

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

Year of Est. 23rd August, 1958

Re-accredited with Grade 'A'

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UNIVERSITY CAMPUS,
AURANGABAD-431 004
Maharashtra
INDIA.

Ref.No.SU/CBCGS/2016/199-243

Date:- 07-05-2016.

To,
All the Heads of Departments,
University Campus & Sub Campus,
Dr. Babasaheb Ambedkar
Marathwada University.

Subject:- **To revise the curriculum of Choice Based Credit & Grading System run in University Departments.**

Sir/Madam,

I am directed by the Hon'ble Vice-Chancellor to inform you that to revise the curriculum of Post Graduate Courses run in your Department under Choice Based Credit and Grading System as per the weightage mentioned against the courses as follows :-

A]	i] Core Course	} weightage to be given 75%	} 100%
	ii] Elective Course		
	iii] Foundation Course		
B]	Research components	} weightage to be given 25%	}
C]	Constitution of India - Additional 02 Credits		

However, I am forwarding herewith the directives of the University, Guidelines of U.G.C. and Circular of C.B.C. & G.S. are enclosed herewith as per Appendixes- "A", "B" & "C" for your ready reference.

You are, therefore, requested to revise the curriculum through Departmental Committee as per the points mentioned above and submit the same to the university authorities for approval in Soft and Hard Copy up-to 25-05-2016 to the Syllabus Section of the University. So that it will be implement to the University Departments including Sub-Centre from the academic year 2016-17.

DIRECTOR,
Board of College and
University Development.

Appendix-"A"**Guidelines for updation the curriculum:**

- [1] **Courses :**
- i. Usually referred to, as 'papers' is a component of a programme.
 - ii. All courses need not carry the same weight.
 - iii. The Courses should define learning objectives and learning outcomes.
- [2] **A course may be designed to comprise :**
- | | |
|--|---------------------------------|
| i. Lectures | ii. Tutorials |
| iii. Laboratory work | iv. Seminars |
| v. Assignments | vi. Project Work / Dissertation |
| vii. Term Papers | viii. Presentations |
| ix. Vocational Training | x. Filed work |
| x. Vocational Training | xii. Outreach Activities |
| xiii. Self-study etc. or a combination of some of these. | |
- [3] **Type of Courses :**
- | | | |
|--------------------------|---|-----|
| i] Core Course : | } | 75% |
| ii] Elective Course : | | |
| iii] Foundation Course : | | |
- [4] **To give more weightage on research components :**
- | | | |
|---|---|-----|
| [i] Research Methodology - | } | 25% |
| [ii] Research Projects Review writing | | |
| [iii] Project/Dissertation Part-I | | |
| [iv] Seminar/Project Dissertation Part-II | | |
- [5] **Fairness in Assessment**
- i. In case of at least 50% of core courses offered in different programmes across the disciplines, the assessment of the theoretical component towards the end of the semester should be undertaken by external examiners from outside the university conducting examination, who may be appointed by the competent authority. In such courses, the question papers will be set as well as assessed by external examiners.
 - ii. In case of the assessment of practical component of such core courses, the team of examiners should be constituted on 50-50% basis. i.e. half of the examiners in the team should be invited from outside the university conducting examination.
 - iii. In case of the assessment of project reports / thesis/ dissertation etc. the work should be undertaken by internal as well as external examiners.
- [6] While designing the curricula it is essential to give the details of all Course Structure, Pattern of Examination, Pattern of Question Paper, Method of Evaluation and to give the latest references, monograph, Website references etc. These instructions should be follows strictly.
- [7] The Compulsory course of "Constitution of India" for 02 Credits should be applied to the students of Semester-I for all Post Graduate Courses run in University Departments and Sub-Centre at Osmanabad from the Academic Year 2016-2017 & onwards. The said curricula will be circulated separately

UGC
HUMAN
RESOURCE
DEVELOPMENT
CENTRE



SAVITRIBAI
PHULE
PUNE
UNIVERSITY



This is to Certify that

*Dr. Garhade Bhagwan Namdevrao,
Assistant Professor of Department of
Hindi, Dr. B. A. Ambedkar
Marathwada University, Aurangabad,
affiliated to Dr. B. A. Ambedkar
Marathwada University, Aurangabad,
has participated in Short Term Course
(Faculty Development Programme) of one
week (Seven Days) duration on Research
Methodology (Hindi) conducted at
Gramonnati Mandal's Arts, Commerce
& Science College, Narayangaon from
21/02/2018 to 27/02/2018 under the auspices
of UGC- Human Resource
Development Centre, Savitribai Phule
Pune University, Pune 411007, on Self-
Financed basis.*

ADIC
CO-ORDINATOR

Garhade
PRINCIPAL

(Signature)
TIC DIRECTOR

(Signature)
REGISTRAR

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

Year of Est. 23rd August, 1958

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UNIVERSITY CAMPUS,
AURANGABAD-431 004
(Maharashtra) (INDIA).

