Book no → 5

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

THREE YEAR DIPLOMA PROGRAMME IN CIVIL / MECHANICAL & ELECTRICAL ENGINEERING UNDER MPECS

SYLLABUS

FOUNDATION COURSES	HARD CORE COURSES	SOFT CORE COURSES
101- Communication skill-I (Revised 2014)	201- Applied Mechanics (Revised 2012)	301- Computer Application (Revised in 98 Basic Programming)
102- Communication skill-II	202- Engineering Drawing	302- Environmental Engg.
103- Physics-I	203- Workshop Practice	303- Elements of Civil Engg.
104- Physics-II		304- Marketing Management
105 Chemistry-I (Revised 2016)		305- Non Conventional sources of Energy
106- Chemistry-II (2017)		
107- Mathematics-I	Revised Syllabus for 301- Computer Applications to be followed. Sent vide Letter No. No. ACD/98/308 Dtd. 10.2.98	306- Enterpreneurship
108- Mathematics-II		307- Mathematics-III
		308- Elements of Mechanical & Electrical Engg. (only for Civil Engg Course.)

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.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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THREE YEARS DIPLOMA PROGRAMME IN

CIVIL ENGINEERING

MECHANICAL ENGINEERING

ELECTRICAL ENGINEERING

UNDER

MULTI POINT ENTRY AND CREDIT SYSTEM

-.-

Detailed Syllabus

FOUNDATION COURSES FOR CIVIL, MECHANICAL AND ELECTRICAL

101 COMMUNICATION SKILL - I

102 COMMUNICATION SKILL - II

103 PHYSICS -I

104 PHYSICS -II

105 CHEMISTRY -I

106 CHEMISTRY -II

107 MATHEMATICS -I

108 MATHEMATICS -II

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M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL

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PREFACE

In Madhya Pradesh most of the Polytechnics offer straight joacketed Diploma programmes in Civil, Mechanical, Electrical and Electronics & Tele Communication Engg. Curriculum is is the most crucial input in a technical education, hence, initiating to develop a need based curriculae 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 apportunity for taking alternative courses appropriate to their capability.

The National policy on Education, threfore, 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. Govt. 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+

(Contd..2)

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(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 Teachers Training Institute, Bhopal. The first workshop for preparing the syllabus of the above three disciplines was conducted at TTTI, 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 MPECS. 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 overlapse of the content.
(d) Relevarce of the content.
(e) Prerequisite of the content.

(Contd...)

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

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

Words of obligation are due, to prof. 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.

Sd/-
Secretary,
M.P.Board of Technical Education,
Bhopal.

L I S T O F P A R T I C I P A N T S.

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 Polytechnic, 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.S. Dote.	S.V. Government Polytechnic, Bhopal.
(9)	Shri P.K. Gowande.	S.V. Government Polytechnic, Bhopal.
(10)	Shri R.C. Chouksey.	Shri Vaishnav Polytechnic, Indore.
(11)	Shri R.R. Jirgane.	Government Polytechnic, Ujjain.
(12)	Shri N.C. Raval.	Government Polytechnic, Jabalpur.
(13)	Shri B.K. Saxena.	S.V. Government Polytechnic, Bhopal.

C.T.T.R. FACULTY.

(1)	Prof. V.M. Kapse	Head of the Department C.D.C.
(2)	Dr. N.S. Kapruan.	
(3)	Prof. G.N.H. Rao.	
(4)	Prof. H.R. Ramanna.	
(5)	Dr. K.C. Sabharwal.	
(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, BHOPAL

SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN CIVIL/MECHANICAL/& ELECTRICAL ENGINEERING (M.P.E.C.S.) w.e.f. August/September, 1992.

FOUNDATION COURSE:

S.No.	Code No.	Courses.	Pre-requisite.	Hours/Week Th.	Hours/Week Pr.	Credits	Sessional Term work	Sessional Lab. work	Progressive Assessment I	Progressive Assessment II	Board Exam. Paper	Board Exam. Dur.	Theory Marks.	Pract/viva Pr.Dur.	Pract/viva Marks	REMARKS.
		FOUNDATION COURSE														
1.	101	Communication Skill-I	-	3	-	3	20	-	10	10	1	3 Hrs.	100	-	-	-
2.	102	Communication Skill-II.	-	3	-	3	20	-	10	10	1	3 Hrs.	100	-	-	-
3.	103	Physics-I	-	4	2	5	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
4.	104	Physics-II	-	4	2	5	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
5.	105	Chemistry-I	-	4	2	5	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
6.	106	Chemistry-II	-	4	2	5	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50
7.	107	Maths. I	-	4	-	4	20	-	10	10	1	3 Hrs.	100	-	-	-
8.	108	Maths. II	-	4	-	4	20	-	10	10	1	3 Hrs.	100	-	-	-
						Total Credits	34									

(1) Foundation courses are compulsory for all 10+ students.
(2) Course code No. 101, 102, 107, 108 are common to DCTM/DME/DEE/DCE.

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(7)

FIRST YEAR DIPLOMA IN CIVIL ENGINEERING/MECHANICAL ENGINEERING/ELECTRICAL ENGINEERING AND OTHER ALLIED DIPLOMA COURSES AS DETAILED ON FRONT PAGE.

SUBJECT : COMMUNICATION SKILLS -I

(TO BE IMPLEMENTED FROM ACADEMIC SESSION-1995-96)

(2 U D ON-WORDS)

(1) Salient features of the new curriculum.

Teaching of English is based on text book approch. The book which is being prepared now, makes almost a total departure from the previous book, 10 new topics have been written. Some of the topics that the book includes are 'Entrepreneurship', 'Environment', 'Safety' and 'Non-Conventional Sources of Energy'. In addition to the above, one part of the book includes 5 short stories from the International and Indian writers of fame.

While the approach to teaching of applied grammar can not be chabged, altogether new exercises have been framed, Particular emphasis has been laid in preparation of topics like the 'Auxiliaries' and 'Conditionals.'

Paper Code 201

RATIONALE

(8)

(2) English occupies an important place in our curriculum. Besides functioning as one of the important library languages in India, it acts as a window to technical and scientfic knowledge. After obtaining their diploma and while in job they have to communicate with personnel belonging to different hierarchy . Therefore, acquiring proficiency in the language for effective communication is absolutely essential. Exphasis is being laid on the development of communication skills among the students.

SKILLS TO BE DEVELOPED

(A) WRITING :

(a) Undrstand & use the vocabulary items of general use besides words from the register of physical and social sciences.

(b) Given a passage use subatitues for identified words and expressions in an appropriate manner.

(c) Ensure that the intended communication through a written passage occurs in pratice.

(d) Express ideas contained in the prescribed units.

(e) Write both guided and free compositions based on the prescribed text.

(f) Construct grammatically correct sentences in English.

(g) Express ideas contained in passages outside the text.

(h) Write paragraphs on topics of general interest like- Day to day happenings; Match that you have seen; Scene in a railway compartment; Picnic; Your parents etc.

Paragraphs should be of descriptive nature avoiding those on abstract topics/ proverbs.

(B) READING :

(a) Develop the ability to read silently as well as aloud.

(b) Involve students in reading paragraphs from the prescribed text.

(c) Recognize main ideas, supporting details, sequence of events and casual relationship.

(d) Develop competence and habit of using dictionaries and other reference books.

