

Book No 23

CTM Syllabus

File No \_\_\_\_\_



23/0

Name \_\_\_\_\_

Subject 202 \_\_\_\_\_

Section \_\_\_\_\_

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CFM

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL

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THREE YEARS DIPLOMA PROGRAMME IN  
CONSTRUCTION TECHNOLOGY AND MANAGEMENT  
UNDER  
MULTIPOINT ENTRY AND CREDIT SYSTEM  
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DETAILED SYLLABUS

HARD CORE COURSES FOR CONSTRUCTION TECHNOLOGY  
AND MANAGEMENT.

- 201 APPLIED MECHANICS - [Revised]  
CTM 202 SOIL MECHANICS  
CTM 203 HYDRAULICS  
CTM 204 ELEMENTS OF CIVIL ENGINEERING DRAWING

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SPONSORED BY.

DIRECTOR OF TECHNICAL EDUCATION BHOPAL (M.P.)

DEVELOPED BY -

CURRICULUM DEVELOPMENT CENTRE

M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL

IN COLLABORATION WITH

TECHNICAL TEACHERS TRAINING INSTITUTE (W.R.) BHOPAL

## PREFACE.

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In Madhya Pradesh most of the Polytechnics offer straight joacketed Diploma programmes in Civil, Mechanical, Electrical and Electronics & Tele-Communication Engineering. Curriculum is the most crucial input in a technical education, hence, initiating to develop a need based curriculum for establishing relevance of Polytechnic output to the needs of industry, is the demand of the time.

At present 10+ and 12+ science stream/technical stream students in different proportions join a three year diploma programme in all Polytechnics. 10+ students are admitted to first year and 12+ students in Second year of three year diploma programme. These students do not have any option in selection of courses (subjects) and have no opportunity for taking alternative courses appropriate to their capability.

The National policy on Education, therefore, rightly recognised the need for a flexible structure which would allow students to enter the system at different points depending on their entry levels, and take up combination of courses according to needs, thereby facilitating the production of man power for a spectrum of technologies and occupations enhancing the efficiency of the system.

It is, in this context, that the Directorate of Technical Education, Madhya Pradesh and M.P. Board of Technical Education explored the feasibility of restructuring polytechnic education in Madhya Pradesh under World Bank Scheme by introducing the Multi Point Entry and Credit System (MPECS). This Scheme of flexible structure has been introduced at S.V. Government Polytechnic, Bhopal from July, 1990.

Considering the nature of the scheme, the courses (subjects) offered in this new scheme have been clustered under the following groups.

- (1) FOUNDATION COURSES are meant for preparing adequate base of Science, Maths. and language and they are to be undertaken only by students who have passed 10+

- (2) HARD CORE COURSES are the courses which are to be taken both by 10+ and 12+ students.
- (3) In the SOFT CORE COURSES there is a choice for the students to select the courses of their choice.
- (4) BASIC TECHNOLOGY courses are the bridge courses between Science subjects and applied Technology courses.
- (5) APPLIED TECHNOLOGY courses are the terminal courses through which the desired knowledge and skills are developed in the students, to perform his job function in the chosen field of technology.
- (6) DIVERSIFIED courses are included to provide an opportunity for some more detailed knowledge in specific areas in the same or related discipline.

The curriculum development centre of the M.P. Board of Technical Education therefore undertook the task of preparing the syllabus/curriculum of the various courses of Diploma programme in Mechanical, Electrical and Construction Technology and Management started under Multi Point Entry and Credit System in collaboration with the CDC Centre of Technical Teacher's Training Institute, Bhopal. The first workshop for preparing the syllabus of the above three disciplines was conducted at TTII., Bhopal from 26-11-90 to 1-12-90 in which teachers from various Polytechnics and particularly from S.V. Government Polytechnic, Bhopal actively participated. The Board of Studies of the respective disciplines have approved the prepared syllabus, and the syllabus is being printed with the intention that the implementation of MFECS should continue unabated.

Where ever required a component of safety and environment has been included in the syllabus and proper care has been taken in :-

- (a) Maintaining sequence of topics.
- (b) Allotting HRS for each topics.
- (c) Avoiding overlaps of the content.
- (d) Relevance of the content.
- (e) Prerequisite of the content.

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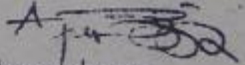
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The comments and healthy criticism from faculty members are however welcome, so that this prepared syllabi can be reviewed and revised periodically.

We are highly grateful to the Director of Technical Education and Prof. C.A. Keshwami, Additional Director of Technical Education, Bhopal for their valuable guidance, encouragement and active co-operation in organising the above workshop.

Words of obligation are due, to P rof. S.A. Balu, Principal, TTTI, Bhopal and the CDC faculty of TTTI, Bhopal. It is out of their valuable suggestions and long term experience in curriculum development that this syllabus is in the hands of the user.

We aspire to improve this in times to come.

  
Secretary, - 22/2/91  
M.P. Board of Technical Education,  
Bhopal.

LIST OF PARTICIPANTS.

POLYTECHNIC FACULTY.

