

CIRCULAR:-

UNIVERSITY OF MUMBAI
No.UG./ 201 of 2006

The Principals of the affiliated colleges in Science are hereby informed that the recommendation made by the Board of Studies in Physics at its meeting held on 31st March, 2006 has been accepted by the Academic Council at its meeting held on 12th May, 2006 vide item No.4.53 and that in accordance therewith, the following Add-on-courses have been instituted by the University as per Appendix and that the same will be brought into force with effect from the academic year 2006-2007:-

Add-on Courses- Certificate Courses in :-

- (i) Computer Network and Optical Fibre
- (ii) Microprocessor and Microcontrollers
- (iii) Laboratory Maintenance
- (iv) Semiconductor Science and Technology
- (v) Medical Electronics

MUMBAI-400 032

19th June, 2006

A.C.4.53/12.05.2006

Accepted 19/6/06
for REGISTRAR

To,

The Principals affiliated colleges in Science .

No.UG/ 201 -A of 2006,

MUMBAI-400 032

19th June, 2006

Copy forwarded with compliments for information to :-

1. The Dean, Faculty of Science,
2. The Chairman, Board of Studies in Physics.

Accepted 19/6/06
for REGISTRAR

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Personal Assistants to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Officer on Special Duty-cum- Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanaigari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Director, Institute of Distance Education, (10 copies) the Director University Computer Center (IDE Building), Vidyanaigari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO) . the Assistant Registrar, Academic Authorities Unit (2 copies) and the Assistant Registrar, Executive Authorities Unit (2 copies) . They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above

UNIVERSITY OF MUMBAI



Add-On-Courses

Certificate Courses in

- i) Computer Network and Optical Fibre
- ii) Microprocessor & Microcontrollers
- iii) Laboratory Maintenance
- iv) Semiconductor Science and Technology
- ~~v) Nano Science and Nano Technology~~
- vi) Medical Electronics

(with effect from the academic year 2006-2007)

UNIVERSITY OF MUMBAI

Certificate Course in Computer Network and Optical fiber

Objectives:

- To provide add on value course for the students doing Bachelor of Science in Mumbai University.
- At the end of this certificate course, the student should be familiar with computer network maintenance and optical fiber network maintenance and repairs.
- This course will enable the student to further take up the job based on network maintenance and support.

Eligibility Criterion:

(For admission to Certificate Course in Computer Network and Optical fiber Network Maintenance and support)

A candidate for being eligible for this course should have passed HSC examination of Maharashtra state or an equivalent examination.

Admission merit list will be on the aggregate total of HSC examination.

Duration of the course 1 year part time:

- 120 theory lectures of one hour each.
- 120 Practical hours.

Teaching Program and syllabus

Appendix – I

: Scheme of Examination:

The scheme of examination will be Internal (40%) and External (60%) to be conducted during each semester based on the Credit Based Semester System.

- Each letter grade has a grade point associated with it as follows:

% Marks	Letter Grade	Grade point
85% and above	O	7
70% - < 85%	A+	6
60% - < 70%	A	5
55% - < 60%	B+	4
50% - < 55%	B	3
40% - < 50%	C	2
< 40%	F	0

: Standard of Passing:

- A candidate has to secure a minimum C grade (Internal & External) in the course taken to pass in that course.
- A candidate who has not secured a minimum C grade in a course shall be declared to have failed in that course.
- A student failed in any course can repeat End- semester examinations for a maximum of three times (excluding the first appearance) along with the subsequent End semester examinations.
- The Internal Marks obtained by the student will be carried over for declaring the result.
- A student is considered to have completed a course successfully and earned the prescribed credits if he/she secures a letter grade other than F.
- A letter grade F in any course implies a failure in that course.
- A course successfully completed can be repeated for the purpose of improvement.

Teaching faculty will be drawn from the department /institution running the course. In addition some faculty from industry may be invited.

The examination will be conducted by the respective college/Institution where the course is being offered.

Fee Structure:

The candidate has to pay a total fee of Rs. 4000/- for the full course in Computer Network and Optical fiber network maintenance and support.

