DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

SYLLABUS

B.Sc. SECOND YEAR

(THIRD & FOURTH SEMESTER)

[ELECTRONICS (OPTIONAL)]

{Effective from – June- 2010 onwards}

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

B.Sc. Electronics (Optional) Course Structure in Semester System (III AND IV SEMESTER)

B.Sc. Second Year

Semester	Course Code	Paper Number	Title of Paper	Credits	Marks
III	ELE-301	Paper-IX	**Operational Amplifiers**	03	50
	ELE-302	Paper-X (A) OR Paper- X (B)	**8086 Microprocessor OR 8085 Microprocessor – I**	03	50
	ELE-303	Paper-XI	Practicals based on **Paper –IX**	1.5	50
	ELE-304	Paper-XII (A) OR Paper-XII (B)	Practicals based on **Paper –X (A) OR** Practicals based on **Paper –X (B)**	1.5	50
IV	ELE-401	Paper- XIII	**Communication Electronics**	03	50
	ELE-402	Paper-XIV(A) OR Paper-XIV(B)	**Microprocessor Interfacing OR 8085 Microprocessor – II**	03	50
	ELE-403	Paper-XV	Practicals based on **Paper – XIII**	1.5	50
	ELE-404	Paper-XVI (A) OR Paper-XVI (B)	Practicals based on **Paper – XIV (A) OR** Practicals based on **Paper – XIV (B)**	1.5	50

THE COLLEGE HAS TO SELECT EITHER X(A), XII(A), XIV(A) AND XVI(A) OR X(B), XII(B), XIV(B) AND XVI(B) ONLY AS AN ELECTIVE.

Note: For Theory Paper, 1 Credit = 15 Periods;
For Practical Paper, 1 Credit = 30 Periods

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B. SC. THIRD SEMESTER

Subject: ELECTRONICS

Course: ELE-301 Paper – IX

(Effective from June 2010)

Title: OPERATIONAL AMPLIFIERS

Marks: 50 **Periods: 45** **Credits: 03**

1. **Operational Amplifier:** **(15 periods)** [**1.0 credits**]
   Differential amplifier, Dual input balanced output differential amplifier, constant current bias, current mirror, block diagram of typical Op-Amp, schematic symbol, interpreting data sheet, the ideal Op-Amp, equivalent circuit of an Op-Amp, open loop Op-Amp configurations
2. **Operational Amplifier Applications:** **(15 periods)** [**1.0 credits**]
   Voltage series feedback amplifier, Voltage shunt feedback amplifier, DC and AC amplifiers, summing, scaling and averaging amplifiers, voltage to current converter (Low voltage DC voltmeter and low voltage AC voltmeter only) , integrator, differentiator, basic comparator, zero-crossing detector, Schmitt trigger
3. **Oscillators:** **(09 periods)** [**0.6 credits**]
   Oscillator principle, oscillator types, frequency stability, phase shift oscillator, Wien Bridge oscillator, square wave generator, triangular wave generator, saw tooth wave generator, voltage controlled oscillator
4. **The 555 Timer:** **(06 periods)** [**0.4 credits**]
   The 555 as monostable multivibrator, monostable multivibrator applications, The 555 as an astable multivibrator, astable multivibrator applications, Free running ramp generator

Books Recommended:

1. Op-Amps & Linear Integrated Circuits (Second Edition) [Chapters 1 to 4]
   Ramakant Gaikwad, Prentice Hall of India
2. Electronic Fundamaentals and Applications (Fifth edition) [Chapters 1and 2.]
   John D Ryder Prentice Hall of India
3. Linear Integrated Circuits D Roy Choudhry & Shail B Jain
   New Age International Publishing
4. Electronic Devices (Sixth Edition) Floyd
   Pearson Education
5. Op Amps & Linear Integrated Circuits James M Fiore
   Thomson Learning
6. Integrated Circuits
   K R Botkar, Khanna Publishers, New Delhi.

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B. SC. THIRD SEMESTER

Subject: ELECTRONICS

Course: ELE-302 Paper – X (A)

(Effective from June 2010)

