B.Sc ELECTRONICS CBCS SYLLABUS

3rd YEAR - VI SEMESTER

Sl.no.	Course	Total marks	Mid Marks	Sem end Marks	Teaching Hours	Credits
1.	Theory VII (A) Micro controller and interfacing	100	25	75	3	3
2.	Lab – VII (A) Micro controller and interfacing	50	0	50	2	2
	CLUSTER GROUP					
3.	Theory VIII (A1) Embedded systems design	100	25	75	3	3
4.	Project work VIII (A1) Embedded systems design	50	0	50	2	2
5.	Theory - VIII (A2) Electronic instrumentation	100	25	75	3	3
6.	Lab VIII (A2) Electronic instrumentation	50	0	50	2	2
7.	Theory - VIII (A3) POWER ELECTRONICS	100	25	75	3	3
8.	Lab - VIII (A3) POWER ELECTRONICS	50	0	50	2	2

B.Sc Electronics CBCS Syllabus
3rd year
VI Semester
Elective
Paper – VII (A) Micro controller and interfacing

Sub: Electronics **Year 2017-18** **Group: B.Sc** **Credits : 3**

Title: MICRO CONTROLLER AND INTERFACING

Objectives:

- To understand the concept of microcontroller based system.
- To enable design and programming of microcontroller based system.
- To know about the interfacing circuits.

UNIT-1 (10 Hrs)

Introduction, Comparison of microprocessor and microcontroller, evolution of microcontrollers from 4 bit to 32 bit, development tools for microcontrollers, Assembler-Compiler- simulator/ Debugger.

UNIT-2 (10 Hrs)

Microcontroller Architecture:
Over view and block diagram of 8051, Architecture of 8051, program counter and memory organization, Data types and directives, PSW registers, register banks, and stack, pin diagram of 8051, port organization, Interrupts and timers.

UNIT-3 (10 Hrs)

Addressing modes, Instruction set of 8051:
Addressing modes and accessing memory using various addressing modes, instruction set: Arithmetic, Logical, Simple bit, jump, loop and call instructions and their usage. Time delay generation and calculation, Timer/ Counter programming.

UNIT-4 (15 Hrs)

Assembly language programming examples: Addition, Multiplication, Subtraction, division, finding from a given set of numbers, arranging given set of numbers in ascending / descending order.

UNIT- 5 (15 Hrs)

Interfacing and application of Microcontroller:
Interfacing of PPI 8255, DAC (0804), Temperature measurement (LM35), interfacing seven segment displays, displaying information on a LCD, control of a stepper motor (Uni – polar), Interfacing a 4 X 3 matrix Keypad, Generation of different types of waveforms using DAC.

TEXT BOOKS:

1. The 8051 Microcontroller and embedded stems using assembly and c - Kennet , J. Ayalam, Dhananjay V.gadre, cengage publications.
2. The 8051 microcontroller and embedded systems By Muhammad Ali Maxzali and Janice Gillispe Mazali – Pearson edition Asis, 4th Reprint 2002.

REFERENCE BOOKS:

1. Microcontrollers Architecture programming, Interfacing and systems design by Ral kamal
2. The 8051 Microcontroller Architecture, programming and applications by Kenneth J.Ajala, West publishing company (St Paul, NewYork, Los angels, SanFrancisco).
3. Microcontroller theory and application by Ajay V.Deshmukh.

OUTCOMES:

- The student can gain good knowledge on microcontroller and implement in practical application.
- Learn interfacing of Microcontroller.
- Get familiar with real time operating system.

ELECTRONICS LAB – VII (A)
Micro controller and interfacing
LIST OF EXPERIMENTRS

1. Addition and subtraction of two 8 bit numbers.
2. Multiplication and division of two 8 bit numbers.
3. BCD operation and reverse and X-OR of given numbers.
4. Subtraction of two 16 bit numbers (Keil software).
5. Program for swapping and compliment of 8- bit numbers (Keil software).
6. Program to find the largest / Smallest number in given array (Keil software).
7. Interfacing LED to 8051 microprocessor (Keil software).
8. Interfacing buzzer to 8051 microcontroller (Keil software).
9. Interfacing Seven segment to 8051 microcontroller (Keil software).