Ref.No.SU/Science/2016/2363-64

Date:-04-06-2016.

To,
The Director,
Deen Dayal Upadhyay Kaushal Kendra,
Dr. Babasaheb Ambedkar
Marathwada University,
Aurangbaad.

Subject:- Approval for the Curriculum of M. Sc. Electronics.

Sir,

I am to inform you that the Curriculum of M. Sc. Electronics submitted by you has been approved by the Academic Council at its meeting held on 01 & 02 June, 2016.

This is for your information & necessary action.

Director,
Board of College &
University Development

Minutes of Faculty Members of Physics Department held in the Chamber of Vice Chancellor

An emergency meeting of all faculty members of the Department of Physics to discuss the viability of a course M.Sc. (Electronics) in the Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, was convened by Hon' ble Vice Chancellor in his chamber on May 31, 2016 at 05.00 pm. It was attended by Professor K. M. Jadhav, Professor P. W. Khirade, Professor M. D. Shirsat, Professor S. S. Patil, Professor B. N. Dole, Dr S. D. Deshpande, Dr: A. G. Murugkar, and Dr. G. M. Dharne. The meeting was chaired by Professor B. A. Chopade, Vice Chancellor, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

The meeting began with a warm welcome by the Chairman.

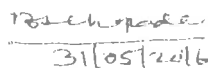

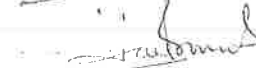



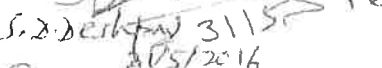
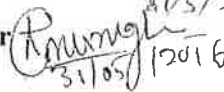
The Chairman appraised the members with background and necessity for starting up of M.Sc. (Electronics) Course on the Dr. Babasaheb Ambedkar Marathwada University Campus.

In the meeting after several deliberations, it was unanimously resolved by all the faculty present that the course M.Sc. (Electronics) be started from June 2016.

However, all faculty members opined that due to scarcity of teaching staff with electronics background, paucity of space and availability of meager funds with Department of Physics, it is not a viable/ feasible idea to start such a course such as M.Sc. (Electronics) in the Department of Physics.

Also the members were of strong opinion that M.Sc. (Electronics) be started in the Deen Dayal Upadhyay – Koushal Kendra, where everything such as technical staff, infrastructure, funds and space are readily available.

The meeting ended with thanks to the Chair.

1. Professor B. A. Chopade Chairman and Vice Chancellor 
2. Professor K. M. Jadhav 
3. Professor P. W. Khirade 
4. Professor M. D. Shirsat 
5. Professor S. S. Patil 
6. Professor B. N. Dole 
7. Dr. S. D. Deshpande 
8. Dr. A. G. Murugkar 
9. Dr. G. M. Dharne

Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad – 431 004 (MS), India
Deen Dayal Upadhyay KAUSHAL Kendra

Dr. Mahendra D. Shirsat
M. Sc. MCA(Engg & Tech.), Ph. D. PDF (USA)
Director



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directorvet@gmail.com

DDU KAUSHAL / 2016 / 74

June 8, 2016

To,
The Hon'ble Vice Chancellor,
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad – 431004

Subject: Establishment of Department of Electronics and commencement of M. Sc. (Electronics) course as per ordinance 1, 2 and 800 (Jan 10, 2007)

Hon'ble Sir,

In reference to the aforesaid subject, I would like to submit that UGC has sanctioned an amount of Rs. 4.0 crores to established DDU KAUSHAL Kendra in the University campus and under this Kendra we have already started B. Voc. and M. Voc. in Industrial Automation and Automobile Technology.

Since we have procured state-of-the-art infrastructure in the area of Industrial Automation for B. Voc. and M. Voc. courses, we have planned to start M. Sc. (Electronics) course from current academic year. The infrastructure procured and man power hired for B. Voc. and M. Voc. courses can be utilized for M. Sc. (Electronics) course as well.

