

## 1.0 About Hardware Courses under DOEACC and MAIT

1.1 The conception of a new Scheme under DOEACC for Hardware courses is a result of the amalgamation of experience of running the existing DOEACC Scheme in Computers and of CEDTI franchising scheme(CFS) of erstwhile CEDTI in hardware courses. The Scheme is being launched jointly in association with Manufacturer's Association for Information Technology ( MAIT ) , an apex body representing IT Hardware training, IT Design / R&D and associated services in India.

An Expert Committee under the chairmanship of Head of Department, Department of Computer Science , Indian Institute of Information Technology ( IIT ) , Delhi representatives of leading hardware industries such as HCL Infosystems , IBM, Wipro Technologies and members from hardware training organizations such as IIHT , Jetking led by MAIT has been constituted as per approval by Minister of Communications and Information Technology, Chairman , Governing Council , DOEACC Society.

1.2 The DOEACC Scheme on Hardware Courses has been worked out jointly with Manufacturer's Association for Information Technology (MAIT), initially, at two levels as under:

<b>CHM- O Level</b>	Diploma in Computer Hardware Maintenance
<b>CHM - A Level</b>	Advanced Diploma in Computer Hardware Maintenance and Networking

## 2 Objective of the Scheme

2.1 The objective of the Scheme is to generate quality manpower for Hardware in the field of Information Technology (IT) by utilizing the facilities and expertise available with training institutes / organizations in the non-formal sector.

2.2 Computer training institutes / organisations in the non-formal sector , subject to meeting well defined norms, are granted accreditation for specified levels

of courses i.e. Diploma in Computer Hardware Maintenance (CHM) – ‘O’ Level and Advanced Diploma in Computer Hardware Maintenance & Networking (CHM) – ‘A’ Level .

2.3 The Courses are to be conducted according to the prescribed syllabus for each level, which has been worked out. Keeping in view the changing requirements of the industry. Students from accredited institutes as well as working professionals are eligible to appear for the examinations at these levels conducted by DOEACC Society.

## 3.0 Diploma in Computer Hardware Maintenance (CHM – O level)

3.1 Objective: The Objective of the CHM-O Level course is to train 10+2 Qualifiers to acquire basic knowledge in Computer hardware and peripherals for installation, trouble shooting and maintenance including system software management and its back up and to undertake disaster prevention, diagnosis and rectification of faults besides personality development and communication skills.

### COURSE STRUCTURE:

CHM-O1	Electronic Components and PC Hardware
CHM-O2	PC Architecture

CHM-O3	Computer Peripherals and Networking
CHM-O4	System Software, Diagnostic & Debugging Tools
CHM-O5	Personality Development and Communication Skills
CHM- OP1 (practicals)	PC Debugging- Repair & Maintenance
CHM- OP2 (practicals)	Software Installation & Maintenance

### 3.2 Eligibility Criteria:

10 + 2 (Science) pass or ITI (one year after 10 pass ) in Electrical / Electronics / Computers / Instrumentation Engineering.

10 + 2 ( Non- Science ) students need to clear Bridge course also ( Module Placed at Point 9.0 ) ( *Eligibility approved since 19<sup>th</sup> July 2006* )

### 3.3 Career Opportunities:

The career opportunities are proposed considering the sector of prospective employers i.e. Service Industry (H/w & S/w) and Academia such as Trouble shooters ,Technicians (PC) , Asst. System Administrators, Lab Demonstrator

## 4.0 Advanced Diploma in Computer Hardware Maintenance and Networking (CHM – A level)

### 4.1 Objective:

The Objective of the CHM-A Level course is to train Diploma or graduates in Electronics / Computers/ Electrical/ Instrumentation to acquire advanced skills in Computer hardware and networking for Network management and administration and to install and trouble shoot advanced Servers and System software, Information Security , Administration of open source softwares besides development of entrepreneurship skills.