Title: Micro controller and interfacing

Model paper

Section – A

Answer any five of the following **5 X 5 =25**

1. Write about evolution of microcontroller.
2. List and explain some 8051 16 – bit registers.
3. Explain CALL instruction and Stack.
4. Write an ALP program for two 8 bit numbers.
5. Write a short notes on temperature measurement.
6. Write a short notes on microcontroller testing tools.
7. Explain about stack pointer.
8. Draw the pin diagram for DAC.

Section-B

Answer the following **5 X 10 =50**

1. (a) Explain the differences between Microprocessor and microcontroller.

(or)

(b) Draw the pin diagram of 8051 and explain each pin in detail.

2. (a) Explain the Architecture of 8051 and explain each block in detail.

(or)

(b) Explain about port organization of 8051.

3. (a) Explain about different types of Addressing modes.

(or)

(b) Explain about (i) Single bit instruction (ii) loop instruction, (iii) Arithmetic instruction with one example each.

4. (a) Write a ALP program on largest number in an array.

(or)

(b) Write an ALP (i) 8 – bit addition, (ii) Multiplication of 8 bit numbers.

5. (a) Briefly explain the architecture of 8255 (PPI).

(or)

(b) Explain about interfacing of stepper motor to 8051 microcontroller.

B.Sc Electronics CBCS Syllabus
3rd year
VI Semester
Cluster Elective – 1
Paper – VIII (A1) Embedded systems design

Sub: Electronics **Year 2017-18** **Group: B.Sc** **Credits : 3**

Title: EMBEDDED SYSTEMS DESIGN

Objectives:

- Design embedded computer system hardware.
- Design implement and debug multi threaded application software that operates under real time constraints on embedded computer system
- Use and describe the implementation of a real time operating system on an embedded computer system.
- Formulate an embedded computer system design problem including multiple constraints, create a design that satisfies the constraints, implementing the design in hardware and software, and measure performance against the design constraints.
- Create computer software and hardware implementations that operate according to well known standards.
- Organize and write design documents and reports.
- Organize and make technical presentations that describe a design.

UNIT-1 (10 Hrs)

Introduction to Embedded systems:

Embedded systems over view, Design challenges, Processor technology, IC technology, and design technology.

UNIT-2(15Hrs)

Custom single purpose processor – Hardware Development:
Introduction, Combinational logic, Sequential logic, Custom single purpose processor design, RT - level custom single purpose processor.

UNIT-3(15 Hrs)

General purpose processors – Soft ware development:
Introduction, Basic architecture, Operation, Programmer's view, ASIPs and Development environment: host and target machines, Linker/ locators for embedded software, getting embedded software into the target system. Debugging techniques: Testing on your host machine, and instruction set simulators.

UNIT-4 (10 Hrs)

RTWA for Embedded system :

Introduction Timers, Counters and watchdog timers, UART, pulse width modulators, LCD Controllers, Keypad controllers, Stepper motor controllers, Analog to digital converters and real time clocks.

UNIT- 5 (10 Hrs

Advance communication principles:

Parallel communication, Serial communication, Wireless communication, **Serial protocol:** I^2C , CAN, fire wire, and USB. **Parallel protocols**: PCI BUS and ARM BUS. **Wireless protocols:** IrDA, Bluetooth, and IEEE 802.11.

TEXT BOOKS:

1. Embedded systems design – A Unified hardware /Software introduction by Frank Vahid / Tony Givargis Wiely edition.
2. Embedded systems Architecture, programming and design – 2nd Edition by Raj kamal Tata MCGraw hill edition.