(C) LISTENING :

(a) Ability to follow spoken instructions .

(b) Develop competence in taking notes while listening.

(c) Ability to listen to news bulletins - Radio Doordarshan, B.B.C.

b) SPEAKING :

(a) Develop the ability of speaking in the class.

(b) Develop the ability to ask pertinent questions as well as to answer them.

(c) Develop the ability to assert one's point of view.

(d) Develop the ability to use conversational skills in situations like:

(i) Introductions /Greetings.

(ii) Seeking/giving information.

(iii) Discussing weather.

(iv) Asking about arrivals/departure of trains.

(v) Making enquiries about health.

(vi) Making enquiries about market places/banks/ any other public places.

(vii) In order to develop the above, the following components of spoken English may be included.

- Short answer; additions to remarks; agreement/ disagreement with remarks; question tags; simple pr/ pr. perfect; question words; phrasal verbs.

(4) SCHEME OF STUDIES AND EXAMINATION.

No.	Topics.	Lecturer Hrs.
	Section A	
	The Text.	
	Part-I - Passages for comprehension.	27
	Part-II- Short Stories.	15
	Part-III-Applied Grammar.	22
	Section B	
	(a) Paragraph writing on topics of general Interest.	10
	(b) Unseen Passage.	10
	Total	84

Note : For spoken English integrated approach may be adopted.

SECTION - A

COURSE CONTENTS. PART -I

PASSAGES FOR COMPREHENSION.

1. Language of science.
2. My Thousandth Goal.
3. Rip Van winkle Comes to Tour.
4. Robotic Revolution.
5. Nondestructive Testing.
6. Designing a car.
7. The wonders of camera.
8. Desalination or Desalting process.
9. Non conventional sources of Energy.*
10. Our Environment.*
11. Entrepreneurship.*
12. Safety. *

Units against which asterisk marks have been made may be taught to students of IInd year Diploma in Engineering.

PART - II

SHORT STORIES

(1) Selfish Giant - Oscar Wilde.
(2) A letter to God - Gregario Lopex Y. Fuentes.
(3) An Astrologer's Day - R.K. Narayan.
(4) The Last Leaf - O' Henry.
(5) The Malefactor - Anton Chekov.

PART -III

APPLIED GRAMMAR

(1) Determiners.
(2) Auxiliaries.
(3) Tenses.
(4) Conditionals.
(5) Passive.
(6) Infinitives.
(7) Modifiers.

(8) Prepositions.
(9) Subject - Verb Agreement.
(10) Clauses & connectors.

SECTION - B

Besides the topics included in the text book, the course includes paragraph writing on topics of general interest and unseen passages.

(6) SCHEME OF ASSESSMENT.

S.No.	Topic/Sub-Topics.	Distribution of marks.
1.	Paragraph Writing on topics of general interest.	10
2.	Unseen Passages.	08
3.	The Text.	
A.	Passages.	
	(a) One -word.	08
	(b) Fill in the blanks with appropriate forms of listed words.	04
	(c) Single sentence answers.	12
	(d) Answers in 5-6 lines	08
	(e) Essay type /Guided comp.	10
B.	Short Stories.	
	(a) Answers in 5-6 lines.	06
	(b) Composition type.	09
C.	Applied Grammar.	25
	Total :	100 Marks.

For achieving the aforesaid objectives the text book titled" Communication skills for Technical Students Book-I" if being prepared for the Ist year of M.P.,Maharastra,Gujrat and Goa may be prescribed. This shall be published by M/s Somaiya Publications, Pvt.Ltd.,Marathi Granth Sangrahalaya Marg, Dadar, Bombay which is based on the revised curriculum. This book is likely to come out in July/August,1995. Besides this, the following reference books. may be used :-

I. Living English structure - Allen.
II. Practical English Grammar (Exercises I by Thomson & Martinet.
III. English Conversation Practice by Grant Taylor .

(8) RECOMMENDATIONS FOR AWARDING SESSIONAL MARKS.

In order to make the implementation of spoken English meaningful, the sessional marks of Comm.Skill be awarded as follows:-

Term Work	-	10 Marks.
Testing of Spoken Skills.	-	10 Marks.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (14)

CIVIL

PROGRAMME : DIPLOMA IN MECHANICAL AND ELECTRICAL ENGINEERING.
COURSE : COMMUNICATION SKILL -II.
COURSE CODE NO. : 102 PREREQUISIT : III.

R A T I O N A L E

The main purpose of designing Communication Skill- II is to reinforce further the skills acquired earlier. While the communication skill I endeavoured to drill certain syntactical patterns and attempted the extension of vocabulary by including words from the register of the Physical Sciences, the thrust of communication skill II is towards greater enrichment of power of expression by acquiring words from the Social Sciences. However, we can not grow oblivious to the fact that for technicians flourishes of ornnamental style have no place in their day-to-day work. They have to communicate with their superiors, peers and subordinates. They have to write reports and letters in the course of their professional life. Threrfore, attempts have been made to familiarize them with different forms and features of technical writing, as well as organisation mechanics and style of letter writing.

M.P.M. PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (15)

CIVIL

PROGRAMME : DIPLOMA IN TECHNICAL AND ELECTRICAL ENGG.
COURSE : COMMUNICATION SKILL - II.
COURSE CODE NO: 102
PREREQUISIT :

SCHEME OF STUDIES.

S.NO.	Topics.	HRS.
I.	Passages for comprehension (Passages in General Studies, Vikas Publication, Bhopal. (Prescribed Units - 3,4,5,6,7 & 10)	15
II.	Technical Writing	15
III.	Business letters (A course in Technical English, Book-II)	12
		42

Credits -3

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL. (16)

CIVIL

PROGRAMME : DIPLOMA IN MECHANICAL AND ELECTRICAL ENGG.

COURSE : COMMUNICATION SKILL II

COURSE CODE NO : 102

PREREQUISITE : -

C O N T E N T S

I. Passages for comprehension.

(Passages in General Studies,

Vikas Publication, Bhopal.

S.NO.	CONTENT.	SCOPE
1.	Salient features of the Indian Constitution (Unit - Three)	(i) Offers cope for composing connected paragraphs on topics like - Unitary tendencies of the constitution; rigidity and flexibility of the constitution; Fundamental Rights etc. (ii) Writing of short paragraphs on given ideas and topics as well as giving sinle - sentence answers to ques--tions. (iii) One-word, substitutes, appropriate word derive--tions.
2.	Structure of Government (Unit- Four)	The treatment of this and other passages may be based on the lines suggested in the preceding unit.
3.	Functioning of an Economic system (Unit- Five)	As above.
4.	The Public Sector in India (unit- Six)	As above.
5.	Production and productivity (Unit- Seven)	As above.
6.	Professional Ethics (Unit- Ten)	As above.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL. (17)

PROGRAMME : DIPLOMA IN CIVIL/TECHNICAL AND ELECTRICAL ENGG.