Therefore, as on today we don't need separate investment for M. Sc. (Electronics) and it will fulfil the requirement of many students of this region.

Moreover, in order make optimum use of infrastructure and man power it would be better to share infrastructure and man power of DDU KAUSHAL Kendra for Department of Electronics to run M. Sc. (Electronics) course forever.

Therefore, we hereby propose to establish Department of Electronics and start M. Sc. (Electronics) course under this Department as per the ordinance 1, 2 and 800 which was submitted to Hon'ble Chancellor on Jan 10, 2007 for approval.

Moreover, we have also submitted a proposal for establishment of Department Electronics and commencement of M. Sc. (Electronics) along with curriculum as per CBCS pattern for kind consideration and approval of Academic Council. ~~I hope that it has~~ been approved by Academic Council in its meeting held on June 2-3, 2016.

I would be highly obliged if you could kindly establish a 'Department of Electronics' and allow us to start M. Sc. (Electronics) under this Department from current academic year.

I am looking forward to have your esteemed co-operation and a favorable response.

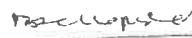
Thanking you in anticipation.

Best Reverence,

Sincerely Yours,


Professor Mahendra D. Shirsat

A' Approved from academic year
2016-2017


08/06/2016

ACAD/NP/SC/ELECTRO./2006/23428

10-01-2007.

:: SPEED POST ::

Mr. C.M. Alegaon,
Deputy Secretary
to the Chancellor,
Raj Bhavan,
Malabar Hill,
MUMBAI - 400 035.

Subject:- **Ordinances-1, 2 and 800 pertaining
to M.Sc. (Electronics) Degree Course
on 'No Grant Basis'.**

Sir,

On the recommendations of the Academic Council, the
Management Council at its meeting held on 24-12-2006 has
accepted the:-

- (a) Ordinance-1 :- pertaining to Tuition Fess,
- (b) Ordinance-2 :- pertaining to Examinations Fees and
- (c) Ordinance-800 :- pertaining to Eligibility Criteria for
admission to M.Sc. (Electronics)
Degree Course on "No Grant Basis".

I am to enclose herewith the Ordinances-1, 2 & 800 with a
request to place the same before the Hon'ble Chancellor for his
assent under the Provisions of S.54(4) of the Maharashtra
Universities Act, 1994.

Further I would like to add that there will not be any
financial burden on the State Govt. at present or in future
while introducing this degree course as it is purely
on "No Grant Basis". The University shall adhere to the State
Government policy from time to time.

The decision in this behalf may please be communicated at
your earliest.

Yours faithfully,

Encl:[as above]

(NAGNATH KOTTAPALLE).

Encl. to Item No.(04)
M.C. dt.24-12-2006

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

Ordinance-1

Statement showing the Tuition Fees and Other Fees for M.Sc. (Electronics) on "No-Grant Basis"

Sr. No.	Course M.Sc. (Electro.)	Admission Fees	Tuition Fees	Library Fees	Laboratory Fees	Medical Exam Fees	Gymkhana Fees	Sports Fees	Students Welfare Fees	Total
1	Per Semester	Rs 25/-	Rs 10,000/-	Rs 50/-	Rs 4780/-	Rs 25/-	Rs 50/-	Rs 50/-	Rs 20/-	Rs 15,000/-

(2)

11

Encl. to Item No.(04-A)
M.C. dt.24-12-2006

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

Ordinance-2

Statement showing the details of the commencement of Examination, Date of application and Examination Fees for M.Sc. (Electronics) Semester-wise on "No Grant Basis"

Sr. No.	Examination M.Sc. (Electronics)	How many time held in a Year	Date of Commencement		Date of application		Examination Fees
			March/April	Nov/Dec	March/April	Nov/Dec	
1	Per Semester	Twice	First week of March	First week of November	First week of December	First week of August	500/- For Theory & 500/- For Practical

Encl to Item No. (4-B)
M.C. dt. 24-12-06

O. 800: Eligibility Criteria :

Candidate shall be admitted for **M.Sc.(Electronics)** only if he/she satisfy the following conditions:

He / She must have passed **B.Sc. Electronics** OR B.Sc. with Electronics as one of the subject with at least 50 % marks (45 % for reserve category) from recognized university.