- (1) Shri B.B. Bhargava. S.V. Government Polytechnic, Bhopal.
- (2) Shri U.K. Shrivastava. S.V. Government Polytechnic, Bhopal.
- (3) Shri T. Chatterjee. Government Polytechnic, Jabalpur.
- (4) Shri B.L. Khare. Government Women's Poly. Sagar.
- (5) Shri B.P. Sinha. S.V. Government Polytechnic, Bhopal.
- (6) Shri S.K. Saxena. S.V. Government Polytechnic, Bhopal.
- (7) Shri P.M. Hastak. Government Polytechnic, Jabalpur.
- (8) Smt. S. Ekbote. S.V. Government Polytechnic, Bhopal.
- (9) Shri R.K. Gawande. S.V. Government Polytechnic, Bhopal.
- (10) Shri R.G. Chouksey. Shri Vaishnav Polytechnic, Indore.
- (11) Shri R.R. Gangane. Government Polytechnic, Ujjain.
- (12) Shri M.G. Rawal. Government Polytechnic, Jabalpur.
- (13) Shri B.K. Saxena. S.V. Government Polytechnic, Bhopal.

T.T.T.I. FACULTY.

- (1) Prof. V.M. Kapse Head of the Department C.D.C.
- (2) Dr. N.S. Kapruan.
- (3) Prof. G.N.N. Rao
- (4) Prof. H.R. Pemarna.
- (5) Dr. K.C. Sabbarwal.
- (6) Prof. S.B.L. Shrivastava.
- (7) Prof. P.C. Jain.
- (8) Prof. M.K. Shrivastava.

CURRICULUM DEVELOPMENT CENTRE:

- (1) Shri Ashok Ratnaparkhi. Joint Director
- (2) Shri K.K. Jain. Deputy Director
- (3) Shri C.P. Bhargava. Deputy Director.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOJAL.

PROGRAMME; DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT UNDER M.P.E.O.S.  
PROGRAMME - SSEMEME.

DISCIPLINE : FOUNDATION COURSES . .

No.	CODE No.	COURSE TITLES	CREDIT
	101	Communication Skill- I	3
	102	Communication Skill- II.	3
IM	103	Physics.	5
IM	104	Chemistry.	5
	107	Mathematics- I.	4
	108	Mathematics- II.	4
Total credits.			24

- as 1. To be compulsorily taken by all 10+ students of DCIM programme ;
2. Courses:101, 102, 107 and 108 are common to DCIM, DME & DEE Programmes.

DISCIPLINE : CORE COURSES . .

S.No.	CODE NO.	COURSE TITLE	CREDIT
1.	201	Applied Mech.	4
2.	CTM 202	Soil Mechanics.	3
3.	CTM 203	Hydraulics.	3
4.	CTM 204	Elements of Civil Engg. Drawing.	5
Total Credits.			15

- Note (1) Compulsory for all 10+ and 12+ students of DCIM programme.
- (2) Course 201 common to DCIM, DME & DEE. programmes.

DISCIPLINE : SOFT CORE COURSES . .

No.	Code No.	COURSE TITLE.	Credit.
	301	Computer App.	3
	302	Environmental Engg.	3
CTM	303	Rural Housing and Sanitation.	3
CTM.	304	Interior Decoration and furniture Design.	3
CTM.	305	Industrial Engg.	3
CTM.	306	Architecture.	3
CTM	307	Element of Mechanical & Elect.Engg.	3
CTM	308	Town and Country planning.	3
Total Credits.			09

DISCIPLINE : BASIC TECHNOLOGY . .

S.No.	Code No.	Course title	Credit
1.	CTM 401	Surveying- I.	5
2.	CTM 402	Surveying- II.	5
3.	CTM 403	Entrepreneurship.	3
4.	CTM 404	Mech.of Structure	4
5.	CTM 405	Civil Engineering Drg.	5
6.	CTM 406	Material Technology	5
Total credits.			27

- Note : All courses are to be taken by students of DCIM Programme.

JIL PROGRAMME SCHEME.

PROGRAMME: DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.

DISCIPLINE : APPLIED TECHNOLOGY.

DISCIPLINE : DIVERSIFIED.

S.No.	Code No.	Course title	Credit.
1.	CTM 501	Construction Tech.I.	6
2.	CTM 502	Construction Tech.II.	6
3.	CTM 503	Construction Tech.III.	6
4.	CTM 504	Quality Surveying Costing.- I.	5
5.	CTM 505	Quality Surveying Costing- II.	4
6.	CTM 506	Construction Management.	5
7.	CTM 507	Structural Design & Drawing. I.(RCC)	5
8.	CTM 508	Structural Design & Drawing II(Steel)	4
9.	CTM 509	Industrial Training & Report I.	3
10.	CTM 510	Industrial Training & Report II.	3
11.	CTM 511	Advanced Entrepreneurship & Project.	5
12.	CTM 512	Project.	5
Total Credits.			57

S.No.	Code No.	Course Title	Credit.
1.	CTM 601	Fabrication & Erection.	4
2.	CTM 602	Materials Management	4
3.	CTM 603	Marketing Management	4
4.	CTM 604	Human Resource Management.	4
5.	CTM 605	Pre-fab. Conc. Construction.	4
6.	CTM 606	Advance Environmental Engineering.	4
7.	CTM 607	Computer Aided Design.	4
8.	CTM 608	Advanced Structural Design and Drafting.	4
Total Credits.			32

Note: S(1) Student will have to clear all the foundation courses before taking up any course of this level of DCTM programme.

(2) All courses are to be taken by students of DCTM programme.

Note : (1) Student will have to clear all the foundation courses before taking up any course of this level of DCTM programme.

(ii) Any two courses to be offered by the student of DCTM programme.

NOTE: To pass the programme, student has to earn 140 credits.



MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL,  
SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.  
(M.P.E.C.S.)

FOUNDATION COURSE.