### 4.2 Course structure:

CHM-A1	Electronics Components and PC Hardware
CHM-A2	PC Architecture
CHM-A3	Computer Peripherals and Networking
CHM-A4	System Software, Diagnostic & Debugging Tools
CHM-A5	Personality Development & Communication skills
CHM-A6	Advance PC Hardware and Networking Components
CHM-A7	Data Communication and Computer Networks
CHM-A8	Network Management and Administration
CHM-A9	Linux Administration
CHM-A10	Entrepreneurship Development
CHM-A11	Elective
CHM-APJ	Project

Electives:

CHM -AE1	IT Security
CHM-AE2	Advanced Network Management
CHM-AE3	Introduction to Embedded Systems
CHM-AE4	Networking with Advance Components

Practical Exams :

Sr. No.	Subject Name	Topics covered for the examination
1.	PC Debugging Repair & Maintenance	From Practicals / Experiments / Assignments of the subjects CHM - O1/A1-RO & CHM-O2/A2-RO
2	Software Installation & Network Maintenance	From Practicals / Experiments / Assignments of the subjects CHM/-O3/A3-RO & CHM – O4/A4 – RO
3	Advanced Hardware and Networking	From Practicals / Experiments / Assignments of the subjects CHM-A6-R0 & CHM-A7-R0.
4	Network Administration	From Practicals / Experiments / Assignments of the subject CHM-A8-R0 (student has to opt. one platform compulsorily out of Win 2000/2003/NT and Novell Netware)
5.	Linux Administration	From Practicals / Experiments / Assignments of the subject CHM-A9-R0) (student has to opt. one out of Red Hat and Suse)
6.	For Selected / Opted Elective	From Practicals / Experiments / Assignments of the elective opted. CHM-A11-R0.

#### 4.3 Eligibility Criteria:

CHM-O Level Pass/Diploma in Electronics/ Computers/ Electrical/ Instrumentation after 10 pass or undergoing 2<sup>nd</sup> year BSc. with Physics/ Electronics/ Computers or undergoing 2<sup>nd</sup> year B.E. (Electrical/ Electronics/ Computer/IT) and accredited 'A' Level course (may be concurrent).

#### 4.4 Career Opportunities:

The career opportunities are proposed considering the sector of prospective employers i.e. Service, Industry (H/w & S/w) and Academia such as Installation /Service /Maintenance Engineer (PC), System Administrator, Lab Specialist, Network Engineer / Consultant, Network / Information Security Manager

#### 5.0 Exemptions

Students, who have qualified 'O' level of a field shall get exemption in the same subjects of 'A' level of the same field. e.g. A student, who has qualified CHM-O1-R0, CHM-O2-R0, CHM-O3-R0, CHM-O4-R0 shall get exemption in CHM-A1-R0, CHM-A2-R0, CHM-A3-R0, CHM-A4-R0.

#### 6.0 Promotion of Open Source Software

Appropriate measures have been taken to include promotion of Open source software's such as Linux Administration in both Theory and Practicals.

#### 7.0 Practicals

There shall be 2 practical examinations for CHM-O and 4 practical examinations for CHM-A. The duration of each practical examination shall be of three hours including viva-voce and maximum marks in each practical examination shall be 100 = 80(Practical) + 20 (Viva). Students shall be awarded grades in practical examinations based on the marks scored by them in the practical and viva-voce. Every candidate has to pass in both Theory and Practical Examinations separately.

## 8.0 Project

DOEACC Hardware curriculum has a project as an important component of 'A' level and higher level courses. The project is identified and carried out by the student under the guidance and support of Faculty/Guide and management of the respective institute. It is felt that such a project provides an opportunity to the student to apply his / her knowledge and skills to real life problems (including oral and written communication skills), and as such the project shall be given utmost importance and priority both by the students as well as by the institute faculty / management in respect of its identification, planning and implementation.

## 9.0 Bridge Course Syllabus :

### 9.1 Objective of the course

Syllabus of Bridge Course has been designed to bring 10+2 (Non-Science) qualifiers at par with other (10+2) qualifiers to take-up CHM-'O' Level course under DOEACC Scheme on Hardware Courses.

This Course is a Bridge Course for Non-Science candidates to gain knowledge about the basic Science and Mathematics required for understanding the various subjects of CHM-O Level so as to learn the CHM-O level subjects more effectively. Course lays emphasis on concepts regarding units, & measurements, basic electricity & magnetism, semiconductor devices, elementary circuits and mathematics for computation.