Reference books:

1. An Embedded software premier. – David E – Siman, Pearson Education
2. Embedded / real time systems – Dr,K.V.K.K.Prasad, Dreamtech
3. The art of programming Embedded systems, JackG.Ganssle. Academic press
4. Intelligent Embadded System, Louis L.Odette, Adison wesly,1991.

Out comes:

- The student can gain good knowledge on embedded systems and implement in practical applications..
- An ability effectively as a member or leader on a technical team.
- A Commitment to quality, Timelines and continuous improvement.

ELECTRONICS LAB – VIII (A1)

Embedded systems design

Project work

Students has to do a group project work during the third year.

Title: Embedded systems design

Model paper

Section – A

Answer any five of the following **5 X 5 =25**

1. Write about embedded system.
2. Write about combinational logic.
3. Discuss about instruction set simulator.
4. Write about watchdog timers.
5. Write short notes on Bluetooth.
6. Write short notes on ARM bus.
7. Explain about IC technology.
8. Draw the pin diagram for pulse width modulators.

Section-B

Answer the following **5 X 10 =50**

1. (a) List various application areas of embedded systems and give examples for each application area.

(or)

(b) Explain about different technologies used in embedded systems.

2. (a)Explain the design of custom single processor.

(or)

(b) Discuss about RT- level custom single processor.

3. (a) Explain about different debugging techniques.

(or)

(b) Describe the function of Linker/ location for embedded software.

4. (a) Interface ADC 0801 with 8051 to convert - 5 V to + 5 V analog voltage to digital equivalent, Draw hardware and write appropriate program.

(or)

(b) Discuss briefly about Stepper motor controllers.

5. (a) Briefly explain about serial communications.

(or)

(b) Explain the following terms (i) I^2C (ii) CAN.

B.Sc Electronics CBCS Syllabus
3rd year
VI Semester
Cluster Elective – 2
Paper – VIII (A2) Electronic instrumentation

Sub: Electronics **Year 2017-18** **Group: B.Sc** **Credits : 3**

Title: ELECTRONIC INSTRUMENTATION

Objectives

The students will learn :

a) Basic concept of indicating instruments.
b) To study integrating instruments like ammeter and voltmeter.
c) Transducers, Sensors and display devices.
d) To study of PLL , PLC

UNIT-1 (17Hrs)

Measurement and measuring instruments : General block diagram of measurement system – Accuracy, precision, resolution, sensitivity – Type of errors – PMMC galvanometers –DC Ammeter, Voltmeter , series and shunt type Ohm meter – Analog Multimeter.
Electrodynamometer – Thermocouple instrument – Electrostatic voltmeter – Watt hour meter.
Digital Voltmeter system for AC measurement – (Ramp type DVM, Dual type DVM)

UNIT-II (10Hrs)

DC and AC bridges:
Wheat stone bridge – Kelvin's – balanced condition for AC bridges – Maxwell's, Anderson's bridge – Schering's, Desauty's bridge for capacitance measurement – Wein's bridge – Determination of frequency.

UNIT-III. (15Hrs)

Phase locked loops (PLL):
Basic principle of phase locked loops (PLL), PLL components – Phase detectors (XOR & edge triggered), Voltage controlled oscillator (Basic, Varactor), Lock and capture, Basic idea of IC PLLs (IC 565).Filter Amplifier Lock in amplifier, idea of techniques for sum and averaging of signals.

UNIT – IV (10Hrs)

Transducers and Display devices:
Strain gauge – Unbounded Stain gauge – LVDT – Resistance Thermometer – Thermocouple and their characteristics – Photoelectric Transducer – Thermistor, Characteristics and applications – Audio Tape recorder – Seven segment Display – LCD.

UNIT – V (18Hrs)

Direct digital control (DDC) Distribution control system(DCS):
PLC'S Block diagram, hardware, PLC operation, basic logic program (ladder logic), Applications of PLC's.

