Transmission lines- reflection coefficient and transmission coefficient, standing waves , Wave Guides Rectangular wave guides, TE mode wave, power transmission in wave guide, power losses, excitation of modes in wave guide, Microwave Components ,Microwave cavities, microwave hybrid circuits(E,H.EH plane Tee),Directional coupler, Circulators and Isolators. **(10)**

2. **Microwave Devices and Antennas: -**Klystrons, reflex klystrons, TWTs, Magnetrons, Microwave Solid State Devices –MESFET, Varactor diode. PIN diode; tunnel Microwave, TED, and avalanche transit time devices. Microwave antenna-horn, parabolic reflector slots, and lens and micro strip antennas. **(8)**

3. **Radar: -**Radar fundamentals, radar Principle, radar range equation, types of radar pulsed radar system, MTI, radar beacons, FM/CW radar, Doppler radar, phased array radar, Plane array radar and Antenna. **(6)**

Section – II

4. **Satellite Communication: -**Introduction, orbital Mechanics, look angle determination, satellite subsystem**.** **(8)**

5. **Satellite Link Design: -**Design of downlink, link budget, design of uplink, modulation techniques, multiplex techniques, earth station, application overview-Radio and satellite navigation, GPS position location, DHS-TV **(8)**

6. **Optical Communication: -** Block diagram of optical communication, advantages and application, Nature of light, ray theory, acceptance cone, and numerical aperture, optical fiber modes and types. Principal operation of optical source and optical detector**.** **(8)**

- **Term Work:**
  Term work consists of minimum eight practical based on above syllabus.

- **Text Books: -**

1. Microwave Devices and Circuit – Samul Liao (Prentice hall of India)
2. Principles of Radar Engineering – Skolnik, TMH
3. Satellite Communication-Second Edition-Timothy Pratt
4. Optical Fiber Communication- Gerd Keiser- McGraw Hill International.

- **Reference Books** –

1. Fundamentals of Microwave Engg. – Peter A. Rizzi -Prentice hall of India.
2. Radar principles, Technology, Application -EDDE-LPE.
3. Optical Fiber Communication- John Senior
4. Communication Electronics principle and application-Frenzel-3rd Edition

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Audio Video Engineering

Lectures: - 4 Hours / week Theory: - 100 marks
Practical: - 2 Hours / week Term Work: -25 marks .

Objectives:

To study

1. Concepts of disc recording and reproduction
2. Basics of Multimedia
3. Concepts of Color Television (CTV) Transmitter and Receiver.
4. Working Principle of Digital Television (DTV) and High Definition Television (HDTV).
5. Satellite receiver, Direct to Home (DTH) Receiver, Digital Video Disc (DVD) player

Section- I

1. **Principle of disc recording and reproduction system**: - Coarse- grooves and micro grooves, construction of cutter stylus, Play back needles, cartridges or pick up units, Principle of magnetic recording and reproduction, Recorded wavelength, Gap-width and tape speed, need for biasing, DC &AC biasing, Parts of tape recorder, tape transport mechanism advantages and disadvantages of tape recording, Block diagram tape recording and reproducing system Wow and flutter distortions, Rumble, Hissing noise, Types of optical recording of sound, Methods of optical recording of sound on films **(9)**
2. **Multimedia** : - Definition, Elements of multimedia system, Need of multimedia Audio applications, audio capture, compression, standards Video applications, video capture, Television, compression, standards **(7)**
3. **Basics of Television:** -Introduction to video systems, Sound and picture transmission, scanning process, Camera pick up devices, camcoder, Video signal, aspect ratio, horizontal and vertical resolution, video bandwidth and interlaced scanning, Composite video signal for monochrome TV video signal standards, sound and video modulation, VSB transmission and reception (CCIR-B standards), composite colour signals, compatibility, TV transmitter block diagrams **(8)**

Section - II

4. **Composite colour signal introduction**: colour spectrum, compatibility considerations, chromaticity diagram, colour TV signal, luminance signal, chrominance signal, recombination to natural colour voltages, interleaving process, colour subcarrier frequency, colour picture tube, shadow mask, gun assembly, in-line guns, precision in line colour picture tube, colour picture tube requirements, degaussing, purity convergence, convergence circuits **(6)**