CERTIFICATE COURSE IN
COMPUTER NETWORKING AND OPTICAL FIBRE

THEORY:

COMPUTER NETWORKING:

History of Network Developments, Network Hardware, Network Software. Mode of transmission: - Asynchronous and Synchronous Transmission. Half and Full duplex Transmission, Concept of DTE and DCE. Concept of Interfacing DTE and DCE. OSI Reference Model (7 Layers):- Functions of each OSI Model Layer. The Physical Layer: - Transmission media, Introduction to various Connections used in Network: - RJ 45, RS - 232, etc. The Data Link Layer: - Stop – and – Wait Flow Control, Sliding – Window Flow Control, Error Detection, Cyclic Redundancy Check, Stop – and – Wait ARQ. Selective – Reject ARQ, High- level Data Link Control (HDLC) and its Operation, X.25 Protocol, Token bus and Token Ring. Switching Concepts: Circuit Switching, Packet Switching. The Network Layers. Routing. Routing Strategies: - Alternate Routing. Adaptive Routing. Fixed Routing. Flooding. Congestion Control. The IP Protocol: - IP Addressing. Subnets. Internet Control Protocols. The TCP Protocol. Introduction to Equipments used in Networking: - Bridges, Hubs, Switches, and Routers. Concepts of Network Security: - Encryption, Public Key, Digital Signature.

OPTICAL FIBRE:

Introduction, Advantages of Optical Fibre communication, Types of Optical Fibres, Numerical aperture of Optical Fibre. Fibre bundles & cables. Fibre: bending, Drawing process, Coating, Packaging. Splicing & Joining of Fibres. Coupling components of Optical Fibres (Couplers, Connectors, Splices), Switches, Transmitters, Receivers, Repeaters.

Fibre Optic applications:-Telecommunication/Telephone. Fundamental limits of Optical communication.

PRACTICALS:

- 1) Crimping of wire
- 2) Interconnecting two computers
- 3) Studying networking commands
- 4) Sharing Files and Folders
- 5) Sharing Printers in the network.
- 6) Classification Of IP address.
- 7) Numerical aperture of Optical fiber.
- 8) Case Study: Learn the Network design implemented in the Institute's Laboratory and prepare a 15 – 20 pages report, with Network Diagram, and considerations for expansion of Network.

UNIVERSITY OF MUMBAI

Certificate Course in Microprocessor & Microcontrollers

Objectives:

- To provide add on value course for the students doing Bachelor of Science in Mumbai University.
- At the end of this certificate course, the student should be able to write programs for the microprocessor 8085 and microcontroller 8051 and also be familiar with the interfacing techniques.
- This course will enable the student to further take up the study of embedded systems.

(For admission to Certificate Course in Microprocessor & Microcontrollers).

A candidate for being eligible for this course should have passed HSC examination of Maharashtra state or an equivalent examination.

Admission merit list will be on the aggregate total of HSC examination.

Duration of the course 1 year part time:

- 120 theory lectures of one hour each.
- 120 Practical hours.

Teaching Program and syllabus:

Appendix – I

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- A student is considered to have completed a course successfully and earned the prescribed credits if he/she secures a letter grade other than F.
- A letter grade F in any course implies a failure in that course.
- A course successfully completed can be repeated for the purpose of improvement.

Teaching faculty will be drawn from the department /institution running the course. In addition some faculty from industry may be invited.

The examination will be conducted by the respective college/Institution where the course is being offered.

Fee Structure:

The candidate has to pay a fee of Rs. 4000/- for the full course in Microprocessor and Microcontrollers.

APPENDIX-I

Certificate Course in Microprocessors & Microcontrollers

Paper – I Digital Electronics

Analog versus digital circuits, Combinational and Sequential digital circuits, Combinational Circuits: Logic gates – AND, OR, NOT, NAND, NOR, EX-OR, De Morgan's Theorems, Identities, Half Adder and Full Adder.

Sequential digital circuits: Flip flops, RS, JK, Toggle, RST, D flip flop, JK flip flop, Master – slave, Asynchronous counters, shift registers, Concept of tri-state, tri-state bidirectional buffer, 8 – bit latch, Concept of a Bus, Multiplexer, De-multiplexer, Encoder, Decoder.

Paper – II Microprocessor 8085

Concept of a microprocessor, INTEL 8085, Pin functions, Internal block diagram, Data bus, address bus, de-multiplexing the lower byte of address bus and data bus using 8 – bit latch, 8085 register set, Flag registers, 8085 interrupts, 8085 addressing modes.