Text Books

1. Electronic instrumentation and Measurement techniques – W.D.Cooper & A.D.Helfrick, Prentice Hall of India,
2. Electronic Instrumentation and measurement – Kalasi.
3. Introduction to instrumentation and control by A.K.Ghosh.
4. Sensors and transducers PHI 2nd Edition by D.Patranabis.
5. Instrumentation measurement analysis by Nakra and chaudary.

Reference Books:

1. A Course in Electrical and Electronic Measurement and Instrumentation – A.K.Sawhney, Dhanpat Rai and Sons
2. Electronic Instrumentation and Measurements – P.B. Zabar, Mc Graw Hill international.
3. Measurement systems Application and Design – Ernest O. Doebelin 4/e. Tata Mc Graw Hill Publishing Co. Ltd.

Out Comes:

- Design a system, component of process to meet desire needs in electrical engineering.
- Measurement of R,L,C, Voltage, Current, Power factor, Power, energy.
- Ability to balance bridges to find unknown values.
- Ability to use Digital Voltmeter.
- Ability to measure Strain, displacement, velocity, angular velocity, temperature, pressure.

ELECTRONICS LAB VIII (A2)

Electronic instrumentation lab

LIST OF EXPERIMENTRS

1. Design multi range ammeter and voltmeter using galvanometer.
2. Measurement of resistance by Wheatstone bridge and measurement of bridge sensitivity.
3. Measurement of low resistance by Kelvin's double bridge.
4. Measurement of capacitance by desautys bridge.
5. To determine the characteristics of resistance transducer - strain gauge (Measurement of strain gauge using half and full bridges)
6. To determine the characteristics of LVDT.
7. Measurement of temperature by thermocouple and study of transducer like AD590 (two terminal temperature sensor), PT- 100, J- type, K – type.
8. To determine the characteristics of thermistors.
9. To study the characteristics of LDR, Photodiode, Phototransistor.

Title: Electronic instrumentation

Model paper

Section-A

Answer any five of the following. **5X5 = 25M**

1. Define and explain (i) Accuracy,(ii) Precision.
2. What is Ayrton shunt?
3. Phase detector in a PLL system?
4. Explain about thermo couple and characteristics.
5. Explain basic operation of wheat stone bridge.
6. Mention some applications of PLL.
7. Discuss the working of edge triggered phase detector.
8. Draw a thermistor temperature control circuit and briefly explain its working.

Section – B

Answer the following. **5X10 = 50M**

1. (a) Draw the block diagram of measurement system, Explain function of each block. Explain the terms Resolution and sensitivity?

   (or)

   (b)Explain the working of DC ammeter and DC Voltmeter using PMMC?

2. (a) Describe how low resistances are measured using Kelvin's double bridge.

   (or)

   (b) Explain how Inductance is measured using Maxwell's Bridge?

3. (a) Draw the basic diagram and wave forms for PLL system. Identify each component and explain its function?

   (or)

   (b) Sketch the basic block diagram for IC 565 PLL system. Show various external components to be Provided and explain function of each component?

4. (a) What is a Strain gauge. Define gage factor and obtain expression for gage factor in terms of poisson's ratio?

   (or)

   (b)Draw the schematic LVDT with essential components and explain how it measures force in terms of displacement?

5. (a) With the help of neat block diagram of PLC. Explain the function of each unit?

   (or)

   (b) Describe the method of programming PLC , Using ladder diagrams?

B.Sc Electronics CBCS Syllabus
3rd year
VI Semester
Cluster Elective – 3
Paper – VIII (A3) POWER ELECTRONICS

Sub: Electronics **Year 2017-18** **Group: B.Sc** **Credits : 3**

Title: POWER ELECTRONICS

Objectives:

a) To study the working of power semiconductor devices such as power diode, power transistor, TRIAC, MOSFET, IGBT
b) To study different types of rectifiers for single phase and three phase controls.
c) To study the working of inverters, Choppers and their applications in industry.