5. **Colour TV systems**: elements of NTSC colour system, Basic colour TV transmitters, (NTSC and PAL), basic parameters of SECAM system, SECAM coder and decoder, Line by line switch and colour identification circuit, delay line, basic features of PAL system, PAL coder and decoder, colourpixed video signal (PAL). **(6)**

6. **Colour TV receivers**: antenna, RF tuner, AFT, Video IF amplifier, video detector sound section, first video amplifier delay line colour burst circuit, AGC amplifier, phase discriminator, phase identification amplifier and colour killer, reference oscillator, vertical deflection system, horizontal deflection system, EHT **(6)**

7. **Advanced TV System: -**High definition TV, satellite TV, cable TV, working of block converter, Introduction to digital television, how digital television works, Remote control, DVD, DTH **(6)**

- **Term Work:**
  Term work consists of minimum eight practical based on above syllabus.

- **Text Books**:

1. Multimedia in practice Technology & Applications -Judith Jeffcoate (PHI)
2. Audio-video Engineering-Gupta
3. Colour television Theory and practice- R.R. Gulati

- **Reference Books:**

1. Television and Video Engineering- A. M. Dhake
2. S. P. Bali, "Color TV Theory and Practice", TMH.
3. Basic Television and Video systems-Bernord Grob

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Embedded Systems

Lectures: - 3 hours / week	Theory: - 100 marks
Tutorial: - 1 hour / week	Term Work: -25marks
Practical: - 2 hours / week	OE: - 25marks

Objectives:

1. To study Hardware and Software architecture of Embedded System.
2. To study ARM7 architecture and learn its assembly language programming
3. To study architecture of Real Time Operating Systems (RTOS)
4. to study wireless protocols and field bus protocols

Section-I

1. **Embedded system Introduction: -** Definition**,** History, Design challenges, Optimizing design metrics, Time to market, Application of embedded systems and recent trends in embedded system. **(04)**

2. **Embedded System Architecture**: -Hardware and software architecture, Processor selection for Embedded System, Memory Architecture and IO devices , Interrupt Service Mechanism, Context switching, Device Drivers. **(07)**

3. ARM Processor: -Architecture and Programming, RISC and CISC, ARM organization, ARM Programmers model, operating modes, Exception Handling, Nomenclature, Core Extensions.ARM instruction set and Assembly language Programming. **(11)**

Section-II

4. Interfacing and Programming: -Basic embedded C programs for on-chip peripherals of ARM Processor architecture. Need of interfacing, interfacing techniques, interfacing of different displays including Graphic LCD, interfacing of input devices including touch screen etc, embedded communication using SPI, I2C, etc. **(08)**

5. Real Time Operating System Concepts
Architecture of the kernel , Task scheduler , ISR , Semaphores , Mailbox , Message queues , Pipes , Events , Timers , Memory Management, Study of Ucos II RTOS. **(08)**

6. Case Study of Embedded System: - Digital Camera, Smart Card **(02)**

7. Protocols: Bluetooth, GPRS, MODBUS CAN and USB **(04)**

- **Term work:**
  Term work consists of
  1. Minimum eight tutorials based on above syllabus
  2. Minimum eight practical from below list:

1. Interfacing keyboard and writing a program to display a pressed key on the 7 segment LED Display.
2. Interfacing LCD display to ARM controller and writing a program to display a message in various ways.
3. Interfacing RTC and PC UART to the ARM controller and writing a program to display real time on the Hyper Terminal on PC.
4. Interfacing ADC to ARM controller.
5. Writing a program using RTOS functions to schedule tasks with priority.
6. Implement a semaphore for any given task switching using RTOS.
7. Write a program to introduce timer based events for ARM controller using RTOS.
8. Write a program to implement I2C protocol.
9. Any other practical on ARM controller using with/without RTOS.

- **Text Books:**

1. Raj Kamal,"Embedded Systems "TMH.
2. Frank Vahid "Embedded System Design.
   Frank valid: -Wiley India
3. Sloss etal,"ARM Developers Guide Morgan Kaufman publishers".