All admissions will be done through Entrance Test

Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad – 431 004 (MS), India
Department of Electronics

Dr. Mahendra D. Shirsat
M. Sc. MCA(Engg & Tech.), Ph. D. PDF (USA)
Professor & Head



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Ret. No: Elect/2017-18/70-10

Date 12/01/2018

To,
Hon'ble Vice Chancellor,
Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad.

Subject: Approval for the First year Second semester curriculum of M.Sc. Electronics for the Department of Electronics for the academic year 2017-18.

Hon'ble Sir,

In reference to aforesaid, I would like to submit that, academic operations of First semester of M.Sc. (Electronics) at Department of Electronics have been completed. The commencement of second semester is scheduled from 15th January 2018. Therefore the Departmental Committee for Department of Electronics at its meeting held on 08th January 2018 has approved the curriculum of Second semester of M.Sc. Electronics for Department of Electronics for the academic year 2017-18.

Please find attached herewith a copy of curriculum for your kind perusal. (Annexure- A).

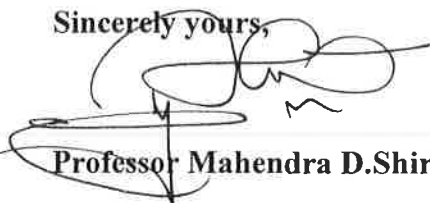
I would be highly obliged if you could kindly accord your approval for the aforesaid curricula.

I am looking forward to have your esteemed co-operation and favorable response.

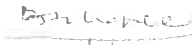
Thanking you in anticipation.

Best reverence,

Sincerely yours,


Professor Mahendra D. Shirsat

Approved


19/1/18

Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad – 431 004 (MS), India
Department of Electronics

Dr. Mahendra D. Shirsat
M. Sc. MCA(Engg & Tech.), Ph. D. PDF (USA)
Professor & Head



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head.electronics@bamu.ac.in

Date: 08-01-2018

Minutes of the Departmental Committee meeting held on January 08, 2018

A meeting of Departmental committee, Department of Electronics was held on January 08, 2018 at 03:30 PM with Professor M.D. Shirsat, Head, Department of Electronics in the chair, at M.Sc. Electronics (Final) Laboratory, Department of Physics. Other members present were Professor Dr. P.W. Khirade, Department of Physics, Mr. Sudhir Sambray, CEO Luans Electronics Aurangabad, and Dr. Kunal Dutta, Assistant Professor, Deen Dayal Upadhyay KAUSHAL Kendra. The meeting began with warm welcome by the Chairman.

Following business was transacted.

1. Minutes of last meeting was confirmed.
2. The new curricula for subject code ELET-211, 212, 213, and 214 (Theory subjects; Semester II, M. Sc. Electronics) and ELEL-221 (Laboratory Course-Work for Semester II, M. Sc. Electronics) were presented and after thorough discussions and meticulous considerations, minor changes were implemented. The final curricula of subject code ELET-211, 212, 213, 214, ELEL-221 and ELER 231 were unanimously decided to be forwarded for necessary accord/ approval (Annexure – A).
3. The Time table for M.Sc. (Electronics), Semester – II program was presented and after minor reshuffling, the same was accepted. It was decided to commence regular lectures from January 15, 2018. It was further decided to submit the time table as per Annexure C to PG Section (Administrative Building) for approval of guest/visiting faculties.

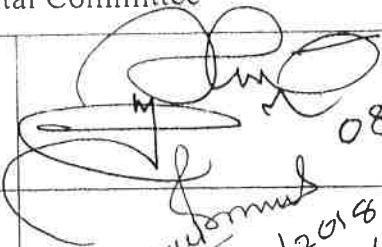
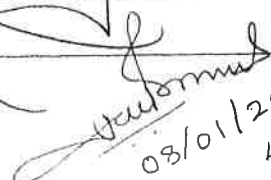
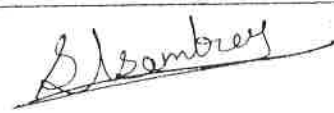
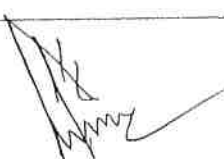
4. The complete list of experiments were considered in purview of purchasing equipments required for Laboratory Coursework - III (ELEL-221; corresponding theory course ELET-211, 212, 213, and 214). The committee had a deep discussion on the various aspects of experimental demands and unanimously finalized following equipments/ trainer kits for purchase. It was decided to prepare and process necessary approvals for effecting the purchase by following due procedure. A detailed list of equipments is attached herewith (Annexure – B)
 5. It was decided to purchase equipments/ trainer kits as per the ‘Annexure- C’ from the non-recurring budget head “Educational & Research Equipments/Computers/Smart Board” allocated to Department of Electronics for the financial year 2017-18
 5. Department of Electronics doesn't have any full time teaching staff appointed. Therefore, visiting faculty on CHB needs to be appointed. Accordingly, it was resolved to appoint visiting faculties namely Mr. P.B.Shinde, Ms. Megha Deshmukh, Mrs. Illa Bharti for M.Sc. II semester for academic year 2017-18
- The meeting ended with thanks to the chair.