II. TECHNICAL WRITING.

(A course in Technical English-Book II)

S.No.	CONTENT
(1) Basic facts of Technical writing.	(a) Its importance. (b) Types of communication- Advantages and Disadvantages.
(2) Features of Technical Style : (i) Style	Difference between literary and technical style; Features of technical style.
(ii) Mechanics:	Abbreviations numerals, punctuations and spelling rules.
(3) Types of Technical Writing.	Feasibility Report, Progress Report, Trouble Report in the form of memo--randum.
(4) Technical Descriptions	(a) Objects - Cooler; refrigerator; Pressure cooker, fire-extingusher; call bell etc. (b) Processes-

III BUSINESS LETTERS

(A course in Technical English Book II)

S.No.	CONTENT.
(1) Business letters (Brief introduction)	Importance; purposes.
(2) Mechanics.	The format of a business letter.
(3) Style.	(i) Negative (ii) Neutral (iii) Positive.
(4) Types of business letter.	(i) Application for job. (ii) Enquiry. (iii) Order. (iv) Complaint.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

CIVIL

PROGRAMME : DIPLOMA IN MECHANICAL AND ELECTRICAL ENGG.

COURSE : COMMUNICATION SKILL -II

COURSE CODE NO : 102

PREREQUISIT : NIL.

The objectives of the course are proposed to be achieved in 42 hours for which following books have been prescribed.

L I S T O F B O O K S

(1) Passages in General Studies,
Vikas Publications, Bhopal.

(2) A Course in Technical English ,Book II,
Somaiya Publications Pvt. Ltd. Bombay.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (19)

CIVIL
PROGRAMME : DIPLOMA IN MECHANICAL & ELECTRICAL ENGG.

COURSE : PHYSICS I. MECH. & ELECT.

COURSE CODE NO. : 103.

PREREQUISITE : -

RATIONALE

Physics builds the foundation for all technician courses. The study of engineering subjects require the knowledge and comprehension of basic concepts like, motion force, energy, molecular phenomena, vibrations and heat. And hence these concepts are incorporated in the syllabi. A good foundation of fundamental sciences will also help student in his self development and to undrstand new technologies.

The different topics in Physics for the foundation course were identified on the following basis:

(1) The attainment level of students in Physics at the entry level in Polytechnics.

(2) Reference to engineering subjects.

(3) Continuity of sequence necessary for logical development of subject.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(20)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL AND ELECTRICAL ENGG.

COURSE : PHYSICS I.

COURSE CODE NO. : 103.

PREREQUISIT :

SCHEME OF STUDIES.

S.No.	Name of topic.	Theory Hrs.	Pract. Hrs.
1.	Physics and its importance in technician education.	1	
2.	SI units.	4	
3.	Force and Motion.	4	
4.	Circular Motion.	3	
5.	Periodic Motion.	6	
6.	Waves and Wave Motion.		
7.	Ultrasonics.	3	
8.	Gravitation.	5	
9.	Molecular Phenomena in Solids liquids and gases.	4	
10.	Kinetic theory of gases.	4	
11.	Surface Tension.	4	
12.	Viscosity.	3	
13.	Heat and work.	3	
14.	Hygrometary.	3	
15.	Heat transfer.	6	
		56	28

Total credits. 5

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.
(21)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL AND ELECTRICAL ENGG.

COURSE : PHYSICS .I

COURSE CODE NO. : 103 : PREREQUISIT :

S.No. TOPICS. SUBJECT TOPICS.

1. PHYSICS AND ITS IMPORTANCE IN TECHNICIAN EDUCATION,
   -Why teach physics, importance of fundamental sciences, Physics in particular.

2. S.I.UNITS:-S.I. units.
   -Base and supplementary units.
   -Derived units.
   -Symbols, abreviations and precautions.

3. FORCE AND MOTION :
   - Classification of Motion.
   - Concept of particle in Mechanics.
   - Characteristics of different type of motion .
   - Distrinction between rotary and circular motion.
   - Newton's laws of motion.
   - Velocity time and Distance- Time graphs.

4. CIRCULAR MOTION :
   - Circular Motion and related physical quantities.
   - Relation between linear and angular velocity.
   - Centripetal and centrifugal forces.
   - Banking of roads, and Bending of cyclist.

5. PERIODIC MOTION :
   - Emples of periodic motion.
   - Necessary conditions for the appearance and persuance of periodic motion.
   - Classification of periodic motion, based on forces acting on the source(particle)
   - Necessary conditions for the motion to be simple hormonic.
   - Characterstics of SHM.

6. WAVES AND WAVE MOTION :

- Wave propagation,
- Wave equation.
- Transverse waves.
- longitdnal waves.

7. ULTRASONICS :

- Audible frequencies.
- Infrasonics & ultrasonics.
- Production of ultrasonics, pizo electric, and Magnetostriction oscillator.
- Detection of ultrasonics, Pizo-electric & Thermal detectors.
- Applicastions, drilling, flowless detection cold welding, cleaning etc.

8. GRAVITATION :

- Newton's law of gravitation, gravitational field.
- Relation between 'g' & G
- Factors influencing 'g'
- Principe and technique of launching artificial Satelite.
- Natural and man made satelite.
- Overlouding and weightlessness in space flight.

9. MOLECULAR PHENOMENA IN SOLIDS LIQUIDS & GASES.

- Order of mass, size and speeds of motion of molecules in matter.
- Postulates of molecular kinetic theory of structure of matter and their caroboration with experiments.
- Brownian motion and Diffusion of gases liquids and solids, random motion of moles.
- Kinetic & potential energy of moles.
- Internal energy.
- Relation of internal energy with quantity of heat and temperature.

10. KINETIC THEORY OF GASES :

- Perfect gas.
- Postulates of kinetic theory of gases.
- Pressure exerted by a perfect gas.
- Kinetic interpretation of temperature.
- Absolute zero concept on kinetic theory.
- Deduction of gas laws.

11. SURFACE TENSION :

- Molecular forces.
- Cohesive and adhesive forces.
- Free still surface of a liquid tries to contract and its behaviour as a stretched membrane. Definition of S.T.
- For a given perimeter circle occupies largest area (Preparation of table)
- For a given volume sphere has the least surface area (Preparation of table)
-
- Reason for spherical shape of rain drops.
- Capillary rise.
- Meniscus and Angle of contact.
- Capillarity phenomena in Science & engineering.
- Effect of temperature on ST of liquids and gases.
- Experimental determination of ST of liquid by capillary rise (no derivation of formula required)

12. VISCOSITY :

- Concept of viscosity of fluids.
- Steady streamline and Turbulent flow.
- Viscus flow, critical velocity, Newton's law of viscus flow.
- Definition of coefficent of viscosity, and its experimental determination by posethics method.
- Dependance of viscosity of liquids on temp.
- Applications.

13. HEAT AND WORK :

- Nature of heat energy
- Relation of temp. of substance with KE of motion of molecules.
- Relation of internal energy of a body with quantity of heat, Heat balance equation.
- Concept of heat capacity, specific heat capacity.
- Variation of specific heat capacity of bodies in different temp. zones.
- First law of thermodynamics. Mechanical equivalent of heat.
- Concept of latent heat of fusion of ice and vaporistion of water.

14. HYGROMATARY :

- Importance of the knowledge of wetness of atmospheric air in industry and metrological observations.
- Concept of Absolute and Relative humidity and dew point.
- Determination of R.H., dew point hygrometer (Regnanlts), wet and dry bulb hygrometer and Hair's hygrometer.