- **Reference Books:**

1. Dr. K.V.K.K. Prasad "Embedded / Real Time Systems" Dreamtech
2. Iyer, Gupta "Embedded Real systems programming "TMH.
3. Steve Heath "Embedded System Design "Neuwans.
4. David Simon - Embedded systems software primer, Pearson
5. Steve Furber - ARM System-on-Chip Architecture, Pearson
6. Jean J Labrose - MicroC / OS-II, Indian Low Price Edition
7. ARM System Developers Guide – Andrew Sloss

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Elective-II-Broadband Communication

Lectures: -3 Hours / week — Theory: 100 Marks
Tutorial: -1 Hour / week — Term Work: -25 Marks

Objectives:

1. Study of various switching technologies
2. To understand the importance of broadband networking services and technologies
3. To understand high-speed network access technologies, core-network architectures and the broadband service environment

Section – I

1. **Types of switching**, Digital switching, Control signaling, X.25, Frame relay , X.25 v/s Frame relaying, Frame mode protocol architecture, Frame relay and Frame switching, Frame mode call control, Call control protocol, DLCI, Bearer capability, Link layer core parameters, LAPF. **(6)**

2. **ISDN** – Integration of Transmission and Switching, Analog and Digital switching, Principles of ISDN, User interface, Architecture, ISDN standards, I-series recommendations. **(4)**

3. **ISDN: interface and Functions** – Transmission structure, User network interface, ISDN protocol architecture, ISDN connections, Addressing, Interworking, ISDN physical layer **(7)**

4. **B-ISDN architecture and standards, B-ISDN Services** – Conversational, Messaging, Retrieval, Distribution, Business and Residential requirements. **(3)**

Section – II

5. **B-ISDN protocols –** User plane, Control plane, Physical layer, Line coding, Transmission structure, SONET- Requirement, Signal Hierarchy, System Hierarchy. **(4)**

6. **ATM –** Overview, Virtual channels, Virtual paths, VP and VC switching, ATM, cells, Header format, Generic flow control, Header error control, Transmission of ATM cells, Adaptation layer, AAL services and protocols, ATM service categories, ATM traffic related attributes, QoS parameters **(10)**

7. **ATM switching** – ATM switching building blocks, ATM cell processing in a switch, Matrix type switch, Input, Output buffering, Central buffering, Performance aspects of buffering switching networks**.** **(6)**

- **Term Work**:
  Term work consists of minimum eight tutorials based on above syllabus

- **Text & Reference Books:**
  1. ISDN and Broadband ISDN with Frame Relay and ATM William Stallings, Prentice-Hall
  2. High Speed networks & Internets-Performance & Quality of Service– William Stallings- 2nd Edition – Pearson Education
  3. Broadband Communications -Balajikumar, Mac-Graw Hill

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Elective-II- Real-Time Systems

Lectures: 3 Hours / week — Theory: 100 Marks
Tutorial: 1 Hour / week — Term Work: 25 Marks

Objectives:
To study
1. Concept of RTS.
2. RTS task scheduling.
3. Software requirements engineering.
4. Software system design.
5. Performance analysis and optimization.

Section – I

1. Introduction: - RTS concept, application, basic model, Characteristics of RTS, RTS design, types of Real time tasks, timing constraints and modeling. **(6)**

2. RTS task scheduling: -Real time task type and its characteristics, Task scheduling, Clock driven scheduling, Hybrid schedulers, Event driven scheduling, EDF scheduling, RMA **(8)**

3. Handling Resource sharing and Dependencies among Real time tasks: -Resource sharing, Priority Inversion, Priority Inheritance Protocol (PIP), Highest Locker Protocol (HLP), Priority Ceiling Protocol (PCP), Features, Handling Task dependencies. **(7)**

Section - II

4. Software Requirements Engineering: -Requirements, types, Requirement specification for RTS, Formal methods, Structured analysis and design, object oriented analysis and UML, Organizing and writing requirement, requirement validation. **(8)**

5. Software System Design: -Properties of software, basic software engineering principles, design activity, procedural oriented design, object oriented design **(8)**

6. Performance analysis and optimization: -Performance analysis, application of queuing theory, Input/output performance, performance optimization, results from compiler optimization analysis of memory requirement, reducing memory utilization. **(5)**

- **Term Work:**
  Term work consists of minimum eight tutorials based on above syllabus

- **Text & Reference Books :**
  1. RTS: Theory and Practical By Rajib Mall, Pearson Education
  2. RTS: Design and Analysis By Phillip .A. Laplante A John Willey and sons
  3. Real Time UML: 3rd edition By Bruce Powel Douglass, Pearson Education.
  4. Embedded/ RTS: Concept, Design and programming
  By K.V.K.K Prasad, Dream tech press

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Elective-II-Speech Processing

Lectures: 3 Hours / week — Theory: 100 Marks
Tutorial: 1 Hour / week — Term Work: 25 Marks

Objectives:

1. To understand basics of speech processing in time domain & frequency domain.
2. To understand homomorphic speech processing
3. To understand LPC.
4. To understand features & algorithms for speech synthesis & recognition.