Dr. K. Datta

Secretary, Departmental Committee

Members of the Departmental Committee

<p>Prof. M.D. Shirsat. Head, Department of Electronics, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</p>	 08/01/2018
<p>Dr. P.W. Khirade, Professor, Department of Physics, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</p>	 08/01/2018 4.24 pm
<p>Mrs. Warsha Kandlikar Senior Scientist, Industrial Automation Division National Institute of Electronics & Information Technology, Aurangabad</p>	
<p>Dr. S.N. Helambe Head, Department of Electronics. Deogiri College, Aurangabad</p>	
<p>Shri Sudhir Sambrey, CEO, Luhans Electronics. MIDC. Chikalthana. Aurangabad</p>	
<p>Dr. Kunal Datta, Assistant Professor. DDUKK, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</p>	

M.Sc. (Electronics)

Semester II (Core and Foundation and Generic Elective Courses)

ELET 211 Embedded Systems II -PIC Microcontroller (04 credits – 100 marks)

Learning Objectives:

1. To introduce with PIC Microcontroller family, PIC hardware
2. To familiarize with PIC assembly language.
3. To interface real world devices

Learning Outcomes:

1. Knowledge of interfacing of real world devices with PIC 18 family microprocessors
2. Knowledge of building self standing solutions with PIC microcontroller platform

Overview:

Difference between 8051 and PIC, Overview of the PIC18 family: PIC18 features, Simplified view of PIC, Members of PIC family, Comparison of 8051 and PIC Family

Course Contents:

Unit- I: PIC Microcontrollers and Assembly Language Programming (12 Hrs)

Introduction to PIC microcontrollers and embedded processors, Assembly Language Programming: WREG Register in PIC, PIC File Register, PIC Status register, PIC data format and directives, Introduction to PIC Assembly Programming: Structure of Assembly language, Assembling and linking a PIC Program, Program counter and program ROM space in the PIC, RISC architecture in PIC

Unit – II: Addressing Modes and Instruction Set (12 Hrs)

Branch Instructions, Looping, Call instructions and Stack, PIC 18 Time delay and Pipeline concepts Arithmetic Instructions and operations, Logic and Compare Instructions, Rotate operation and Data serialization,

Unit – III: I/O programming and Interfacing (12 Hrs)

Pin connection, PIC configuration registers, I/O port programming in PIC 18, I/O port bit manipulation programming Real World device interfacing: LCD, ADC, DAC, Relay, Stepper Motor, DC motor

Unit – IV: Communication (12 Hrs)

Types of Communication, Serial Communication, Parallel Communication Introduction of various Encoders & Decoders -Examples HT12E/HT12D. Interfacing circuits-Real time implementation using encoder/decoder Programming -Examples -Communication between two systems using RF module

Unit – V:

(12 Hrs)

Presentations, case studies, Assignments, Tutorials based on Module I to IV.

References / Books:

1. PIC microcontrollers and embedded systems- M.A. Mazidi, R. D. Mc. Kinlay, C, Causy; Pearsn, 2008, fourteenth impression ISBN-13: 978-0131194045 ISBN-10: 0131194046
2. Basic for PIC microcontrollers- N. Matic; webmaster, 2001
3. John B. Peatman, "Design with PIC microcontroller", McGraw Hill International Ltd., 1997
4. PIC Microcontrollers by Milan Verle (2008 version)

ELET 212 Microcontroller Interfacing (04 credits – 100 marks)

Learning Objectives:

1. To introduce students with the concepts of interfacing 8051 microcontroller to real world elements
2. To introduce students with the protocols for interfacing 8051 microcontroller to real world elements

Learning Outcomes:

1. Students will acquire understanding interfacing concepts and protocols for 8051 microcontroller.
2. Students will be able to develop programs for interfacing real world elements to 8051 microcontroller
3. Students will be able to implement 8051 microcontroller for process automation applications

Unit -I: Interfacing of Display Devices to 8051 (12 Hrs)

Different types of display units - basic theory of the LED, Interfacing circuit of LED; 7 Segments & its types, Principle of Operation, Interfacing circuit of 7 segments; Basic theory of 16x2 LCD, Pin diagram of 16x2, working mechanism LCD using Arrays & Pointers, Interfacing of 16X2 LCD

Unit -II: DAC, ADC and sensor interfacing to 8051 (12 Hrs)

Introduction to DAC, PIN Description for any standard DAC and its interfacing; Basic concepts of ADC interfacing, PIN Description of any standard ADC and its interfacing, Concept of Encoders and Decoders; Interfacing of sensors

Unit-III: Keypad and Motor interfacing to 8051 (12 Hrs)

Keypad interfacing concepts, Standard Keypad interfacing; Relay interfacing concepts, Relay interfacing; DC motor interfacing concepts, DC motor interfacing; Stepper motor interfacing concepts; Stepper motor interfacing; Servo motor interfacing concepts, Servo motor interfacing

Unit -IV: Serial Communication and RTC interfacing with 8051 (12 Hrs)

Concept of Serial Communication, Hardware Description of MAX 232, Interfacing of MAX 232 to 8051 and serial communication; Concept of RTC, Hardware Description of DS12887 RTC, Interfacing of DS12887 RTC to 8051

Unit - V: (12 Hrs)

Tutorials, Assignments, Demonstrations and Presentation Based On Module I to IV

References/Books:

1. M. A. Mazidi, J. G. Mazidi, and Rolin D. McKinlay; 2006; 8051 Microcontroller and Embedded Systems - using assembly and C; Pearson Education; ISBN-13: 978-01-311-9402-1
2. S. Ghosal; 2010; 8051 Microcontroller: Internals, Instructions, Programming and Interfacing; Pearson Education; ISBN 978-81-317-3143-7
3. Using the MCS-51 Microcontrollers by Han Way Huang Oxford Uni Press
4. Programming and Customizing the 8051 Microcontroller by Myke Predko Tata McGraw Hill
5. The 8051 Microcontroller & Embedded Systems using Assembly and C By K. J. Ayala, D. V. Gadre (Cengage Learning , India Edition).

ELET 213 Generic Elective-II

- i) **Sensors and Actuators**
- ii) **Industrial Robotics**
- iii) **Signal Conditioning Circuits**

i) **Sensors and Actuators**

(04 credits – 100 marks)

Learning Objectives:

1. To facilitate the students to understand
 - a) the concepts of sensor
 - b) the concept of different principles of sensors
2. To provide an opportunity to the students to enter into sensor research
3. To create enthusiasm among the students to undertake research in sensors

Learning Outcome:

1. Students will be able to -
 - a) Learn Sensors, characteristics of sensors, optical fiber and optical sensors.
 - b) Develop sensor devices.
2. Students will be capable to undertake research in Sensors.

Course Contents:

Unit I: Introduction

(12 Hrs)

Sensors and Sensor Science, Sensors–Eyes and Ears of Machines, The Term ‘Sensor’, Optical Sensors, Physical Sensors, Chemical Sensors, elements of chemical sensors, **Sensor Physics**, Solids, Energy Band Model, Lattice Defects, Ionic Conductance, Hopping, Junctions and Potential Barriers, **Primary electronics for sensors** : Amplification by Operational Amplifier, Instruments for electric measurements.

Unit II: Sensors and Sensor Characteristics

(12 Hrs)

Sensors, Signals, and Systems; Ideal sensor curve, ideal sensor requisite, Sensor Classifications ; **Sensor Characteristics**: Transfer Function; Span (Full-Scale Input) ; Full-Scale Output ; Accuracy ; Calibration ; Calibration Error ; Hysteresis; Nonlinearity ; Saturation ; Repeatability ; Dead Band ; Resolution ; **Parameters of sensors** : Sensitivity, detection limit, response and recovery time, selectivity, dynamic range, linearity and stability

Unit III : Optical and Physical Sensors

(12 Hrs)

Introduction of light detectors: Photodiodes, Phototransistor , Photoresistors ; photovoltaic cell, Optical waveguides and fibres, types of optical fibers : single mode, multimode and graded index optical fiber, concept of TIR and ATR, Optical fibre sensors: Introduction and classification of sensors with optical fibres. **Potentiometric Sensors**; Gravitational Sensors; LVDT and RVDT, Eddy Current Sensors, Piezoelectric sensors, Resistive Sensors:

Potentiometers, Strain gages; Inductive sensors, capacitive sensors, Bridge circuits, Displacement Measurements.