15. HEAT TRANSFER :

- Modes of heat transfer.
- Concept of conduction, convection, radiation and eveporation transfer of heat.
- Explanation of different modes of heat transfer based on molecular theory.
- Variable and study state of heat conduction.
- Thermal conductivity 'K'.
- Determination of K of good conductor(searle's method)
- Natural and forced convection.
- Ventilation of buildings.
- Radiation, good and bad radiators, absorbers.
- Black body radiation.
- Prevost theory, stefan Boltzman law.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (25)

COURSE : PHYSICS I.
CODE NO. : 103
PROGRAMME : DIPLOMA IN CIVIL/MECH. & ELECT. ENGG.

(1) Fraction measurement by
(a) Vernier callipers
(b) Angular vernier.
(c) Micrometer screw.
(d) Travelling Microscope.

(2) To study SHM with the help of simple pandulum and investigate the effect of length, mass of bob, and amplitude on time period.

(3) To determine surface tension of liquid by capi--llary rise method.

(4) To determine coefficient of viscosity by poiso--ille's method.

(5) To determine thermal conductivity of a good conductor by Searle's method.

(6) To determine specific heat of a given solid with the help of Regnault's apparatus.

(7) To determine specific heat of a given liquid with the help of Regnault's apparatus.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (26)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL & ELECTRICAL ENGG.
COURSE : PHYSICS I.
COURSE CODE NO : 103
PREREQUISIT :

BOOKS RECOMMENDED

(1) Principles of Physics - Prepared by T.T.T.I. Bhopal.
(2) Principles of Physics - by Brijlal & Subrahamaniyam.
(3) Physics for Technician education by L.S. Zednor.
(4) A text Book of Applied Physics : By Mehta Banwat Suris Kaushik.
(5) Basic Applied Physics. -By R.K. Gour.

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M.DHY. PR.DESH BO.RD OF TECHNIC.L EDUC.TION,
BHOP.L. (27)

PROGR.MME : DIPLOM. IN CIVIL/MECH.NIC.L & ELECTRIC.L ENGG.
COURSE : PHYSICS II.
COURSE CODE NO. : 104
PREREQUISIT : -

R A T I O N .L E

Physics builds the foundation for all technician courses. The study of engineering subjects require the knowledge and comprehension of basic concepts like, light electric current and nuclear interactions. And hence these concepts are incorporated in the syllabi. A good foundation of fundamental sciences will also help student in his self development and to understand new technologies.

The different topics in Physics for the foundation course were identified on the following basis.

(i) The attainment level of students in Physics at the entry level in Polytechnics.
(ii) Reference to engineering subjects.
(iii) Continuity of sequence necessary for logical development of subject.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,

BHOPAL. (28)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL AND ELECTRICAL ENGG.

COURSE : PHYSICS II.

COURSE CODE NO. : 104

PREREQUISIT :

SCHEME OF STUDIES

PHYSICS II.

S.NO.	Name of topic.	TH. HRS	PR.HRS.	TOTAL.
1.	D.C. Circuits.	8		
2.	High temperature measurement.	4		
3.	Heating effect of electric current.	2		
4.	Comparative study of cells batteries and their maintenance.	3		
5.	Magnetic field.	2		
6.	Force on current carrying conductor.	3		
7.	Moving chrge in magnetic field.	3		
8.	Quantum nature of light photoelectric effect.	4		
9.	Radio-activity mass energy equivalent.	8		
10.	Refraction of light.	6		
11.	Defects of images.	3		
12.	Optical instrument.	5		
13.	Dispersion of light. -Scale of electromagnetic spectrum.	5		
		56	28	84

Credits 5

M.DHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (29)

PROGRAMME : DILOMA IN CIVIL/MECHANICAL AND ELECTRICAL ENGG.
COURSE : PHYSICS II.
COURSE CODE NO. 104
PREREQUISIT :

C O N T E N T S

S.No.	Name of topic.	Subtopics.
1.	D.C. Circuits.	- Electric current, free electron theory of metallic conduction. - Ohm's law, current-voltage relation resistance. - Dependance of resistance on diamensions and TEmp. - Grouping of resistances. - Determination of resistance, wheatstone bridge. - Internal resistance of sources of emf's - Potentiometer and its use to compare EMF's of two cells. - To determine internal resistance of cell.
2.	HIGH TEMP.MEASUREMENT :	- Principle of reistance thermometer. - Construction and working of resistance thermo- meter. - Accuracy and range of measurement. - Principle of thermocouple, seaback effect. - Neutral temp. and temp. of inversion. - Constructuion of thermo-electric thermo-meter. - Different elements forming thermo-couple. - Arrangement for protecting the hot junction, and keeping cold junction away. - Recording the developed thermo-emf. MV & potentiometer. - Accuracy and range.
3.	HEATING EFFECT OF ELECTRIC CURRENT.	- Joule's law of heating. - Electric work and Electric power. - Verification of joule's laws. - Calculation of electric energy consumed.

4. COMPARATIVE STUDY OF CELLS BATTERIES & THEIR MAINTENANCE :	- Comparative study of electrodes, (30) electrolytes, depolariser, emf's and order, of internal resistances of different cells and batteries with the aid of a chart.
	- Ampere-hour capacity of batteries
	- Sulphating of plates.
	- Testing and maintenance of secondary cells.
5. MAGNETIC FIELD :	- Magnetic field due to a magnet
	- Magnetic field due to a current carrying conductor.
	- Magnetic induction.
	- Magnetic induction due to a straight conductor carrying current.
	- Magnetic induction at the centre of a circular coil carrying current.
	- Magnetic induction of a solnoid.
	- Electro-magnet, relation between strength of electro-magnet and intensity of electric current.
6. FORCE OF CURRENT CARRYING CONDUCTIOR.	- Force acting on a current carrying conducor,
	- Fleming's left hand rule.
	- left hand palm rule.
7. MOVING CHARGE IN MAGNETIC FIELD.	- Magnetude of force on a moving charge 'q' $F = Bva \sin$
	- Conditions when no force acts on charge.
	- Path described by the charge in magnetic field.
8. QUANTUM NATURE OF LIGHT PHOTO-ELECTRIC EFFECT :	- Plank's quantum theory.
	- Photo-electric effect.
	- Chareactoristics of photo-electrons.
	- Einstein's photo-electric equation.
	- Laws of photo electric emission.
	- Photocell & other applications.

9. RADIO-ACTIVITY MASS ENERGY EQUIVALENT MASS DEFECT, BINDING ENERGY, FISSION AND FUSION.	- Radio- activity - properties of - Radio- active substances and half life period, - Radio- active isotopes. - Einstein's mass energy equation. - Mass defect and Binding energy - Nuclear fission - Nuclear fu sion.
10. REFRACTION OF LIGHT.	- Refraction of light & laws of refraction of light. - Speed of light in different media. - Refraction through prism. - Refraction through lenses. (no derivation of formula required) -Combination of lenses and power of a lens.
11. DEFECTS OF IMAGES.	- Defects of images. - Chromatic abberation. - Spherical aberration. - Removal of chromatic abberation. - Minimization of spherical abberation.
12. OPTICAL INSTRUMENTS :	- Simple microscope. - Compound microscope. - Astronomical telescope. - Terrestrial telescope. - Gallilian telescope.
13. DISPERSION OF LIGHT & SCALE OF ELECTROMAGNETIC SPECTRUM.	- Dispersion of light. - Dispersive power. - Impure spectrums. - Pure spectrum. - Spectrometer & measurement of refractive index. - Emission and Absorption spectrum - Scale of electro-magnetic spectrum range, detection & properties.