Title: 8086 MICROPROCESSOR

Marks: 50 **Periods: 45** **Credits: 03**

1. **The 8086 Microprocessor: (15 periods)** [**1.0 credits**]
   Pin diagram (Signal Description),CPU architecture, general bus operation, I / O processing capability, special processor activities, minimum mode 8086 system and timing, maximum mode 8086 system and timing
2. **The 8086 Microprocessor Instruction set: (15 periods)** [**1.0 credits**]
   Machine language instruction formats, addressing modes of 8086, Data copy / transfer instructions, Arithmetic instructions ,logical instruction, Branch instructions, loop instructions, machine control instructions, Flag manipulation instructions, Shift and rotate instructions, String instructions
3. **Assembly language programming : (15 periods)** [**1.0 credits**]
   A few machine level programs, programming with an assembler, entering a program, assembling a program, linking a program, using debug, assembly language example programs, addition of two numbers, addition of a series of 8 bit numbers, find the largest number from given array of 8 bit numbers, find out odd and even numbers from the given series of hexadecimal numbers, find out positive numbers and negative numbers from a given series of signed numbers, move a string of data from one location to other location, arrange given array of 8 bit numbers in ascending order, arrange given array of 8 bit numbers in descending order, one byte BCD addition, factorial of a 8 bit number , average of block of 8 / 16 bit data.

Books Recommended:

1. Advanced Microprocessors and Peripherals (Second Edition) [Chapters 1 to 3] – A K Ray & K M Bhurchandi Tata McGraw Hill 2009
2. The INTEL Microprocessors 8086 /8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Processor –Barry B. Brey Printice-Hall INDIA
3. Microprocessors – S. K. Gupta Pragati Prakashan Meerut
4. Microprocessors – II –A. P. Godse Technical Publications PUNE

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B. SC. THIRD SEMESTER

Subject: ELECTRONICS

Course: ELE-302 Paper – X (B)

(Effective from June 2010)

Title: 8085 MICROPROCESSOR – I

Marks: 50 **Periods: 45** **Credits: 03**

1. **Microprocessor Architecture and Organisation: (09 periods)** [**0.6 credits**]
   The ideal microprocessor, architecture of microprocessor, organisation of microprocessor, features of Intel 8085, 8085 functional pin description, 8085 CPU architecture
2. **The Configuration: (09 periods)** [**0.6 credits**]
   Demultiplexing $AD_7 - AD_0$, generation of control signals, 8085 clock circuit, basic 8085 microprocessor unit, 8085 instruction fetching and execution operation
3. **8085 Instruction Set : (12 periods)** [**0.8 credits**]
   Instruction formats, addressing modes, op-code format, classification of instruction set, instruction set
4. **8085 Programming: (15 periods)** [**1.0 credits**]
   Programming technique, simple programs, concept of looping,

Books Recommended:

1. 8 - bit Microprocessors System Design – V J Vibhte & P B Borole
   [Chapters 1 to 4] Technova Publications, PUNE
2. Microprocessor Architecture, Programming, and Applications with the **8085**
   (5th Edition) –Ramesh S. Gaonkar Penram International Publishing.
3. Microprocessors –I –A. P. Godse Technical Publications PUNE

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B. SC. THIRD SEMESTER

Subject: ELECTRONICS

Course: ELE-303 **Paper – XI** (Practical) [**1.5 credits**]

(Effective from June 2010)

Every candidate appearing for examination must produce journal showing that he/she has completed 07 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

Experiments **(Marks 50)**

1. Study of Op – Amp as a non inverting amplifier.
2. Study of Op – Amp as an inverting amplifier.
3. Study of Op – Amp as an inverting adder.
4. Study of Op – Amp as an inverting subtractor.
5. Study of Op – Amp as an integrator.
6. Study of Op – Amp as a differentiator.
7. Study of Op – Amp as a Schmitt trigger.
8. Study of Op – Amp as an analog computer to solve simple equation.
9. Study of Op – Amp as Low voltage DC voltmeter
10. Built and study Wien Bridge oscillator using Op – Amp.
11. Built and study phase shift oscillator using Op – Amp.

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B. SC. THIRD SEMESTER

Subject: ELECTRONICS

Course: ELE-304 **Paper – XII [A]** [**1.5 credits**]

(Practicals based on 8086)

(Effective from June 2010)

Every candidate appearing for examination must produce journal showing that he/she has completed 07 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

Experiments **(Marks 50)**

1. Assembly language program to find sum of 8 bit numbers.
2. Assembly language program to find sum of 8 bit numbers in a given array.
3. Assembly language program to find out positive numbers and negative numbers from a given series of signed numbers.
4. Assembly language program to find average of block of data containing N numbers.
5. Assembly language program to determine whether the number is even or odd. If the number is odd, copy 00 to ML ------- otherwise copy EE.
6. Assembly language program to move a string of data from one location to other location.
7. Assembly language program to find a factorial of 8 bit number.
8. Assembly language program to find square root of a 16 bit number.
9. Assembly language program to perform one byte BCD addition.
10. Assembly language program to arrange given array of 8 bit elements in ascending order.
11. Assembly language program to arrange given array of 16 bit elements in descending order.
12. Assembly language program to add two multi-byte numbers and store the result as a third number.