S.No. CODE NO. COURSE	PRE-REQUISITE	HOURS /WEEK	PR.	CREDITS	SESSIONAL		PROGRESSIVE BOARD EXAM. MARKS.	THEORY PRACTICAL/TOTTA REMARKS.	
					TERM WORK	LAB ASSESSMENT			
					I	II			
1. 101	COMMUNICATION SKILL I	3	-	3	20	10	10	3 Hrs. 100	-
2. 102	COMMUNICATION SKILL-II.	3	-	3	20	10	16 <sup>a</sup>	3 Hrs. 100	+
3. CEM103	PHYSICS.	4	2	5	20	10	10	3 Hrs. 100	1 3 Hrs. 50
4. CEM104	CHEMISTRY.	4	2	5	20	10	10	3 Hrs. 100	1 3 Hrs. 50
5. 107	MATHEMATICS-I	4	-	4	20	10	10	3 Hrs. 100	-
6. 108	MATHEMATICS-II.	4	-	4	20	10	10	3 Hrs. 100	-
				<b>TOTAL CREDITS</b>	<b>24</b>				

NOTE: (1) Foundation courses are compulsory for all 10+ students.

(2) Course code 101, 102, 107, 108 are common to DCIM/DME/DSE.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.

SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT

(M.P.B.C.S.)  
2. HARD CORE

PRE-REQUISITE TH. PR. HOURS/WEEK CREDIT. SESSIONAL PROGRESSIVE BOARD EXAM. PRACT. VIVA REPAIRS. TERM LAB ASSESSMENT. PAPER WORK. HOURS. PRACT. DCR. MARKS.

2. HARD CORE.

S. No.	CODE NO.	COURSE.	REQUISITE TH.	PR.	HOURS/WEEK	CREDIT.	SESSIONAL	PROGRESSIVE	BOARD EXAM. PAPER WORK.	HOURS.	PRACT. DCR. MARKS.	REPAIRS.	TERM LAB ASSESSMENT.	PAPER WORK.	HOURS.	PRACT. VIVA	MARKS.
7.1.	201	APPLIED MECHANICS.	-	3	2	4	20	10	1	3 Hrs.	100	1	3 Hrs.	1	3 Hrs.	50	10
8.2.	C1M 202	SOIL MECHANICS.	-	2	2	3	20	10	1	3 Hrs.	100	1	3 Hrs.	1	3 Hrs.	50	10
9.3.	C1M 203	HYDRAULICS.	-	2	2	3	20	10	1	3 Hrs.	100	1	3 Hrs.	1	3 Hrs.	50	10
10.4.	C1M 204	ELEMENTS OF CIVIL ENGG. DRAWING.	-	2	6	5	20	10	1	3 Hrs.	100	1	3 Hrs.	1	(VIVA)	50	10

TOTAL CREDITS 15

NOTE 1-(1) Hard Core courses are compulsory for all 10+ and 12+ students.

(2) Course Code No. 201 is common to DCTM/DCE/DEE.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.  
 SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.  
 (M.P.E.C.S.)

3. SOFT CORE.

S. No.	CODE NO.	COURSE.	PRE-REQUISITE TH.	HOURS/WEEK PR.	CREDIT.	SESSIONAL		PROGRESSIVE	BOARD EXAM. PAPER DUR.	EXAM. DUR.	THEORY MARKS,	PRACTICAL/VTVA MARKS,	REMARKS.
						TERM I	TERM II						
1.	301	COMPUTER APPLICATION.	-	2	3	20	20	10	1	3 Hrs.	100	1	3 Hrs. 50
2.	302	ENVIRONMENTAL ENGINEERING.	-	2	3	20	20	10	1	3 Hrs.	100	1	3 Hrs. 50
3.	CTM 303	RURAL HOUSING AND SANITATION.	-	3	3	20	20	10	1	3 Hrs.	100	1	3 Hrs. 50
4.	CTM 304	INTERIOR DECORATION AND FURNITURE DESIGN.	-	2	3	20	20	10	1	3 Hrs.	100	1	3 Hrs. 50
5.	CTM 305	INDUSTRIAL ENGINEERING.	-	2	3	20	20	10	1	3 Hrs.	100	1	3 Hrs. 50
6.	CTM 306	TECHNICAL DRAWING	CTM 204	2	3	20	20	10	1	3 Hrs.	100	1	3 Hrs. 50
7.	CTM 307	ELEMENTS OF MECHANICAL AND ELECTRICAL ENGR.	-	2	3	20	20	10	1	3 Hrs.	100	1	3 Hrs. 50
8.	CTM 308	PLANNING.	CTM 204	2	3	20	20	10	1	3 Hrs.	100	1	3 Hrs. 50
						TOTAL CREDITS		9					

NOTE :- Any Three courses will be offered by each student.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.  
 SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.  
 (M.P.E.C.S.)

4. BASIC TECHNOLOGY.

S. No.	CODE NO.	COURSE.	CREDITS	Th.	Pr.	SEMESTER	SESSIONAL	LAB.	PROGRESSIVE	BOARD	EXAM.	THEORY	PRACTICAL/VIVA	REMARK.		
															TERM	LAB.
<u>4. BASIC TECHNOLOGY</u>																
1.	CIM 401	SURVEYING I	5	2	6	5	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
2.	CIM 402	SURVEYING-II.	5	2	6	5	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
3.	CIM 403	ENTREPRENEURSHIP.	3	-	3	-	-	-	10	10	1	3 Hrs.	100	-	-	-
4.	CIM 404	MACH. OF STRUCTURES.	4	-	4	-	-	-	10	10	1	3 Hrs.	100	-	-	-
5.	CIM 405	CIVIL ENGG. DRAWING.	5	2	6	5	20	20	10	10	1	4 Hrs.	100	1	-	50(VIVA)
6.	CIM 406	MATERIALS TECHNOLOGY.	5	3	4	5	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
TOTAL CREDITS 27																

NOTE:- All courses are compulsory.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.  
SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.  
(M.P.E.C.S.)