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M.DHY. PR.DESH BO.RD OF TECHNIC.L EDUC.TION,
BHOP.L. (32)

PROGR.MME : DIPLOM. IN CIVIL/MEC'.NIC.L & ELECTRIC.L ENGG.
COURSE : PHYSICS II.
COURSE CODE NO.: 104 PREREQUISIT : NIL

L I S T O F E X P E R I M E N T S

(1) To determine resistance of a conductior with the aid of meterbridge.
(2) To determine J- by electrical method.
(3) To compare EMF's of two cells with the aid of potentiometer.
(4) To determine internal resistance of a cell with the aid of potentiometer.
(5) To determine focal length of convexe lens by conjucate foci method.
(6) To construct an astronomical telescope on the optical bench and to find its magnifying power by visual observation and to verify it from actual calculations.
(7) To determine refractive index of prism material.
(8) To find refractive index of water.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(33)

PROGRAMME : DIPLOMA IN MECHANICAL AND ELECTRICAL ENGG. CIVIL

COURSE : PHYSICS II.

COURSE CODE NO. : 104

PREREQUISIT :

BOOKS RECOMMENDED.

(1) Principles of Physics - Prepared by T.T.T.I. Bhopal.
(2) Principles of Physics - by Brij lal & Subramaniyam.
(3) A text book of Applied Physics. - By Mehta, Nanwat, Suri & Kaushik.
(4) Basic Applied Physics - By R.K. Gour.
(5) Physics for Technician Education - By L.S.Zednov.

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M.P. PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (34)

PROGRAMME : DIPLOM. IN CIVIL/MECHANICAL & ELECTRICAL ENGG.

COURSE : CHEMISTRY - I

COURSE CODE NO. : 105

PREREQUISIT : ---

RATIONALE

The basic aim of teaching chemistry is to develop right type of attitudes in students. It develops in the students the habit of scientific enquiry, ability to investi--gate the cause and effect relationships, ability to predict the result under given conditions.

The knowledge of Chemistry is essential for tech--nicians and engineers because Chemistry is concerned with the changes in structures and properties of matter and all engineering activities and processes are involved to bring out the changes.

The depth and bredth of the contents were discussed and the topics were identified with due consideration to the following :

(1) The common requirement of chemistry for all Engineering courses.

(2) The attainment level in chemistry of the student entering Polytechnics.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(35)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG.

COURSE : CHEMISTRY - I.

COURSE CODE NO. : 105

PREREQUISIT : ---

SCHEME OF STUDIES.

S.No.	Topic.	Theory Hrs.	Pr. Hrs.	total.
1.	Atomic Structure and Nuclear Chemistry.	7		
2.	Colligative properties and chemical energetics.	6		
3.	Chemical Equillibrium.	4		
4.	Periodic classification of elements.	6		
5.	Redoximetery.	2		
6.	Electro-Chemistry.	6		
7.	Thermo-Chemistry.	4		
8.	Surface Chemistry.	4		
9.	Chemical process technology.	4		
10.	Metal and alloys.	13		
		56	28	84
	Credits	5		

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M.DYA PR.DESH BOARD OF TECHNIC.L EDUCATION, BHOP.L. (36)

PROGR.MME : DIPLOM. IN CIVIL / MECH.NIC.L / ELECTRIC.L ENGG.

COURSE : CHEMISTRY - I.

COURSE CODE NO. : 105

PREREQUISITE :

C O N T E N T S

1. Atomic Structure & Nuclear Chemistry. - Discovery of electron, Nucleous proton and neutron. .t No; .t mass. Bohrs Burry scheme. Sub shells electrovalency and Co-valency. Radio activity, .lfa Gamma & Beta rays. Theory of radio activity group dis--placement law, Half life period, Atomic fission & fusion.

2. Colligative proper--ties and Chemical Energetics. - Osmosis & osmotic pressure. Relative vapour pressure and Routl's law. Internal energy (enthalpy) Entrophy, Entropy fusion free energy. Effect of change in temperature catalysis.

3. Chemical Equilibrium. - Rate of reaction, factors effecting rate of reaction, Reversible reaction, law of mass action and its applications to reversible reactions. Le-Chateliers principle. Effect of Temp. pressure & concentration in MH3 and HI.

4. Periodic classification of elements. - Dobernior, Newland, Luther-mayer and Mandeleef law. .dvantage & disadvantage and limitation, periodicity, electron affinity, Modern periodic law. Classification on the basis of spdf, .ctinide & Lanthnide series.

5. REDOXIMETERY - Explanation of oxidation and reduction; oxidation number and its calculation. Radox reactions cal--culation of Chemical equivalents on its basis.

6. ELECTROCHEMISTRY - Explanation of electrolysis, Faradays laws of electrolysis electroplating of Cu & Ni.

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7. Themo Chemistry	- Heat of formation, Heat of neutra-lisation, Heat of reaction, Heat of obustion. Hesses law, simple numericals.
8. Surface Chemistry.	- True solution, colloidal solution & suspension, classification of colloids, properties of colloids, explanation of gels & emulsions.
9. Chemical Process Technology.	- Explaination of unit process in the manufacture of sodium carbonate & ammonia (their flow sheet diagram).
10. Metals and Alloys.	- General principles and terms used in metallurgy, purification and extraction of Cu, Fe and Al (flow sheet alloying purposes. Composition and uses of steel, brass, bronze, duralium alloy.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (38)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.
COURSE : CHEMISTRY - I.
COURSE CODE NO. : 105
PREREQUISITE:

LIST OF EXPERIMENTS

PRACTICALS Total Pract.Hrs (28)

(1) Identification of one cations in a given simple salt.
(2) Identification of one anions in a given simple salt.
(3) Identification of two cations in a given simple mixture.
(4) Identification of two anions in a given simple mixture.
(5) To determine percentage of copper in a given sample of brass iodometrically.
(6) To determine percentage of iron in a simple iron salt Redoximetrically.
(7) To determine percentage of iron in a complex iron salt Redoximetrically.
(8) Quantitative estimation of two metals in an alloy/solder brass.
(9) Colorimetric estimation of metals in a given sample of an alloy.
(10) To prepare colloidal solution, emulsion and gel.
(11) To study the general properties of colloidal solution.
(12) To set up a (danial) cell for conversion of chemical energy to electrical energy.
(13) Quantitative extimation of Normality of simple acid by acidimetry method.
(14) Qualitative estimation of normality of simple base by acidimetry method.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (39)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL / ELECTRICAL ENGG.

COURSE : CHEMISTRY - I.

COURSE CODE NO. : 105 :

PREREQUISITE : -

R E F E R E N C E S

(1) Physical Chemistry
by Bahl & Tuli.

(2) Advance inorganic Chemistry
by Mitra.

(3) Applied Chemistry
by Shrivastava & Singhal
PBS Pub. Bhopal.

(4) Objective Chemistry
by Shrivastava & Shrivastava
(Chandra Publication Bhopal.)

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (40)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL / ELECTRICAL ENGG.
COURSE : CHEMISTRY - II.
COURSE CODE NO. 106.
PREREQUISIT : ---

R A T I O N A L E

Chemistry is concerned with the changes in the structure and properties of matter. The basic aim of teaching chemistry to develop light type of attitude in the students. It develops in the students the habit of scientific enquiry ability to investigate the cause and effect relationships ability to predict the results under given conditions. A student of chemistry is able to make generalisation.