8085 Instructions – Data transfer group, Arithmetic and logic group, Jump instructions, Compare, rotate, CALL and RET instructions, other miscellaneous instructions.

Interfacing 8085 with the real world, Peripheral chips, 8255 PPI, 8253 programmable interrupt timer, 8155 timer with scratch pad RAM, DAC and ADC interface.

Paper – III

Microcontroller 8051

Architecture, Internal and external memory, Registers, I/O ports, Bit addressing and byte addressing, Relative addressing, Set/Clear individual pins on the port, configuring the port as input or output port. Simple programs.

Practicals:

Paper – I

1. Study of AND, OR, NOT, NAND, NOR and EX-OR gates.
2. Verification of De Morgan's theorems
3. Study of Half adder and Full adder
4. Study of Adder-Subtractor
5. Study of 7490 and 7493 counters
6. Study of shift register (only serial in parallel out)
7. Study of Multiplexer and De-multiplexer
8. Study of Decoder

Paper – II

8085 Programs:

1. Addition (with carry) and subtraction with borrow of two 8 – bit numbers.
2. To find largest and smallest of three numbers.
3. Block transfer of data
4. BCD Addition
5. Generating a delay
6. Rolling display
7. To read 8 –switches and store the value
8. To drive 8 – LEDs, running LEDs, Binary counter, flashing LEDs
9. To drive a seven segment LED display
10. To drive a relay

Paper – III

8051 Programs

1. Addition of two 8 – bit numbers
2. To display a message
3. Generation of a delay loop
4. Interface with switches and LEDs
5. To drive a relay and a solenoid
6. DAC Interface and Waveform generation

Paper Total 24 practicals.

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UNIVERSITY OF MUMBAI
Certificate Course in Laboratory Maintenance

Objectives:

- To provide add on value course for the students doing Bachelor of Science in Mumbai University.
- At the end of this certificate course, the student should be able to Maintain and carry out minor repairs of common laboratory equipments.
- This course will enable the student to undertake the maintenance and repair jobs.

(For admission to Certificate Course in Laboratory Maintenance.)

A candidate for being eligible for this course should have passed HSC examination of Maharashtra state or an equivalent examination.
Admission merit list will be on the aggregate total of HSC examination.

Duration of the course 1 year part time:

- 120 theory lectures of one hour each.
- 120 Practical hours.

Teaching Program and syllabus: Appendix – I

: Scheme of Examination:

The scheme of examination will be Internal (40%) and External (60%) to be conducted during each semester based on the Credit Based Semester System.

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55% - < 60%	B+	4
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- A student failed in any course can repeat End- semester examinations for a maximum of three times (excluding the first appearance) along with the subsequent End semester examinations.
- The Internal Marks obtained by the student will be carried over for declaring the result.
- A student is considered to have completed a course successfully and earned the prescribed credits if he/she secures a letter grade other than F.
- A letter grade F in any course implies a failure in that course.
- A course successfully completed can be repeated for the purpose of improvement.

Teaching faculty will be drawn from the department /institution running the course. In addition some faculty from industry may be invited.

The examination will be conducted by the respective college/Institution where the course is being offered.

Fee Structure:

The candidate has to pay a fee of Rs. 3500/- for the full course in Microprocessor and Microcontrollers.

The break up of fees is as follows:

Admission Fee	: Rs. 100/-
Tuition Fee	: Rs. 1000/-
Library Fee	: Rs.100/-
Laboratory Fee	: Rs. 2000/-
Examination Fee	: Rs.300/-

Total	Rs.3500/-
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Appendix-I
Syllabus

Unit I : Indicators Display Devices & Transducers
Basic meter movement, moving Iron type instrument Display Device. Printers.
Classification and types of printers.

Ammeters, voltmeters, multimeters, AC-DC, Analog and Digital. Construction and working principle, Transducers. Thermocouple, Thermistor, Resistance thermometers, load cell, photoelectric transducers, piezoelectric transducers.