5. AFFILIATED TECHNOLOGY.

S.No.	CODE NO.	COURSE.	PRE-REQUISITES.	HOURS/ WEEK	CRS.	SESSIONAL TERM LAB.	PROGRESSIVE BOARD EXAM.	THEORY PRACTICAL/VIVA	REMARKS.							
										TH.	Pr. Dns.	MAPS.	PRACT. DUR.	MARKS.		
5 AFFILIATED TECHNOLOGY.																
35	CIM 501	CONSTRUCTION TECHNOLOGY-I.	CIM 204	4	4	6	20	20	10	10	1	63 Hrs.	100	1	3 Hrs.	50
36	CIM 502	CONSTRUCTION TECHNOLOGY-II.	CIM 204	4	4	6	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
37	CIM 503	CONSTRUCTION TECHNOLOGY-III.	CIM 204	4	4	6	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
38	CIM 504	QUANTITY SURVEY AND COSTING-I.	CIM 405	2	6	5	20	-	10	10	1	3 Hrs.	100	-	-	-
39	CIM 505	QUANTITY SURVEY AND COSTING-II.	CIM 405 & CIM 501	2	4	4	20	-	10	10	1	3 Hrs.	100	-	-	-
40	CIM 506	CONSTRUCTION MANAGEMENT.	VII.	4	2	5	20	-	10	10	1	3 Hrs.	100	-	-	-
41	CIM 507	STRUCTURAL DESIGN AND DRAWING I (R.C.C.)	CIM 404	3	3	5	20	-	10	10	1	3 Hrs.	100	1	3 Hrs.	50
42	CIM 508	STRUCT. DESIGN- AND DRAWING-II (STEEL)	CIM 404	2	3	4	20	-	10	10	1	3 Hrs.	100	1	3 Hrs.	50
43	CIM 509	INDUSTRIAL TRAINING REPORT-I	-	-	6	3	20	-	10	10	-	-	-	1	-	50 (VIVA)
44	CIM 510	INDUSTRIAL TRAINING REPORT-II	-	-	6	3	20	-	10	10	-	-	-	1	-	50 (VIVA)
45	CIM 511	ADVANCED ENTREPRENEURSHIP AND PROJECT.	CIM 403	2	3	5	20	20	40	40	4	3 Hrs.	100	1	-	50 (VIVA)
46	CIM	PROJECT (CIVIL ENG.)	MIN. CREDITS 90	-	6	5	20	-	-	-	-	-	-	1	-	50 (VIVA)
TOTAL CREDITS																

(1) The students will not be allowed to take up these 5, and 6 level courses unless he clears all the foundation courses.  
(2) All courses are compulsory.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.  
 SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT  
 (M.P.E.C.S.)

6. DIVERSIFIED COURSES.

S.No.	COURSE	PRE-REQUISITE	TH.	FR.	HOURS/SEMS CREDITS	SESSIONAL TERM LAB. ASSESSMENT	PROGRESSIVE PAPER	BOARD EXAM. THEORY PRACTICAL/VIVA	DUR.	MARKS	FRACT. DUR.	MARKS	PERCENTAGE		
WORK I II															
1.	CTM 601 FABRICATION ERECTION.	CTM 508	3	2	4	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
2.	CTM 602 MATERIAL MANAGEMENT.	CTM 406 & CTM 509	3	2	4	20	-	10	10	1	3 Hrs.	100	-	-	-
3.	CTM 603 MARKETING MANAGEMENT.	CTM 403	3	2	4	20	-	10	10	1	3 Hrs.	100	-	-	-
4.	CTM 604 HUMAN RESOURCES MANAGEMENT.	CTM 403	3	2	4	20	-	10	10	1	3 Hrs.	100	-	-	-
5.	CTM 605 PRECAST CONSTRUCTION.	CTM 501	3	2	4	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
6.	CTM 606 ADVANCED ENVIRONMENTAL ENGS.	302	3	2	4	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
7.	CTM 607 COMPUTER AIDED DESIGN.	301	3	2	4	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
8.	CTM 608 ADVANCED STRUCTURAL DESIGN AND DRAFTING.	CTM 507 & CTM 508	3	2	4	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50

NOTE:-

- (1) Only two courses are to be offered.
- (2) The student will not be allowed to take up these five and six level courses unless he clears all the foundation courses.
- (3) Total credits for diversified courses - 08

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION  
BHOPAL.

PROGRAMME : DIPLOMA IN CIM. MECH. ENGG. ENGG. AND ELECT. ENGG.

COURSE : APPLIED MECHANICS.

COURSE CODE NO : 201

PRE-REQUISITE : NIL.

R A T I O N A L E .

In the wider sense " Applied Mechanics" may be defined as a Science which deals with the problems related to objects in motion or in equilibrium.

Depending on the discipline of the technicians the depth of knowledge and extent of areas of Mechanics will vary.

Only those topics which form common requirement of the different courses and those too, to a depth required by all have been included in the subject. Further study of this subject in respect of topic/ depth is left out and could be integrated with their use in subjects like Theory of structures; strength of materials; theory of machines, Basic Machine Design.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, 23/15  
BHOPAL.

PROGRAMME : DIPLOMA IN CIM., MECH. ENGG. AND ELECT. ENGINEERING

COURSE : AFFLIED MECHANICS.

COURSE CODE NO: 201

PRE-REQUISITE : NIL.