The chapter on pollution has been particularly included in the order to emphasize the effect on environment caused by the emanation by waste gases and other waste products from various chemical industries.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (41)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL & ELECTRICAL ENGG.

COURSE : CHEMISTRY II.

COURSE CODE NO. : 106 PREREQUISIT : —

SCHEME OF STUDIES

S.No.	TOPIC	TH. HRS.	PR.HRS.	TOTAL
(1)	Ionisation, pH corrosion and protection.	8		
(2)	Fuels, Nuclear fuels fuel cell.	8		
(3)	Glass and Refractory.	4		
(4)	Carbon Chemistry.	2		
(5)	High polymers.	4		
(6)	Insulators.	2		
(7)	Galvanizing & Electro plating.	3		
(8)	Paints Varnish and Lacquers.	4		
(9)	Pollution and control.	4		
(10)	Water.	8		
(11)	Bio-Mass and waste.	4		
(12)	Soaps and Detergents.	5		
		56	28	84

Credits = 5

MADHY. PR.DESH BO.RD OF TECHNICAL EDUC.TION,
BHOP.L. (42)

PRROGR.MME : DIPLOMA IN MECHANICAL /ELECTRICAL ENGG.
CIVIL
COURSE : CHEMISTRY - II.
COURSE CODE NO. : 106 : PREREQUISIT : --

C O N T E N T S.

S.No.	TOPIC.	
1.	IONIS.TION, pH CORROSION AND PROTECTION.	- Arhenius theory of ionisation. - Factors effecting ionisation. - Hydrolysis of salts, Acids, Bases . -pH meaning, numericals. -Buffer solutions & buffer actions. - Indicator & its choice in Acidimetry & Alkalimetry (pH curves.) - Explaination of corrosion. - Types of corrosion. - Factors effecting corrosion. - Corrosion control (Protection against corrosion.
2.	FUEL UNCLEAR FUEL AND FUEL CELLS.	- Introduction & classification of solid, liquid and gaseous fuel. - Proximate and ultimate analysis. - Petrdeum and its various fractionation products. - Calorific value, Gross & Net calorific value. - Introduction to Nuclear fuel. - Classification and application of Nuclear fuel. - Definition, classification and application of fuel cell.

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3.	GL..SS .ND REFR.CTORY.	- Raw materials, composition and manufacture of glass.
		- Varieties and .nnealing of glass
		- Meaning, Types and properties of various refereCtories.
4.	C.RBON CHEMISTRY.	- Satureated and unsturated hydro carbons.
		- Isomerism.
		- Laboratory preparation properties and uses of acteylene and ethyl alcohol.
5.	HYPOLYMERS.	- High polymers.
		- Polymerisation and condensation
		- Classification of plastics.
		- Preparation properties and uses of PVC, Polyethylene.
		- Synthetic fibres. Nylon, Rayon, Decron orlon & Polyesters.
6.	INSUL.TORS.	- Definition, Thermal insulators & their applications.
		- Characteristics, classification & properties of insulators .
		- Glass wool and Thermocole.
7.	G.LV.NIZING .ND ELECTROPLATING.	- Definition, classification Types & factors influencing galvanizing.
		- Definition, Principles involve & factors influencing electro--plating.
		- Electroplating of copper & nickle in regular & irregular articles.
8.	P.INTS V.RNISHES & LACQURES.	- Meaning, ingradiants and characteristics of paints, varnishes and lacquers.
		- Classification of paints & varnishes.
		- Manufacture of paint & varnish.
		- .pplication of paint, varnish & lacqures in Engineering field.

9. POLLUTION & CONTROL.	- Introduction and chemical Toxicology.
	- Air and water pollution.
	- Control of air and water pollu--tion.
	- Effect of waste gases and waste products in environment.
10. WATER.	- Sources of water.
	- Hardness of water, its causes, types and removal.
	- Boiler feed water.
	- Municipal water supply.
	- Determination of hardness . EDTA & . O'Henors'IS method .
11. BIOMASS & WASTE RECYCLING.	- Concept of Biomass
	- Chemistry of fuel gas from Biomass.
	- Production of Gobar gas from gobar gas plant.
	- Advantages and disadvantages of gober gas plant.
	- Concept of producing non-con--ventional energy from waste of plants. (organic matters).
12. SOAPS & DETERGENTS.	- Definition, characteristic
	- Classification of different types of soaps and their uses.
	- Soap action and soap as washing agent.
	- Industrial application of soaps.
	- Definition, Characteristics of detergents.
	- Difference between soaps and detergents.
	- Classification, preparation & uses of detergents.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(45)

PROGRAMME : DIPLOM. IN CIVIL / MECHANICAL / ELECTRICAL ENGG.
COURSE : CHEMISTRY II.
COURSE CODE NO. : 106 : PREREQUISIT : --

L I S T O F E X P E R I M E N T S.

(1) To determine the percentage of Moisture content from a sample of coal.
(2) To prepare Bakelite.
(3) To determine the pH value of a solution by
  (a) Colorimetric method.
  (b) Electrometric method.
(4) To estimate hardness of water
  (a) Temporary hardness by (i) Clarkenous method
    (ii) EDTA method.
  (b) Permanent hardness by (i) EDTA Method.
    (ii) Soap solution method.
(5) To determine Iodine value of sample of oil/fat.
(6) To determine soap orification value of a sample of oil/fat.
(7) To determine flash point of a sample of oil.
(8) Preparation of a Bio-gas.

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MADHY. PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (46)

PROGRAMME : DIPLOMA IN CIVIL/ MECHANICAL/ ELECTRICAL ENGG.

COURSE : CHEMISTRY II.

COURSE CODE NO. : 106 : PREREQUISIT : ----

LIST OF REFERENCE BOOKS.

(1) Text book of Engineering Chemistry
By S.S. Dara(S.Chand Publication)

(2) A Text Book of Engineering Chemistry
By. M.M. Uppal.

(3) Basic Applied Chemistry
By. P.C. Jain & Monica Jain
(Dhanpat Rai & Sons Pub.)

(4) Engineering Chemistry
By P.C. Jain & Monica Jain
(Dhanpat Rai & Sons Pub.)

(5) Applied Chemistry
By Shrivastava and Singhal
(PBS Publication, Bhopal)

(6) Experiments in Applied Chemistry
By M. Prasad (Chandra Publication Bhopal.)

M.DHY. PR.DESH BO.RD OF TECHNIC.L EDUC.TION,
BHOP.L. (47)

PROGR.MME : DIPL.M. IN CIVIL / MECH.NIC.L / ELECTRIC.L ENGG.
COURSE : M.THEM.TICS - I.
COURSE CODE NO. : 107

PREREQUISITE : ---

R.T I O N.L E.

M.thematics forms backbone for all technolo--gies and hence occupies an important place in the curriculum of polytechnic education. The subject is equally important for the future self development of polytechnic students. In designing the curriculum for foundation course the admission level to Polytechnics has been considered as 10th Board examination and mathematical needs of Technical subjects have been given due consideration.

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M.P.T.E. PRADESH BOARD OF TECHNICAL EDUCATION, (48)

CIVIL BRANCH.