Unit II : Instrumentation System
Generalized instrumentation system and its characteristics. Working principle of the following laboratory instruments:

- 1) Signal Generator / Function Generator
- 2) Power Supply Unit
- 3) C.R.O.
- 4) Ph. Meter
- 5) Potentiometers
- 6) Colon meters
- 7) Telescope, Microscope and eye pieces
- 8) Different types of light sources
- 9) Spectrometers
- 10) Ballistic Galvanometers

Unit III : Basic Electricity- Electronics
A.C. supply, Rectification. Transformer –types and working principle.
Regulated power supply commonly used in Instruments Amplifiers Basic concepts.

Unit IV : General Analysis of fault finding and trouble shooting.
Component testing, different components printed circuit board.

Practical Component :

Practical shared involve testing of different components. experiments with kits.

Certificate Course in Semiconductor Science and Technology

Objectives:

- To provide add on value course for the students doing Bachelor of Science in Mumbai University.
- At the end of this certificate course, the student should be familiar with the basic aspects of semiconductor technology.
- This course will familiarize the student with the emerging field of semiconductor technology so as to enable the student to decide on the further career in the field.

(For admission to Certificate Course in Semiconductor science and technology.)

A candidate for being eligible for this course should have passed HSC examination of Maharashtra state or an equivalent examination.

Admission merit list will be on the aggregate total of HSC examination.

Duration of the course 1 year part time:

- 120 theory lectures of one hour each.
- 120 Practical hours.

Teaching Program and syllabus:

Appendix – I

: Scheme of Examination:

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- A letter grade F in any course implies a failure in that course.
- A course successfully completed can be repeated for the purpose of improvement.

Teaching faculty will be drawn from the department /institution running the course. In addition some faculty from industry may be invited.

The examination will be conducted by the respective college/Institution where the course is being offered.

Fee Structure:

The candidate has to pay a total fee of Rs. 4000/- for the full course in semiconductor technology.

APPENDIX-I
UNIVERSITY OF MUMBAI
Syllabus for Certificate Course on
SEMICONDUCTOR SCIENCE AND TECHNOLOGY

Paper I SEMICONDUCTOR SCIENCE

- The Atomic- Bond Model
 - Crystal lattices
 - Current Carriers
 - Doping of semiconductor
 - (SD Chapter 1)

- Energy Band Model
 - Electron as wave
 - Energy Levels in Atom and Energy Bands
 - Electron and Hole as Particle
 - Population of electron states
 - (SD Chapter 2)

- Drift and Diffusion
 - Energy bands with applied electric field
 - Carrier Mobility
 - Diffusion current equation
 - Basic continuity equation
 - (SD Chapter 3,4)

- Fundamental Devices Structure
 - P-N Junction Principles
 - DC Mode

Capacitance in P-n Junction
BJT Principles
Current -Voltage Characteristics
(SD Chapter 6)

- Metal- Semiconductor Contact and MOSFET Structures
Metal- Semiconductor Contact
MOS Capacitor
MOSFET Principle and characteristics
Nanoscale MOSFETs
MOS based Memory Devices.
(SD Chapter 7,8)

Reference: SD: Principle of Semiconductor Devices – Sima Dimitrijevic

Paper II: SEMICONDUCTOR TECHNOLOGY

- Integrated Devices Technology and Electronic
A Diode in IC Technology
MOSFET Technologies
Bipolar IC Technology
(SD Chapter 10)
- Devices Electronics and Equivalent Circuit
Diodes
MOSFET
BJT
(SD Chapter 11)
- Photonic Devices
Light Emitting Diode

photodetectors and Solar cell

Lasers

(SD Chapter 112)

- Microwave FET and Diodes

GaAs Versus Si

JFET

ME3FET

HEMET

Negative Resistance Diodes

(SD Chapter 13)

- Power Devices

Power Diodes

Power MOSFET

IGBT

Thyristor

(SD Chapter 14)

Reference: SD: Principle of Semiconductor Devices – Sima Dimitrijević

Note: The approach can be described as a significant emphasis on explanation by words and figures. Related to mathematical equation, the main role of the word is not to guide the mathematical derivations; it is to explain the meaning and the role of different types of equations.

Practical component will be based on theory learnt. It will include visits to institution with device fabrication facility.