UNIT- I (15Hrs)

Power Semiconductor Devices:
Power diode, Power transistor, TRIAC, MOSFET and IGBT – turn on methods, driver circuits – SCTR Characteristics – Two transistor analogy – methods of turning ON and turning OFF – Series and parallel connections of SCRs.

UNIT-II (12Hrs)

Phase controlled Converters:
Single phase controlled rectifier – Half wave controlled rectifier with (i) Resistive load (ii) RL load – full wave controlled rectifier and bridge controlled rectifier use of fly wheel diode in those circuits . with above types of loads.

UNIT- III (13Hrs)

Choppers: basic Chopper circuit , types of choppers (Type A – D) Step down chopper, Step up chopper, Operation of DC chopper circuits using self commutation (A & b type commutating circuit), Cathode pulse turn off chopper(Using class- D commutation) , load sensitive cathode pulse turn off chopper ,zones chopper, Morgans chopper.

UNIT- IV (10Hrs)
Inverters:
Need for various commutating circuits, Single phase and three phase inverters – Series and parallel inverters – Bridge inverters – Current source inverters.

UNIT-V (10Hrs)
Control circuits and applications:
Generation of Control pulse – Microprocessor based implementation – Static circuit breakers for DC and AC circuits – Regulated power supply – UPS – SMPS.

Out comes:

Student should be able to

- Explain the characteristics various semiconductor devices and analyze the static and dynamic characteristics of SCR's.
- Design firing circuits for SCR.
- Explain the operation of rectifiers with different loads.
- Analyze the operation different types chopper.

Text Books:

1. Power Electronics – M.H. Rashid, Prentice Hall of India,
2. Power electronics – P.C.Sen, Tata McGraw Hill Publishing Co. Ltd.

Reference Books:

1. Thyristorised Power controllers – G.K.Debye, Wiley Eastern Ltd.
2. An Introduction to Thyristors and Their Applications – M.Ramamoorthy, 2/e, East West Press.

ELECTRONICS LAB **VIII (A3)**

POWER ELECTRONICS

LIST OF EXPERIMENTRS

1. Study of IV Characteristics of TRIAC
2. Study of IV Characteristics of SCR
3. SCR as a Half with R and RL loads
4. SCR full wave rectifier with R and RL loads
5. AC Voltage controller using TRIAC with UJT triggering.
6. Study parallel inverter
7. Study of series inverters
8. VI characteristics MOS FET and IGBT (both)
9. Study of any Chopper circuit

Title: POWER ELECTRONICS

Model paper

Section-A

Answer any five of the following. **5X5 = 25M**

1. Explain V-I characteristics of power diode.
2. Give the basic structure of IGBT and mention its applications?
3. Draw the circuit diagram of SCR Half wave controlled rectifier with resistive load and fly wheel diode? What is the use of fly wheel diode?
4. Draw the basic chopper circuit and explain its working?
5. Describe briefly about Jone's chopper?
6. Sketch the circuit diagram of single phase bridge inverter?
7. Explain the function of static circuit breakers?
8. Discuss the working of transfer type UPS? What are its disadvantages?

Section – B

Answer the following. **5X10 = 50M**

1. (a) Explain the switching characteristics of SCR during Turn – ON and turn – OFF process.

   (or)

   (b) Explain the triggering arrangement for series connection of SCR.

2. (a) Describe the structure, working and V-I characteristics of TRIAC.

   (or)

   (b) Describe the operation of single phase full wave rectifier with inductive load and draw its output wave forms.

3. (a) Explain the principle of Step up operation of chopper with the help of circuit diagram and wave form. Obtain an expression for average output voltage.

   (or)

   (b) Explain the Morgan chopper and draw its voltage and current waveforms.

4. (a) Draw the circuit diagram of single phase series inverter and explain its working with its relevant wave forms of current and voltages.

   (or)

   (b) Explain the working of single phase parallel inverter and sketch load voltage and current wave forms?

5. (a) Discuss the microprocessor based implementation of a process control in general?

   (or)

   (b) With a neat block diagram explain the working of switch mode power supply (SMPS).