PROGRAMME : DIPLOMA IN MECHANICAL/ ELECTRICAL ENGG.

COURSE : MATHEMATICS - I.

COURSE CODE NO. 107 PREREQUISITE :

SCHEME OF STUDIES.

Prerequisite - Nil
Theory hours.- 56
Tut.hours. - Nil
Total hours. - 56
Credits. - 04

S.No.	Topic.	Duration of Hours. Th.	Pr.	Tut.	Total
ALGEBRA.					
1.	Sequence and series.	1	-	-	1
2.	Arithmetical Progression	3	-	-	3
3.	Geometrical Progression.	3	-	-	3
4.	Harmonical Progression.	3	-	-	3
5.	Permutations.	3	-	-	3
6.	Combinations.	3	-	-	3
7.	Partial fractions.	3	-	-	3
8.	Binomial Theorem.	3	-	-	3
9.	Determinants.	4	-	-	4
10.	Exponential series.	3	-	-	3
TRIGONOMETRY					
1.	Trigonometrical ratios.	5	-	-	5
2.	Properties of Triangles.	5	-	-	5
3.	Trigonometrical Equations.	3	-	-	3
4.	Demoiver's Theorem.	4	-	-	4
DIFFERENTIAL CALCULUS.					
1.	Definitions.	2	-	-	2
2.	Differentiation.	6	-	-	6
3.	Successive Differentiation.	2	-	-	2
		56			56

Credits 4

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M.DHY. PRADESH BO.RD OF TECHNIC.L EDUCATION,
CIVIL BHOP.L. (49)

PROGR.MME : DIPLOM. IN MECH.NIC.L / ELECTRIC.L ENGG.

COURSE : M.THEM.TICS - I.

COURSE CODE NO. 107 PREREQUISIT :

M . T H E M . . T I C S - I.

.LGEBR.

(1) Sequence and Series	- Difference between sequence and series, General term of a series and to formulate a series.
(2) Geometrical Progression.	- Definition, Computation of n^{th} term, sum of n terms, .rithmetic mean.
(3) Geometrical Progression.	- Definition, computation of n^{th} term, sum of 'n' terms, Infinite Geometric series & Geometric mean.
(4) Harmonical progression.	- Definition, n^{th}, Harmonic mean.
(5) Permutations.	- Factorial notation, Permuta--tions of 'n' dissimilar things taken 'r' at a time. Different cases of the above permutations.
(6) Combinations.	- Combination of 'n' dissimilar things taken 'r' at a time and its different cases.
(7) Binomial Therorem.	- Statement of theorem for positive index, general term Middle term, use of theorem to approximate values. Sum of Binomial coefficients.
(8) Partial fractions.	- Principle of partial frection of different .lgebraic expressions, viz. cases of linear, different and repeated linear factors, Quadratic factors.
(9) Determinants.	- Concept and principles of Determinants, properties of determinants of order thre--e and simple problems for evaluation of determinants . solution of simultaneous equations of three unknowns by determinants.
(10) Exponential series.	- Statement of ex and sum of series given in exponential form.

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TRIGONOMETRY

1. Trigonometrical ratios – Sum and difference formulae, allied angles, Multiple and sub-multiple angles, product formulae and problems relating to them.

2. Properties of triangles. – Relation between sides and angles of a triangle i.e. Sine law , cosine formula projection formula and tangent formula.

3. Trigonometrical equations – Solution of trigonometrical equations based on

   $\sin \phi = \sin \alpha$
   $\cos \phi = \cos \alpha$
   $\tan \phi = \tan \alpha$

4. Demoiver's Theorem – Meaning of $i = \sqrt{-1}$, Definition of complex number in carterian and polar forms and their conver-sion , Statement of Demoiver's Theorem for any index. Applica-tion of Demoiver's theorem for algebraic equations such as $x^2 \pm 1=0$, $x^3 \pm 1=0$, $x^5 \pm 1=0$ etc.

DIFFERENTIAL CALCULUS

1. Definitions. – Definition of function, constant, variable, limit and evaluation of limits. Definition of differ-entiation and differentiation by first principles.

2. Differentiation – Differentiation of sum, product and quotient of two functions. Differentiation of a funtion of a function, Implicit function, Logarithmic function, Trigono-metrical functions, Parametric equations and exponential func-tions.

3. Successive differentia-tion. – Successive derivatives of a function w.r. to x and simple problems related to successive differentiation.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (51)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL / ELECTRICAL ENGG.

COURSE : MATHEMATICS -I.

COURSE CODE NO. : 107 PREREQUISIT :

MATHEMATICS -I

LIST OF REFERENCE BOOKS.

(1) Applied Mathematics Publisher Popular Book Depot. Bhopal.

(2) Mathematics for Polytechnic Vol. I T.T.T.I.. Bhopal.

(3) Applied Mathematics Publisher Deepak Prakashan, Gwalior.

(4) Algebra by Hall and Knight.

(5) Trigonometry. by S.L. Loney.

(6) Calculus. by G. Prasad.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(52)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL / ELECTRICAL ENGG.

COURSE : MATHEMATICS -II.

COURSE CODE No. 108 : PREREQUISIT :

RATIONALE

Requisite knowledge of Mathematics for the entrants to Polytechnics can not be denied. The depth and breadth of Mathematics needed will vary from course to course hence the topics included for Mathematics have been selected after carefully analysing the needs of each course.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (53)

CIVIL

PROGRAMME : DIPLOM. IN MECHANICAL / ELECTRICAL ENGG.

COURSE : MATHEMATICS -II.

COURSE CODE NO. : 108 : PREREQUISIT : —

SCHEME OF STUDIES.

S.No.	Topic	Duration of hours Th.	Pr.	Tut.	Total
	COORDINATE GEOMETRY				
1.	Coordinate system	1	–	–	1
2.	Distance, Division and area.	2	–	–	2
3.	Standard forms of the equation of a straight line.	4	–	–	4
4.	Intersection of straight lines.	4	–	–	4
5.	Change of axes.	1	–	–	1
6.	Pair of straight lines.	2	–	–	2
7.	General equation of second degree.	3	–	–	3
8.	Circle.	3	–	–	3
9.	Conic section.	1	–	–	1
10.	Parabola.	4	–	–	4
11.	Ellipse.	3	–	–	3
12.	Hyperbola.	3	–	–	3
	VECTOR ALGEBR.				
1.	Introduction of vectors.	1	–	–	1
2.	Addition of vectors, components of vectors.	4	–	–	4
3.	Multiplication of vectors.	2	–	–	2
4.	Application of product of two vectors.	3	–	–	3
	INTEGRAL CALCULUS.				
1.	Integration.	2	–	–	2
2.	Methods of Integration.	5	–	–	5
	MATRIX.				
1.	Matrix.	1	–	–	1
2.	Special Matrices.	2	–	–	2
3.	Operation and different laws.	5	–	–	5
		56			56

Credits 4

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (54)

PROGRAMME : DIPLOM. IN CIVIL / MECHANICAL / ELECTRICAL ENGG.

COURSE : MATHEMATICS -II.