SCHEME OF STUDIES.

<u>S.No.</u>	<u>TOPIC.</u>	<u>TH.HRS.</u>	<u>PR.HRS.</u>	<u>Total</u>
(1)	Composition and Resolution of forces.	4	6	10
(2)	Parallel forces and couples.	3	2	5
(3)	Moments and their applications.	3	2	5
(4)	Equilibrium of forces.	4	4	8
(5)	Centre of gravity and Moment of Inertia.	5	2	7
(6)	Friction.	3	2	5
(7)	Simple lifting machines.	8	8	16
(8)	Laws of Motion.	3	-	3
(9)	Motion of particles linear.	3	-	3
(10)	Motion of rotation.	3	-	3
(11)	Work, power, and energy.	3	2	5
		<u>42</u>	<u>20</u>	<u>70</u>

Total credits : 4



PROGRAMME : DIPLOMA IN CIM., MECH ENGG. & ELECT. ENGG.

COURSE : APPLIED MECHANICS.

COURSE CODE NO. : 201

C O N T E N T S .

(1) COMPOSITION AND RESOLUTION OF FORCES :

Revision of concept of forces, unit, graphical representations and system of forces i.e. coplaner, Non coplaner, concurrent forces etc. combining two or more coplaner concurrent forces, in to one single force, graphically and analytically.

Resolving the given forces in any two directions <sup>Perpendicular</sup> to each other in the same plane.

Conditions of statical equilibrium of a rigid body acted upon by a system of concurrent forces and non-concurrent forces.

Laws of (1) Parallelogram of forces.

(ii) Triangle forces.

(iii) Polygon of forces.

(iv) Lami's theorem.

(2) PARALLEL FORCES AND COUPLES :

Understanding of parallel forces and their resultant, graphically and analytically. Definition of couple, conditions for couple, Balancing of couple, Moment <sup>of</sup> couple, Funicular-polygon for beam, Bow's notation.

(3) MOMENTS AND THEIR APPLICATIONS :

Concept of moment, Moment of a force at a point, moment of a force about an axis, moment of a couple, Difference between moment of a force and a couple, application of moment and couple, levers.

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(4) EQUILIBRIUM OF FORCES.

Concept of a body in equilibrium, meaning of equilibrant relation and difference between resultant force and equilibrant force, three condition of equilibrium of the rigid body  $\sum H=0$ ,

$\sum V = 0$  &  $\sum M = 0$ , c

Free body diagram Condition of statical equilibrium of a rigid body, body acted upon by a system of concurrent forces and non-concurrent forces, laws of parallelogram of forces, triangle of forces, polygon of forces, Lami's theorem.

(5) CENTRE OF GRAVITY AND MOMENT OF INERTIA.

Concept of C.G centre of mass, centroid of areas, length and volume, Determination of C.G. of a lamina body by Geometrical considerations, centre of gravity by method of moments, C.G. of symmetrical section and unsymmetrical sections,

concept of moment of inertia and radius of gyration and <sup>relation between them</sup> Moment of inertia of a Lamina and different sections, Moment of inertia at <sup>its</sup> C.G., perpendicular axis theorem, parallel axis theorem, M.I. of a symmetrical and unsymmetrical <sup>sections</sup> at the above axis.

(6) FRICTION.

Introduction to the subject related to the Engineering works, characteristics and conditions to develop a frictional force.

Types of friction, Limiting equilibrium, Angle of friction, <sup>Angle of repose</sup> laws of friction, equilibrium of a body on an <sup>inclined</sup> plane, with force acting along the plane, Simple problems on friction when the body is dragged on horizontal plane and inclined plane.

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(7) SIMPLE LIFTING MACHINE :

Introduction, Definition of effort, Force/Load, Input, output, Principle of work, Definition of a machine, mechanical advantage, Velocity ratio, efficiency of the machine, Ideal machine, effect of friction in a machine, law of machine reversibility of machine, self locking machine, pulley, Different types of pulley Simple pulley, first system of pulley,  $p = mw + c$  second system of pulley, third system of pulley, Differential wheel and axle, simple screw jack, single and double purchase crab, simple problems on machines and pulleys.

(8) LAWS OF MOTION :

Momentum, Inertia, Newton's Law of motion ( First, Second (Third), Difference between mass and weight, projectile, simple problems.

(9) MOTION OF PARTICLES (LINEAR)

Displacement, different types of motions, speed, velocity, relative velocity, Acceleration, uniform and variable acceleration, Motion under uniform acceleration- Derivations of equations of motion (a)  $v = u + at$  ft, (b)  $v^2 = u^2 + 2as$  (c)  $s = ut + 1/2at^2$  motion under gravity and against gravity. Simple problems on equations of motion.

(10) MOTION OF ROTATION:

Introduction to Angular motion, Difference between linear and angular motion, angular displacement, system of measuring angular displacement, angular velocity, angular acceleration, radial acceleration, centrifugal and centripetal force, Motion of rotation under constant angular acceleration, simple problems on rotation.

(11) WORK, POWER AND ENERGY.

Definition of work, power, energy, impulse, principle of conservation of momentum, units of the above, work done, work done by a varying force, graphical representation of <sup>work done</sup>  $w.d.$  by a constant force and variable force, Definition of HP, relation between ~~watt~~ and HP, IHP, BHP, efficiency, types of energy, law of conservation of energy simple problems.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHPAL.

PROGRAMME : DIPLOMA IN CIM, MECH. ENGG. & ELECT. ENGG.

COURSE : APPLIED MECHANICS.

COURSE CODE NO : 201.