Section - I

1. **Introduction to Speech Processing : -**Speech signal, speech processing, digital speech processing, speech synthesis, recognition, applications, sampling, basics of process of human speech production **(4)**

2. **Time Domain Models : -**Energy, magnitude, zero crossing, silence discrimination, pitch period estimation, autocorrelation, smoothing **(7)**

3. **Homomorphic Speech Processing : -**Homomorphic systems for convolution, complex cepstrum of speech, pitch detection, formant estimation, Homomorphic vocoder **(7)**

Section - II

4. **Linear Predictive Coding : -**Linear predictive analysis by different methods, prediction error signal, evaluation of LPC parameters, interpretation, selective linear prediction, relation between various speech parameters, speech synthesis using LPC, other applications **(8)**

5. **Speech Recognition : -**Common features, dynamic features, robustness, basics of isolated word recognition & connected word recognition **(5)**

6. **Speech Synthesis: -**Formant synthesizer, filter synthesizer, concatenative methods **(5)**

- **Term Work :**

  Term work shall be based on Tutorials covering Matlab implementation of above concepts

- **Text Books:**

1. Digital Processing of Speech Signals by L.R. Rabiner & R.W. Schafer (Pearson education)
2. Speech & Audio Signal Processing by Ben Gold & Nelson Morgan (Wiley India)

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Elective-II- PLC and Industrial Controllers

Lectures: -3 Hours / week
Tutorial : -1 Hour / week

Theory: 100 marks
Term Work:25 marks

Objectives:

1. To understand hardware architecture of PLC.
2. To understand programming of PLC
3. To understand processor controllers and its components

Section – I

1. **Introduction to programmable controllers : -**Industrial motor control circuits, relay ladder logic circuits, building a ladder diagram, motor control starter circuit, rack assembly, power supply, PLC programming unit, Input / Output sections, Processor unit, Addressing, relationship of data addresses to I/O modules. **(08)**

2. **Fundamental PLC programming: -**PLC program execution, ladder diagram programming language, ladder diagram programming, relay logic instructions, Timer instructions, counter instructions, data manipulation instructions, arithmetic operations, writing a program. **(08)**

3. **Advanced programming, PLC interfacing & Troubleshooting: -**Jump commands, data manipulations, discrete input/output modules, troubleshooting I/O interfaces, analog input and output signals, special purpose modules, troubleshooting programmable controllers. **(08)**

Section – II

4. **Process Controllers**: Introduction to Process Control, On/Off proportional Controller, PI &PD Controllers, PID Controller- Tuning and implementation **(08)**

5. **Sensors and Actuators**: Flow sensors, Pressure sensors, Temperature sensors, Semiconductor sensors **,**Actuators: Control Valves, Directional Control Valves, switches & Gauges, Hydraulic actuation system, Pneumatic actuators **(08)**

6. **Signal Conditional Networks**: I to V, V to I floating load and grounded load, Data Acquisition System using microcontroller **(04)**

7. **CNC Machines**: Introduction to Computer Numerically Controlled machines, Interpolation and Control Drive **(04)**

- **Term Work**:
  Term work consists of minimum eight tutorials based on above syllabus

- **Text Books:**
  1. Industrial & Process Control by C.D. Johnson
  2. Industrial Electronics: Circuits, instruments and control techniques -Terry Bartelt – Delmar pub.
  3. Programmable Logic Controllers by Frank Petruzella

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Elective-II- Network Security

Lectures: 3 Hours / week
Tutorial: 1 Hour / week

Theory : 100 Marks
Term Work: 25 Marks

Objectives:

1. To know the methods of conventional encryption.
2. To understand the concepts of public key encryption and number theory
3. To understand authentication and Hash functions.
4. To know the network security tools and applications.
5. To understand the system level security used.