Certificate Course in Medical Electronics

COURSE OBJECTIVES

1. To provide add on value course for the students doing Bachelor of Science in Mumbai University.
2. Understand the generation and source of Bioelectric & Biophysical signals
3. Recognize the techniques that are used for recording and measuring bioelectric and Biophysical signals
4. Appreciate the procedures used for imaging the Human body
5. Understand the technology that is used in Diagnostic Medical Electronics Instruments Equipment

(for admission to Certificate Course in Medical Electronics.)

A candidate for being eligible for this course should have passed HSC examination of Maharashtra state or an equivalent examination.
Admission merit list will be on the aggregate total of HSC examination.

Duration of the course 1 year part time:

- 120 theory lectures of one hour each.
- 120 Practical hours.

Teaching Program and syllabus:

Appendix – I

: Scheme of Examination:

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55% - < 60%	B+	4
50% - < 55%	B	3
40% - < 50%	C	2
< 40%	F	0

3

APPENDIX-I
Certificate Program
Medical Electronics
(Phase-I, Diagnostic Instruments)

About the Program :

The medical electronics technology is changing so rapidly, that every day something new is discovered or developed for benefit of mankind. Today, we are witnessing an increased use of electronics devices in the medical field. The major factor behind the rapid progress in health care has been the development of microelectronics, micro-controllers, digital signal processing, electrodes, transducers, data processing techniques, etc. The present trend in medical electronics technology worldwide is towards developing highly sophisticated and reliable equipment.

Therefore the program "Medical Electronics – Diagnostic Instruments" has been prepared considering this present trend. The program deals with diagnostic medical electronics instruments. It covers the Anatomy and Physiology, Biological signals & waveforms. Diagnostic technique. Electrodes & Transducers and the Instrumentation associated with the instrument.

The major topics that are covered in the program are:

- Human Biology
- Basic Electronics
- Testing and Measuring Instruments
- Generation and Recording of Bioelectric Potentials
- Physical Measurements
- Recording Instrumentation
- Measuring Instrumentation
- X-Rays
- Advanced Imaging Systems
- Patient Safety

Duration: 1 Year (30 Weeks, 120 Hours, 4 Hours/Week))

Theory: 60 Hours (2 Hours/Week); Practical: 60 Hours (2 Hours/Week)

Contents

Topic	Hours
Human Biology	08
1.1 The Life and Human Cell	
1.2 The Blood	
1.3 The Cardiovascular System	
1.4 The Respiratory System	
1.5 The Digestive System	
1.6 The Urinary System	
1.7 The Reproductive System	
1.8 The Skeletal and Skin System	
1.9 The Nervous System	
1.10 The Special Senses	

2.	Basic Electronics	14
2.1	Electronics Devices and Components	
2.2	Oscillators and Multivibrators	
2.3	Transistor Amplifiers, Operational Amplifiers	
2.4	Power Supplies, Voltage Regulators, SMPS	
2.5	Integrated Circuits: IC741, IC555, etc.	
2.6	Digital Electronics	
3.	Testing and Measuring Instruments	04
3.1	Voltmeter, Ammeter, Multimeter, Insulation Tester	
3.2	Signal Generator, Function generator	
3.3	Cathode Ray Oscilloscope	
4	Generation and Recording of Bioelectric Potentials	04
4.1	The Cell as a Bioelectric Generator	
4.2	Electrocardiography (ECG)	
4.3	Electroencephalography (EEG)	
4.4	Electromyography (EMG) and Evoked Potentials (EP)	
6.	Physical Measurements	02
5.1	Blood Pressure and Flow	
5.1	Blood Oxygen Saturation	
5.2	Heart Rate and Heart Sounds	
5.3	Respiration and Temperature	
5.4	Ear and Skin Responses	
6	Recording Instrumentation	10
6.1	Electrodes	
6.2	Basic Instrumentation	
6.3	Electrocardiograph	
6.4	Electroencephalograph	
6.5	Electromyograph	
6.6	Phonocardiograph	
7	Measuring Instrumentation	06
7.1	Transducers	
7.2	Blood Pressure, Blood Flow and Pulse Oximeters	
7.3	Heart Rate, Respiration Rate and Temperature Meters	
7.4	Fetal Monitor	
7.5	Audio Meter and Hearing Aid	
8	X-Rays	04
8.1	X-Ray Physics	
8.2	Fluoroscopy and Radiography	
8.3	X-Ray Tubes	
8.4	X-Ray Equipment	