LIST OF EXPERIMENTS.

- (1) Verification of law of triangle of forces.
- (2) Verification of law of parallelogram of forces.
- (3) Verification of law of polygon of forces.
- (4) Verification of law of Lami's theorem.
- (5) Verification of Moments.
- (6) To find CG. of regular Lamina.
- (7) To find out the coefficient of friction for surfaces of different materials on horizontal plane.
- (8) To find out the coefficient of friction between two surfaces of different materials on inclined plane. Compare the value of angle of repose with coeff. of friction.
- (9) To study the forces in the members of jib crane. Comparison of the results by vector diagrams and <sup>by</sup> Lami's theorem.
- (10) To find out :
  - (a) Velocity ratio.
  - (b) Mechanical Advantage and
  - (c) Efficiency of Differential wheel and axle and interpolate the law of machine. Draw graph.
- (11) To find out the velocity ratio, Mechanical advantages and efficiency of single purchase crab and interpolate the law of machine with the help of graph.
- (12) To find out the velocity ratio, Mechanical Advantage and efficiency of Double purchase crab and interpolate the result graphically.
- (13) To find out the V.R., M. Adv and efficiency of screw Jack demonstrate its working, interpolate the results graphically.
- (14) To find out the V.R. M. Adv. and efficiency of Differential pulley block. Interpolate the law of machine. Draw Graph.
- (15) Measurement of Brake Horse power of an engine by Rope Brake Dynamometer, Give expression of measuring H.P. with rope Brake Dynamometer.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHO PAL

PROGRAMME : DIPLOMA IN CTM, MECH. ENGG. & ELECT. ENGG.

COURSE : APPLIED MECHANICS.

COURSE CODE NO : 201

REFERENCE BOOKS.

- (1) Applied Mechanics By I.B. Prasad.
- (2) Applied Mechanics By Ramamurthan
- (3) Applied Mechanics By S.N. Junarkar.
- (4) Applied Mechanics. Timo Shinko.
- (5) Applied Mechanics. Sadhu Singh.
- (6) Applied Mechanics. Shama.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL.

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT

COURSE : SOIL MECHANICS.

COURSE CODE NO. CTM 202

PREREQUISITE : NIL

R A T I O N A L E.

Field of construction is an important area for passout from Polytechnic. Day to day supervision of construction work is an important function. Therein Earth work is an important item of the construction of Civil Engineering works e.g. Dams, embankments and cutting work in the construction of Roads and Railways, pavement etc. For efficient supervision and proper execution of the earth work, the technicians must have knowledge of the basic principles of Soil Mechanics.

With the motto in mind the subject of "Soil Mechanics" has been introduced in Diploma Course.

To develop interest in the students towards this subject a chapter of "Introduction" is included which deals with concept/history and scope of Soil Mechanics.

Supervision of construction work rather than design of structure is considered more relevant to the job function of a technician and hence more emphasis is given to the practical aspect. However, necessary theoretical background has also been incorporated.

Hope this will fulfill the requirements of a Civil Engineering Technician.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL.

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY & MANAGEMENT.

COURSE : SOIL MECHANICS.

COURSE CODE NO: CTM 202

PREREQUISITE :

SCHEME OF STUDIES.

S.NO.	TOPICS.	Hours.		
		Theory.	Pr.	Total.
(1)	Introduction.	1	-	1
(2)	Soil formation and Composition.	2	-	2
(3)	Soil classification.	4	5	9
(4)	Permeability.	3	3	6
(5)	Shear Strength and Bearing capacity.	6	8	14
(6)	Compaction.	3	4	7
(7)	Soil Stabilisation.	3	-	3
(8)	Earth Pressure.	3	-	3
(9)	Soil Investigation and sampling.	3	8	11
Total.		28	28	56

Credits. 3

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL.

PROGRAMME. DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.

COURSE : SOIL MECHANICS.

COURSE CODE NO: CTM 202.

PREREQUISITE :

C O N T E N T S.

(1) INTRODUCTION TO SOIL MECHANICS :-

Concept of soil, Definition and meaning of soil mechanics,  
History of Soil Mechanics, Scope of Soil Mechanics.

(2) SOIL FORMATION & COMPOSITION :

Definition of Soil mass, components of soil Mass, phase diag<sup>m</sup>. of soil mass and its labelling weight and volume of soil with usual notation, Dry soil and wet soil, void ratio, porosity and their relations, Tuptews of water in soil, Relations between Y, G, S, E and W, Bulk density, Difference between absorbed water and absorbed water in soil. Moisture contents sa sataartes, dry density

(3) CLASSIFICATION OF SOIL :-

Definition of coarse and fine grains, Homogeneity, consistency, cohesive ness, toughness, plasticity, shear strength, compressibility, Different<sup>cs</sup> between coarse and fine grained soil.

Two methods of soil classification grain size classification of soil as per I.S.I. and plasticity classification of soil.

Seive analysis of soil and sedimentation of soil, log, scale of particle size.

Strokes law consistency limits. Liquid limit, plasticity limit, shrinkage limit and plasticity index (P.I.)  
S.I.

Consistency limit diag<sup>m</sup>. and limits. Laboratory methods to find out these.

Classification of fine grained soil by using plasticity chart. Field identification tests. I.S. classification chart.



(4) PERMEABILITY : Definition and understanding of permeability.

Different type of soil and permeability. Laminar and turbulent flow. Importance of permeability. Coefficient of permeability and its determination in laboratory, Darcy's Law.

Factors affecting permeability. Field determination of permeability, Concept meaning of seepage, Effect of seepage, flow lines and flownet (only understanding)

(5) SHEAR STRENGTH AND BEARING CAPACITY.