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B. SC. FOURTH SEMESTER

Subject: ELECTRONICS

Course: ELE-304 Paper – XII [B] [1.5 credits]

(Practicals based on 8085)

(Effective from June 2010)

Every candidate appearing for examination must produce journal showing that he/she has completed 07 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

Experiments (Marks 50)

1. Assembly language program to find sum of two 8 bit numbers.
2. Assembly language program to find sum of 8 bit numbers in a given array.
3. Assembly language program to find difference of two given numbers.
4. Assembly language program to find largest number in a block of data containing N numbers.
5. Assembly language program to find smallest number in a block of data containing N numbers.
6. Assembly language program to move a block of data from one location to other location.
7. Assembly language program to find a factorial of 8 bit number.
8. Assembly language program to find sum of two 16 bit numbers.
9. Assembly language program to perform one byte BCD addition.
10. Assembly language program to multiply two single byte numbers.

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B. SC. FOURTH SEMESTER
Subject : ELECTRONICS

Course: ELE-401 **Paper - XIII**

(Effective from June 2010)

Title: COMMUNICATION ELECTRONICS

Marks: 50 **Periods: 45** **Credits: 03**

1. Types of Modulation: **(15 periods)** [**1.0 credits**]
Amplitude modulation, expression for amplitude modulated voltage, waveforms of amplitude modulated voltage, sidebands produced in amplitude modulated wave, Frequency modulation, expression for frequency modulated voltage, waveforms of frequency modulated voltage, sidebands produced in frequency modulated wave, Phase modulation, comparison of frequency modulated and phase modulated expressions

2. Pulse Modulation: **(06 periods)** [**0.4 credits**]
Pulse amplitude modulation, pulse code modulation, pulse frequency modulation, pulse position modulation, pulse width modulation

3. Modulation and Detection: **(12 periods)** [**0.8 credits**]
Amplitude modulation theory, Square Law modulation, class C linear diode detector, varactor diode frequency modulator, Armstrong modulator, phase discriminator, AM transmitter, Superheterodyne receiver

4. Digital Communication: **(12 periods)** [**0.8credits**]
Synchronization, Asynchronous transmission, Probability of error in base-band transmission, Matched filter, Bit timing recovery, Digital carrier system, amplitude shift keying, frequency shift keying, phase shift keying, differential phase shift keying

Books Recommended:

1) Electronics and Radio Engineering – M L Gupta (Chapters 1, 2 and 3) Dhanpat Rai & Sons
2) Electronic Communications [IV Edition] –Dennis Roddy & J Coolen, (Chapters 2, and 4) PHI Private Ltd. New Delhi
3) Advanced Electronic Communication Systems –Wayne Tomasi, PHI publication 2001.
4) Introduction to Telecommunication –A A Gokhale, Thomson Learning

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B. SC. FOURTH SEMESTER

Subject: ELECTRONICS

Course: ELE – 402 Paper – XIV(A)

(Effective from June 2010)

Title: MICROPROCESSOR INTERFACING

Marks: 50 Periods: 45 Credits: 03

1. **Interfacing of memory and I/O (09 Periods)** [**0.6 credits**]
   Semiconductor memory interfacing, static RAM interfacing, dynamic RAM interfacing, interfacing I/O ports

2. **Programmable Input – Output 8255: (12 Periods)** [**0.8 credits**]
   PIO 8255 pin diagram and architecture, modes of operation of 8255, Interfacing ADC, interfacing of DAC, stepper motor interfacing

3. **Communication Interface: (12 Periods)** [**0.8 credits**]
   Methods of data communication, architecture and signal description, operating modes, interfacing and programming of 8251

4. **Programmable Interval Timer: (12 Periods)** [**0.8 credits**]
   Pin diagram and architecture, control word, operating modes, programming and interfacing 8253.

Books Recommended:

1. Advanced Microprocessors and Peripherals (Second Edition) [chapters 1to 4] – A K Ray & K M Bhurchandi Tata McGraw Hill 2009

2. The INTEL Microprocessors 8086 /8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Processor –Barry B. Brey Printice-Hall INDIA

3. Microprocessors – S. K. Gupta Pragati Prakashan Meerut

4. Microprocessors – II –A. P. Godse Technical Publications Pune

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B. SC. FOURTH SEMESTER

Subject: ELECTRONICS

Course: ELE-402 Paper – XIV (B)

(Effective from June 2010)