Unit IV: Actuators

(12 Hrs)

Actuators: Actuation principle, Mechanical, Electrical, Fluid Power, Piezoelectric, Magnetostrictive, Shape memory alloy, applications, selection of actuators, Actuators in motor vehicles, power switches, electrical rotary and linear actuators.
- Electro-pneumatic and electro-hydraulic actuators for motor vehicles, pumps and valves.

Unit – V:

(12 Hrs)

Tutorials, Assignments, Demonstrations and Presentation Based On Module I to IV

References/Books:

1. Chemical Sensors: An Introduction for Scientists and Engineers : Grundler, Peter; Springer Berlin Heidelberg New York (2007), ISBN 978-3-540-45742-8
2. Modern Sensors Handbook, Edited by Pavel Ripka and Alois Típek; ISTE Ltd, USA (2007), ISBN 978-1-905209-66-8.
3. Handbook of Chemical and Biological Sensors; Edited by Richard F Taylor, Arthur D Little Inc., Jerome S Schultz, University of Pittsburgh ; Institute of Physics Publishing Bristol and Philadelphia; (1996) ISBN 0 7503 0323 9
4. Hand Book of Modern Sensors : Physics, Designs and Applications By Jacob Fraden Third Edition (Springer-Verlag New York, Inc.)(2004), ISBN 0-387-00750-4.
5. Understanding Smart Sensors By Randy Frank; Second Edition; Artech House Boston . London (2000), ISBN 1-58053-398-1.
6. Sensors and Transducers, Third Edition By Ian R. Sinclair; Butterworth-Heinemann publication, Woburn (2001), ISBN 0 7506 4932 1
7. Principles of Chemical Sensors : Janata, Jiri 2nd Edition ; Springer Dordrecht Heidelberg London, New York(2009), ISBN 978-0-387-69930-1 e-ISBN 978-0-387-69931-8
8. Optoelectronics Devices and System SECOND EDITION by S. C. Gupta; Prentice Hall International(2011) ISBN: 978-81-203-5065-6
9. Optical Fibers and fiber optic communication Systems by Subir Kumar Sarkar; S Chand & Company Ltd (2000), ISBN:9788121914598
10. Lasers and Optical Fiber Communications by P Sarah; I.K. International Publishing House Pvt Ltd, New Delhi (2008), ISBN : 9788189866587 / 8189866583
11. Optoelectronics by R. A. Barapate (Tech-Max Publication) (2003)
12. Andrzej M. Pawlak Sensors and Actuators in Mechatronics Design and Applications, 2006

ii) Industrial Robotics

(04 credits – 100 marks)

Learning Objectives:

1. To understand the basic elements of industrial robots
2. To learn the robot programming
3. Acquire Comprehensive knowledge about Performance, Interaction, Safety and robustness, Applications of Humanoids and Industrial Robots

Learning Outcomes:

1. Design various Specific applications based Field, Humanoids and Industrial Robots
2. Design Models and write Algorithms for various Specific applications for Material Handling robots

Unit I: Fundamentals of Robotics

(12 Hrs)

Introduction, Automation and Robotics, A brief History of Robotics, Robotics Market and the Future Prospectus

Unit II: Robot Programming

(12 Hrs)

Methods of Robot Programming, Lead through Programming Methods, Robot Program as path in space, Motion Interpolation, WAIT Signal and Delay Commands, Capabilities and Limitations of Lead through Methods; Robot Languages: Textual Robotic Languages, Generations of Robotic Programming Languages, Robot Language Structure, Motion Commands, Program Control and Subroutines, Monitor Mode Commands

Unit III: Robot Applications in Manufacturing

(12 Hrs)

Material Transfer and Machine Loading/Unloading, Processing Operation: spot welding, arc welding, spray coating, other processing operation using Robotics, Assembly and Inspection: Assembly and Robotic Assembly Operation, Inspection Automation

Unit IV: Implementation Principles and Issues of Robotics

(12 Hrs)