### 9.2 Outline of the Course

#### Part I

S. No.	Topics	Min No. of hours
1	Units, Measurements and Conversion	04
2	Basics of Electricity and Magnetism	06
3	Electrostatics and Electromagnetic Induction	05
4	Basic Electric Circuits	10
5	Semiconductor Devices	05
6	Communications	05
7	Introduction to Electro-chemical Power Source	05

#### Part II

1	Arrays and Matrices	04
2	Sets, Relations and Functions	05
3	Permutations and Combinations	02

4	Probability			03
5	Number systems and Boolean Algebra			06
		Lecture	=	60 Hrs
		Practicals	=	60 Hrs
		Total	=	120 Hrs

### Part I (Science)

- Units, Measurements and Conversion: 04 Hrs

Need for measurement related to electronics (resistance, capacitance, inductance, voltage, current, frequency, time, power, energy, wavelength) and their units (Milli, micro, kilo, nano, pico, mega, gega etc.) and conversion. Concept of pixel, resolution.
- Basics of Electricity and Magnetism: 06 Hrs

Coulomb's law and dielectric constant, relation between electric field, flux, intensity potential, and potential difference, basics of magnetism, magnetic domain, non-magnetic and ferro-magnetic materials, self and mutual induction, electromagnetic waves and propagation of electromagnetic waves in atmosphere, electromagnetic spectrum.
- Electrostatics and Electromagnetic Induction: 05 Hrs

Static electricity, breakdown voltage, field and dielectric strength. Faraday's laws of electromagnetic induction, Fleming's rules, Lenz's law.
- Basic Electric Circuits: 10 Hrs

Elements of an electric circuit- resistance, capacitance, inductance and their types, equivalent resistance, Ohm's law, definition of voltage, current, power, energy, voltage divider rule, open and short circuits, electric circuits, Thevenin's and Norton's theorems, Reciprocity theorem, ideal voltage and current source, maximum power transfer theorem.
- Semiconductor Devices: 05 Hrs

Energy bands in solids, Intrinsic and extrinsic semiconductors, P type and N type semiconductors, P-N junction diodes, zener diodes, LED, photo transistor, solar cells, introduction to rectifiers and regulators.
- Communications: 05 Hrs

Introduction to communication, line communication, two- wire cables, optical communication, satellite communication.
- Introduction to Electro-chemical Power Source: 05 Hrs

Introduction, electrochemical cells, Faraday's Law of electrolysis, Emf of a cell, conversion used to represent a cell, types of electrodes, common type of cells, concept of corrosion, primary and secondary batteries.

### Part II (Mathematics)

- Arrays and Matrices : 04 Hrs

Definition and types of arrays and matrices, algebra of arrays and matrices.
- Sets, Relations and Functions: 05 Hrs

Sets and basic operations, relations, functions and graphs, different kinds of functions in computer science.
- Permutations and Combinations: 02 Hrs

Fundamental principle of counting, permutations, combinations.

4. Probability: 03 Hrs

Type of events, additional theorem without proof, conditional probability.

5. Number systems and Boolean Algebra: 06 Hrs

Number systems, binary arithmetic, boolean constants, variables, truth table, boolean algebra and its theorems, D Morgan's theorem, boolean functions, mathematical logic.

### 9.3 Practical Assignments

#### Recommended Bridge Course Syllabus

1. Identification of components, its symbols, units of measurements.
2. Study of analog and digital multi-meter.
3. Measurement of voltage, current, power and resistance using multi-meter.
4. Verification of Ohm's law.
5. Determination of equivalent resistance of resistances in series and/ or in parallel.
6. Determination of equivalent capacitance of capacitances in series and / or in parallel.
7. Study and testing of relays (AC & DC) and transformer.
8. Study of potential divider.
9. Assembling and testing of electronics hobby kits –I.
10. Assembling and testing of electronics hobby kits –II.
11. Study V-I Characteristic of a diode and its two states.
12. Study of zener diode as voltage regulator.
13. Study of types of cells and batteries.
14. Graphical representation of components used in electronic circuits.
15. Reading and drawing of various electronics circuits.
16. Transmission of light through fiber optic cable.
17. Study of Number system conversion (binary, octal, hexadecimal and decimal)
18. Binary addition and subtraction and logic using digital gates.
19. Role- play with permutation and combination.
20. Probability using dice, coins and playing cards.

### 9.4 Recommended Books:

#### General Reading:

CBSE/ NCERT books of Physics, Chemistry, Mathematics for XI and XII standard.

The syllabus is framed from various units of both XI and XII class curriculum to make the non-science candidates at par with the science candidates at 10+2 level, particularly in topics required for understanding CHM-O level subjects. Hence all these topics may not be available in a single book.