Title: 8085 MICROPROCESSOR – II

Marks: 50 **Periods: 45** **Credits: 03**

1. **Instruction Timing and Operations:** **(12 periods)** [**0.8 credits**]
   Introduction to machine cycle, machine cycles, timing diagram, 8085 wait, hold and halt states, 8085 transition state diagram

2. **Stack and Subroutine:** **(15 periods)** [**1.0 credits**]
   Stack, use of stack for programmer, advanced stack related instructions, use of stack by microprocessor subroutines, Call address and RET instructions, parameter passing techniques, subroutine documentation, conditional call and return instructions

3. **I / O Data Transfer Techniques:** **(09 periods)** [**0.6 credits**]
   Microprocessor controlled transfer, hand shake I / O data transfer techniques

4. **8085 Interrupts :** **(09 periods)** [**0.6credits**]
   Interrupt system, types of interrupts, 8085 interrupt structure, interrupt logic control instructions, priority interrupt structures

Books Recommended:

1. 8 - bit Microprocessors System Design – V J Vibhte & P B Borole
   [Chapters 1 to 4] Technova Publications, PUNE

2. Microprocessor Architecture, Programming, and Applications with the **8085**
   (5th Edition) –Ramesh S. Gaonkar Penram International Publishing

3. Microprocessors –I –A. P. Godse Technical Publications PUNE

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B. SC. FOURTH SEMESTER
Subject: ELECTRONICS

Course: ELE-403 **Paper –XV** (Practical) [**1.5 credits**]

(Effective from June 2010)

Every candidate appearing for examination must produce journal showing that he/she has completed 04 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

VII – A: Experiments (Marks 30)

1. Built and study astable multivibrator using IC 555.
2. Built and study monostable multivibrator using IC 555.
3. Built and study free running ramp generator.
4. Study of amplitude modulation using transistor.
5. Study of AM detector using diode.
6. Study of F M modulation using IC.
7. Study of F M detector using IC.
8. Study of Balance modulator.

VII – B: Project (Marks 20)

Every student should construct one project based on the syllabus of Third and Fourth Semester. He/she should submit the project and project report thereon at the time of practical examination. The project report must be certified at the end of the semester by The Head of the Department.

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B. SC. FOURTH SEMESTER
Subject: ELECTRONICS

Course: ELE-404 **Paper – XVI [A]** [**1.5 credits**]

(Practicals using 8086)

(Effective from June 2010)

Every candidate appearing for examination must produce journal showing that he/she has completed 04 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

VIII – A: Experiments (Marks 30)

1. Interface 8 LED and 8 switches & write ALP to display status of switch using 8255.
2. Write a program for 8 bit binary UP counter and implement it using 8255.
3. Write a program for 8 bit binary DOWN counter and implement it using 8255.
4. Write a program to acquire 8 – bit data from an ADC and implement it using 8255.
5. Interface Hex Key board and seven segment display to display key pressed on seven segment display.
6. Write ALP to generate triangular waveform of frequency 500 HZ using DAC 0800 with 8255 & 8086 microprocessor.
7. Design stepper motor controller and write an ALP to rotate shaft of stepper motor in clockwise direction (5 rotations) & anticlockwise direction (5 rotations).
8. Study of modes ‘0’of 8253.
9. Study of modes ‘1’of 8253.
10. Study of modes ‘2’of 8253.

VIII – B: Project (Marks 20)

Every student should construct one project based on the syllabus of Third and Fourth Semester. He/she should submit the project and project report thereon at the time of practical examination. The project report must be certified at the end of the semester by The Head of the Department.

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B. SC. FOURTH SEMESTER
Subject: ELECTRONICS

Course: ELE-404 Paper – XVI [B] [1.5 credits]

(Practicals based on 8085)

(Effective from June 2010)

Every candidate appearing for examination must produce journal showing that he/she has completed 04 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

VIII – A: Experiments (Marks 30)

1. Assembly language program to add first ten even hexadecimal numbers and store the result in D register.
2. Assembly language program to find square of a single digit number.
3. Assembly language program to move a block of data from one location to other location in reverse order.
4. Assembly language program to find positive numbers in an array of ten elements. Store the result at -----.
5. Assembly language program to add two multi byte hex numbers. Each number consists of four bytes.
6. Assembly language program to divide a number by another number. Store the result in one register and remainder in another register.
7. Assembly language program to find first two highest numbers from a given array of 16 numbers.
8. Assembly language program to arrange given array of 8 bit elements in ascending order.
9. Assembly language program to arrange given array of 16 bit elements in descending order.

VIII – B: Project (Marks 20)

Every student should construct one project based on the syllabus of third and Fourth Semester. He/she should submit the project and project report thereon at the time of practical examination. The project report must be certified at the end of the semester by The Head of the Department.