Section- I

1. **Conventional Encryption: -**Introduction ,Conventional encryption model, Steganography, Data Encryption Standard ,block cipher, Encryption, algorithms, confidentiality , Key distribution **(9)**

2. **Public Key Encryption and Hashing: -**Principles of public key cryptosystems, RSA algorithm Diffie-Hellman Key Exchange. Elliptic curve, cryptology, message authentification and Hash functions, Hash and Mac algorithms, Digital signatures **(9)**

3. **Network Security Application : -A**uthentification applications, Electronic mail security: PGP, SS/MIME **(3)**

Section- II

4. **IP Security**: -IP Security Overview, IP security Architecture authentification Header, Security payload, security associations ,Key Management **(6)**

5. **Web Security :** Web security requirement, secure sockets layer, transport layer security, secure electronic transaction, dual signature **(8)**

6. **System Security: -**Intruders, Viruses, Worms, firewall design, Trusted systems, antivirus techniques, digital Immune systems **(8)**

- **Term Work**:
  Term work consists of minimum eight tutorials based on above syllabus

- **Text & References Books***:*

1. Network Security Essentials- Applications & Standards*:* William Stallings- Pearson Education Asia
2. Cryptography and Network security*:* William Stallings, 2nd Edition, Prentice Hall of India, New Delhi
3. Cryptography and Network Security: Theory and Practice: William Stallings,2nd Edition, John Wiley
4. The RC5, RC5-CBC, TC5-CBC-PAD and RC5-CT5 Algorithms, RFC2040",: Baldwin R and Rivest.R." October1996

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Elective-II- Digital Signal Processors

Lectures: 3 Hours / Week — Theory: 100 Marks
Tutorial: 1 Hours / week — Term Work: 25 Marks

Objectives:

1. The objective of this course is to provide students with an understanding of a DSP processor, their architectures and instruction set.
2. To establish fundamental concepts of implementing DSP algorithms using Digital signal processors.

Section - I

1. **Introduction**: - Architecture overview, Fixed and Floating point digital signal processors. **(2)**

2. **TMS320C54X Architecture and Assembly language instructions**: -Introduction, Bus structure, CALU, ARAU, index register, ARCR, BMAR, Block repeat registers, Parallel Logic Unit (PLU), Memory mapped registers, Program controller, On chip memory & peripherals, Addressing modes & instructions. **(8)**

3**. ADSP family**: -Analog 21061 series sharc block diagram, Interrupt Hardware, memory quantization, central arithmetic logic unit, system control , memory addressing modes, instruction set, Software applications – Process initialization , interrupts etc. **(8)**

Section – II

4. **An overview of TMS320C6X DSPs: -**Introduction, TMS320C6X architecture, functional units, Fetch & Execute packets, pipelining, registers, addressing modes, instruction set, assembly directives, timers, interrupts, Memory considerations, code improvement, constraints. **(8)**

5. **Overview of Motorola DSP563XX Processors: -** Data ALU, Multiplier-Accumulator(MAC), Address generation unit, Program control unit, On chip peripherals, Internal buses, Instruction set of DSP56300 Family processors, addressing modes **(6)**

6. **DSP Applications**: -FIR/IIR filtering, Adaptive filtering, FFT Analysis, Spectral Analysis etc. Implementation using TMS320C62X / TMS320C67x. **(6)**

- **Term Work**:
  Term work consists of minimum eight tutorials based on above syllabus

- **Text & Reference Books:**

1. Programming with DSP processors – Texas Instruments.
2. Digital Signal Processors Architectures, Implementations & Applications – Sen Kuo, Woon-Seng S. Gen. Pearson Publicatios.
3. Digital Signal Processors – Venkataramani / Bhaskar.
4. Digital Signal Processing and applications with C6713 and C6416 DSK by Rulph Chassaing. A JOHN WILEY & SONS, INC., PUBLICATION
5. DSP Processor fundamentals Architectures and Features by Phil Lapsley, Jeff Bier, Amit Shoham. Wiley India.

Solapur University, Solapur
BE (Electronics Engineering) Part-II
Project

Practical - 8 hours / week

Term work - 100 marks
OE - 100 marks

Objectives:

1. To expose student to different Project life cycle phase
2. To impart hands on experience for design & development of project
3. To enhance team working skills
4. To enhance presentation and technical documentation skills.

The project work is carried out in two semesters of B.E. (Electronics). The practical batch for the project will be of 15 years students. The batch will be divided into groups each consisting of not more than 3 students.

In semester –II, the project group and project work initiated in semester II will continue. In semester – II, the remaining phases of project life cycle (assembly, testing, coding, validation etc) will be completed. The project work along with the comprehensive project report shall be submitted as a part of term work in semester –II on or before the last day of the semester –II.