Implementation of Robotics; Safety Training and Maintenance and Quality Improvement; Social Issues and Future of Robotics

Unit V:

(12 Hrs)

Tutorials, assignments and presentation based on Module I to IV

References/ Books:

1. Tsuneo Yohikwa, Foundations of Robotics Analysis and Control, MIT Press. 2003.
2. John J. Craig, Introduction to Robotics Mechanics and Control, Third Edition, Pearson, 2008.
3. Bijay K. Ghosh, Ning Xi, T.J. Tarn, Control in Robotics and Automation Sensor – Based integration, Academic Press, 1999
4. Deb. S. R. “Robotics technology and flexible automation”, Tata McGraw Hill publishing company limited, 1994
5. Industrial Robotics-Technology Programming and Applications by Mikell P Groover, Mitchell Weiss, Nagel and Odrey ISBN-13:978-0-07-026509-7 ISBN- 10: 0-07-026509-7
6. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
7. 3. P.A. Janaki Raman, Robotics and Image Processing An Introduction, Tata Mc Graw Hill Publishing company Ltd., 1995.
8. Francis N-Nagy Andras Siegler, Engineering foundation of Robotics, Prentice Hall Inc., 1987.
9. Bernard Hodges, Industrial Robotics, Second Edition, Jaico Publishing house, 1993.

iii) **ELET 213 Signal Conditioning Circuits (04 credits – 100 marks)**

Learning Objectives:

1. To introduce students to the classifications of various signal conditioning circuits
2. To make students understand the advantages and limitations of various types of signal conditioning circuits

Learning Outcomes:

1. Students will acquire terminologies signal conditioning
2. Students will be able to understand which type of signal conditioning should be used for a specific applications

Unit I: Principles of analog and digital signal conditioning (12 Hrs)

Introduction, signal level and bias changes, linearization, conversation faltering and impedance matching, concept of loading, divider circuits, bridge circuits, lead compensation, RC filters (low pass, high pass), Readout/ meter. Introduction, application of Boolean algebra, Converters (comparators, DAC, ADC), Readout/display

Unit II: signal conditioning for resistive sensors : (12 Hrs)

Temperature sensor (RTD, Thermister), load cell, potentiometric sensors, Basic characteristics (principle, linearity, range, power rating and losses), excitation techniques (constant power, current, bridge), detectors and converters (resistance to Current, resistance to voltage, resistance to frequency, resistance to time)

Unit III: signal conditioning for capacitive sensors : (12 Hrs)

Level sensor, displacement sensor, proximity detector, humidity sensor, differential pressure cell, Basic characteristics (principle, linearity, range), excitation techniques (constant voltage/current, bridge), detectors and converters (impedance matching, capacitance to frequency, capacitance to time, capacitance to voltage)

Unit IV: signal conditioning for inductive sensors : (12 Hrs)

Displacement transducer (LVDT/RVDT), proximity detector, inductive pick-up, Basic characteristics (principle, linearity, range), excitation techniques, detectors and converters (phase sensitive detector/rectifier, wave shaper)

Unit V: (12 Hrs)

Presentation, case Studies, Assignments, Tutorial based on Module I to IV

References / Books:

1. Paul Horowitz, Winfield Hill, "The Art of Electronics", 2nd Ed., Cambridge University press, 2008.
2. Andrew Parr, "Industrial Control hand book", 3rd ed., Newness Industrial Press, 2000
3. Walt Kester, "Practical Design Techniques for Sensor Signal" Analog Devices, Inc., 1999
4. John G. Webster, "Sensors and signal conditioning" 2nd ed. Wiley-Inter science Publication, 2001.
5. Thomas G. Beckwith, John H. Lienhard V, Roy D. Marangoni, "Mechanical measurements" 6th ed., Pearson Prentice Hall, 2012.

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E/ea / 2018-19 / 16-122

Date : 22-06-2018

To,
The Director,
Internal Quality Assurance Cell (IQAC)
Dr. Babasaheb Ambedkar
Marathwada University,
Aurangabad

Subject : submission of supporting documents and data as per revised templates.

Reference : office letter no./IQAC/2018-19/190 dated 11-06-2018

Dear Sir,

With reference to the subject noted above, I am sending herewith copy of detailed mandatory supporting documents and revised six data templates of NAAC.

Thanks

With regards,

Head

Department of Electronics

Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad-431004