Concept of shear strength of loaded soil. Friction and coefficient of Friction between two soils,. Internal friction, cohesion, Normal and shear stress, shear strength of soil. Factors on which shear strength of soil depends Coulom's law, Shear failure

Types of shear test. Box shear test and triaxial test. Causes of Failure of foundation Meaning of Bearing capacity and safe Bearing capacity. Concept of S.B.C, ultimate bearing capacity. Method of finding S.B.C. (Plate load test) of soil factors affecting Bearing capacity of soil.

(6) COMPACTION :-

Concept and meaning of compaction. Consolidation and its meaning. Difference between consolidation and compaction.

Max. Dry density and optimum moisture content. Proctor Test. Factors affecting compaction. Methods of compaction in field.

(7) SOIL STABILIZATION :

Concept and meaning (Purpose) of soil stabilizing. Methods of stabilization, Materials of stabilizing of soil and their uses. C.B.R- application and determination.

(8) EARTH PRESSURE:

Earth pressure, effective pressure. Neutral pressure, and total pressure Magnitude of earth pressure. Rankine theory, Assumptions made in the Rankine's theory. Earth retaining structures. Earth pressure on earth retaining structures.

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(9) SOIL INVESTIGATIONS :

Meaning and objectives of soil investigation. Site investigations. Site exploration. Number, Depth and disposition of borings. Methods of exploration. Trial pits types of Augers. Auger boring, wash boring and percussion drilling.

Soil sample and their types disturbed and undisturbed samples and their meaning. Record of boring Borehole log.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.

PROGRAMME : Diploma in CONSTRUCTION TECHNOLOGY & MANAGEMENT.

COURSE : SOIL MECHANICS.

COURSE CODE NO: CTM 202

PREREQUISITE : NIL.

LIST OF EXPERIMENTS.

- (1) Field Density. Core Cutter/Sand Replacement.
- (2) Moisture contents.
- (3) Specific gravity by Pycnometer/ or Density Bottle.
- (4) Liquid Limit.
- (5) Plastic Limit.
- (6) Shrinkage limit.
- (7) Grain size Analysis.
- (8) Compaction Test - Light and Heavy.
- (9) Soil sampling.
- (10) Field Identification Tests.
- (11) Box shear Test.
- (12) Triaxial shear Test.  
(demonstration only)

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL.

PROGRAMME. DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.

COURSE: SOIL MECHANICS.

COURSE CODE NO: CTM- 202

PREREQUISITE: NIL

LIST OF REFERENCES.

<u>S.No.</u>	<u>Name of Book.</u>	<u>Author.</u>	<u>Publisher.</u>
(1)	A Text Book of Soil Mechanics.	Dr. S.B. Sehgal	Metropolitatn Book Co. Fvt. Ltd. New Delhi.
(2)	Introductory Soil Mechanics.	S.N. Awasthy.	J.K. Publishing House, Bhopal.
(3)	A Text Book of Soil Mechanics.	Bharat Singh.	Nemi Chand Prakashan Roorkee.
(4)	Soil Mechanics and Foundation Engg.	Alam Singh...	Stand Book House Delhi.
(5)	Soil Mechanics and Foundation Engineering.	Dr. B.C. Punamia.	Standard Book House, Delhi.
(6)	Elements of Soil Mechanics.	Kamalker.	
(7)	I.S. Code 2720 (Part I, II, III, IV, V, VI, VII, IX, XI, XIII, XXV, XXVIII, XXVI		
(8)	I.S. codes 1892, 2132, 2809		

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL.

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.

COURSE : HYDRAULICS.

COURSE CODE NO: CIM 203

PREREQUISITE : NIL

R A T I O N A L E.

Constructional Engineer are often required to deal with flow of water through pipe lines and canals, therefore they must know the various hydraulic phenomena with which they have to come across during their professional carrier.

Many times they may require to design pipe line for a colony, measure the discharge in canals, to work out the forces on hydraulic structures and to select proper type of pump for a given situation. In order to be able, to do so they must be trained properly to perform the above jobs satisfactorily.

The topics in the curriculum in the subject Hydraulics is so included that they fulfil the needs of a construction Engineer and is aimed at equipping them with the basic knowledge of the principles involved and preparing a base for further studies.

The curriculum is divided into Nine Chapters and each chapter is allotted specific numbers of lectures to cover up the chapter.

A list of experiments to be performed to cover the curriculum and a list of books is given in the end of the curriculum.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL.

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.

COURSE : HYDRAULICS.

COURSE CODE NO. CTM203

PREREQUISITE : NIL

SCHEME OF STUDIES.

<u>S. No.</u>	<u>TOPIC.</u>	<u>No. of Theory periods.</u>		<u>Total</u>
(1)	Introduction of Hydraulics.	2	-	2
(2)	Hydrostatics.	4	-	4
(3)	Pressure and its measurement.	4	2	6
(4)	Hydrokinematics.	2	-	2
(5)	Hydrodynamics.	2	2	4
(6)	Water Discharge measurement.	5	10	15
(7)	Flow through pipes.	06	6	12
(8)	Open channels.	1	2	3
(9)	Pumps.	2	6	8
		<hr/>		
Total.		28	28	56
		<hr/>		
Credit		- 3		

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL.

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY & MANAGEMENT.  
COURSE : .. ( .. ) HYDRAULICS.  
COURSE CODE NO. CIM 203  
PREREQUISITE : NIL

C O N T E N T S.

S.No. UNIT.

1. INTRODUCTION : Definition of liquid, ideal liquid, real liquid, mass density, Specific weight Phenomenon of compressibility, Viscosity Surface Tension, Hydrostatics, Hydro Kinematics Hydrodynamics, Definition.
2. PRESSURE AND PRESSURE MEASUREMENTS. Pressure, Pressure intensity, variation of pressure with depth of liquid, pressure head, unit of pressure effect of shape and size of container on pressure. Pascals law, Types of <sup>pressure</sup> atmospheric pressure, Gauge pressure, Absolute pressure. Pressure measuring instruments Piezometer U tube, Manometer, Differential manometer. Bourde pressure gauge.
3. HYDROSTATICS. Total pressure on plane horizontal surface on vertical surface, inclined surface centre of pressure, pressure diag<sup>n</sup>.
4. HYDROKINEMATICS. Law of conservation of mass, equation of continuity. Steady and unsteady flow, uniform and non-uniform flow. Laminar and turbulent flow. Lines of flow. Path line Stream line.
5. HYDRODYNAMICS. Various forms of energies present in liquid flow- potential energy kinematic energy, pressure energy, Total energy, Bernoullis theorem. Limitations of Bernoullis theorem.
6. WATER DISCHARGE MEASUREMENT. Principles of discharge measurement through pipes. Venturimeter. Equation of discharge through venturimeter, orifice meter, Description, discharge calculations. Velocity measuring instruments. Pitot tube, description, method, orifice, flow through orifice Hydraulic coefficients. Jet trajectory. Small and large orifice. Expressions for discharge for free flow, submerged flow. Time required for emptying tank. Notch- Sharp crested, rectangular, triangular and Trapezoidal. Expression for discharge of flow through notches. Weirs, Definition, description and types of weirs.

7. FLOW THROUGH PIPES.

Laws of liquid friction for laminar flow, turbulent flow, Expression for head loss in pipes due to friction. Darcy's or Weishback equation. Major losses. Expressions for loss due to sudden enlargement, sudden contraction entrance to pipe, exit from pipe, bends minor losses. Flow through long pipe. Discharge in open and discharge in another reservoir. Pipes in series or compound pipe. Pipes in parallel discharging pipes. Hydraulic grade lines. Energy grade lines in cases Venturimeter, sudden expansion, convergent pipe, pipe connection of two reservoirs, having different water levels. Compound pipes connecting two reservoirs. Pipes connected in parallel. Syphon pipes.

8. FLOW THROUGH OPEN CHANNELS.

Open channel, uniform flow. Non uniform flow. Wetted perimeter. Hydraulic mean depth. Hydraulic gradient. Chezy's formula. Mannings formula, constant "C" for open channels.

9. PUMPS

understanding, Definition, A description of centrifugal pump. Its Components, Working principle, priming, types, layout Selection criteria, <sup>and</sup> Situation where used.

Reciprocating pumps, understanding (definition, Description, components, working principle. Situation where <sup>used</sup> creat. Selection of pumps. Horse Power calculation of H. P. for pumps.



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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION  
BHOPAL.

PROGRAMME: DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.

COURSE : HYDRAULICS.

COURSE CODE NO: CTM 203.

PREREQUISITE : NIL

LIST OF EXPERIMENTS.

- (1) Pressure measurement at a point. To measure difference of pressure between two given points.
- (2) Determination of Hydraulic coefficients  $C_c$ ,  $C_v$ ,  $C_d$ .
- (3) Determine discharge through venturimeter.
- (4) Determine discharge through orifice meter.
- (5) Plotting Hydraulic gradient line and total energy line.
- (6) Verification of Bernoulli's theorem.
- (7) Determine time of emptying tank.
- (8) Determine friction losses through pipes.
- (9) Determine losses in pipe due to sudden enlargement and sudden contraction.
- (10) Determine discharge through open channel.
- (11) Study the working of
  - (a) Reciprocating pump.
  - (b) Centrifugal pump.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL.

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY & MANAGEMENT.

COURSE : HYDRAULICS.

COURSE CODE NO: CTM 203

PREREQUISITE : Nil

LIST OF REFERENCE BOOKS.

(1) Hydraulics and Hydraulic Machines	By Shri K.D. Saxena.
(2) Hydraulics and Hydraulic Machines	By Priyani.
(3) Hydraulic and Hydraulic Machines	By Dr. Jagdish Lal.
(4) Fluid Mechanics	By Dr. A.K.Jain.
(5) Fluid Mechanics	By Dr. M.L. Mathur.
(6) Engineering Fluid Mechanics.	by K.L. Kumar.
(7) Fluid Mechanics.	By Victor L Sreeter E Benjamin Wyle.
(8) Experimental Hydraulics.	by S.N. Ghosh and S.C. Talapatra.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,  
BHOPAL.

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT.

COURSE : ELEMENTS OF CIVIL ENGG. DRAWING.

COURSE CODE NO; CTM 204

PREREQUISITE : NIL

SCHEME OF STUDIES.

TOPICS S.No.	NAME OF TOPIC.	TH.	PRACT.	TOTAL.
(1)	Introduction to Drawing and Drawing Instruments.	2	-	2
(2)	Line work : Lettering and Dimensioning.	2	08	10
(3)	Scales.	3	12	15
(4)	Orthographic Projections and Section of solids.	6	20	26
(5)	Fictorial drawing.	4	12	16
(6)	Standard symbols and conventional signs.	1	06	07
(7)	Sketching.	4	8	12
(8)	Flaming, Detailing of small Residential building (single storeyed)	6	18	24
Total Hours.		28	84	112
		Credits 5		