COURSE CODE NO. : 108 : PREREQUISIT : ---

COORDINATE GEOMETRY :

1. Coordinate system. - Cartesian and polar coordinates and relation between them.

2. Distance, Division & area. - Distance between two points, Division of a line segment, area of triangle.

3. Standard forms of the equation of a straight line. - Locus of a point, standard forms viz $y = mx + c$, $\frac{x}{a} + \frac{y}{b} = 1$ and $x \cos\alpha + y \sin\alpha = p$, General equation of a straight line and its reduction to the standard form. Equation of straight line passing through one point and two points.

4. Intersection of straight lines. - Point of intersection of two lines, angle between two straight lines, Bisector of the angle between the two straight lines. Length of perpendicular.

5. Change of axes. - Transformation of coordinates when the origin is shifted or the axes are rotated.

6. Pair of straight lines. - Homogeneous quadratic equation $ax^2 + 2hxy + by^2 = 0$. Properties of the pair of straight lines represented by the above equation.

7. General equation of second degree. - Condition that the general equation of second degree represents a pair of straight lines, point of intersection and the angle between them.

8. Circle. - Definition, standard form, general equation, centre, radius, tangent and normal.

9. Conic Section. - General equation of second degree and its representation in particular cases.

Contd..

10.	Parabola.	- Definition and its standard forms, General equation of parabola, tangent and normal Geometrical properties.
11.	Ellipse.	- Definition, standard equation, Tangent and normal.
12.	Hyperbola.	- Definition, standard equation, Asymptotes, rectangular hyperbola and confugate hyperbola.

VECTOR ALGEBRA.

1.	Introduction of vectors	- Concept of vector and scalar quantities.
2.	Addition of vectors components of vectors.	- Principles of addition and sub-straction of vectors, componant of vectors, standard unit vectors i, j, k.
3.	Multiplication of vectors.	- Scalar and vector product of two vectors.
4.	Application of product of vectors.	- Work done, Power, Power-factor, moment of a force about a point and reactive power.

INTEGRAL CALCULUS.

1.	Integration.	- Definition, Fundamental properties of Integration.
2.	Methods of Integration.	- Integration by substitution, Integration by parts.

MATRIX

1.	Matrix.	- Definition of matrix.
2.	Special matrices.	- Row matrix, column matrix, sub-matrix, Square matrix, Diagonal matrix, principal diagonal, Determinant of a square matrix, unit matrix, scalar matrix, zero or null matrix, upper and lower triangular matrices, symmetric and skew symmetric matrices.
3.	Operation and different Laws.	- Scalar multiple of a matrix, Addition of matrices, commutative and associative law, Transpose of matrix, product of matrices, Reversal law for the transpose of a product, adjoint of a square matrix, singular and Non- singular matrices, Inverse of a matrix, Reversal law for the inverse of a product of matrices.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (56)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG.

COURSE : MATHEMATICS II.

COURSE CODE NO. : 108

LIST OF REFERENCE BOOKS.

MATHEMATICS - II.

(1) Co-ordinate Geometry by S.L. Loney.
(2) Mathematics for Polytechnic
Vol. I and Vol. II- prepared by T.T.T.I. Bhopal.
(3) Vector Algebra - B.R. Thakur.
(4) Applied Mathematics - Popular Book Depot, Bhopal.
(5) Applied Mathematics - Deepak Prakashn, Gwalior.
(6) Integral calculus by Gorakh pd.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING,
MECHANICAL ENGINEERING
AND
ELECTRICAL ENGINEERING
UNDER
MULTIPOINT ENTRY AND CREDIT SYSTEM

* *

DETAILED SYLLABUS

CIVIL
HARD CORE COURSES FOR MECHANICAL AND
ELECTRICAL ENGINEERING

201 - APPLIED MECHANICS
202 - ENGINEERING DRAWING
203 - WORKSHOP PRACTICE

* *

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.

* *

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PREFACE

In Madhya Pradesh most of the Polytechnics offer straight joacketed Diploma programmes in Civil, Mechanical, Electrical and Electronics & Tele Communication Engg. Curriculum is is the most crucial input in a technical education, hence, initiating to develop a need based curriculae for establishing relevance of Polytechnic outpnt 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 apportunity for taking alternative courses appropriate to their capability.

The National policy on Education, threfore, 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 Schcme of flexible structure has been introduced at S.V. Govt. 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+

(Contd..2)

(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 Teachers Training Institute, Bhopal. The first workshop for preparing the syllabus of the above three disciplines was conducted at TTTI, 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 MPECS. 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 overlapse of the content.
(d) Relevance of the content.
(e) Prerequisite of the content.

(Contd...)

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

We are highly grateful to the Director Technical Education and prof. C. A. Keshwani, 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 prof. 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.

Sd/-
Secretary,
M.P. Board of Technical Education,
Bhopal.

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L I S T O F P A R T I C I P A N T S.

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 Polytechnic, 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.C. 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.

I.I.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. Ramanna.	
(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, BHOPAL.
SCHEME OF STUDIES & EXAMINATION OF DIPLOMA IN CIVIL, MECHANICAL & ELECTRICAL ENGG.(MPECS.)
2. HARD CORE.

S.No.	Code No.	Courses.	Pre-requisite.	Hours/week Th.	Hours/week Pr.	Credits.	Sessional Term work	Sessional Lab. work	Progressive Assessment I	Progressive Assessment II	Board Exam Theory Paper	Board Exam Theory Dur.	Board Exam Theory Marks.	Pract./Viva Pr.	Pract./Viva Dur.	Pract./Viva Marks.	Remarks.
		HARD CORE.															
1.	201	Applied Mech.	-	3	2	4	20	20	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
2.	202	Engineering Drawing.	-	2	4	4	20	-	10	10	1	4 Hrs.	100	-	-	-	
* 3.	203	Workshop Practice.	-		8	4	-	20	-	-	-	-	-	1	3 Hrs.	50	
				Total Credits		12											

(1) Hard core courses are compulsory for 10+ and 12+ students.

(2) Course code 201 is common to DCTM/DME/DEE/DCE.

* Evaluation in Theory paper, Term work, Progressive assessment has been removed. The theory period (1 theory/week) has been removed & practical periods has been increased from 6 to 8 in 203 workshop course. This course is renamed as workshop Practice.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (63)

PROGRAMME : DIPLOMA IN CIVIL / MECH. AND ELECT. ENGG.
COURSE : APPLIED MECHANICS.
COURSE CODE NO. : 201
PREREQUISITE : NIL.

RATIONALE

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 disciple 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 this 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.

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M.P.GOVT. PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN CIVIL,MECH.ENGG.& ELECT. ENGG.
COURSE : APPLIED MECHANICS.
COURSE CODE NO. : 201
PRE-REQUISITE : NIL

SCHEME OF STUDIES.

S.No.	TOPIC.	TH. HRS.	PR. HRS.	TOTAL
(1)	Composition & Resolution of forces.	4	6	10
(2)	Parallel forces & couples.	3	2	5
(3)	Moments & their applications.	3	2	5
(4)	Equilibrium of forces.	4	4	8
(5)	Centre of gravity & 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 & energy.	3	2	5
		42	28	70

Total Credits : 4

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (65)

PROGRAMME : DIPLOMA IN CIVIL, 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. combiningt two or more coplaner concurrent forces, in to one single force, graphi--cally and analytically.

Resolving the given forces in any two directions perpendicular 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-con--current forces.

Laws of (1) Parallelograph of forces.
(2) Triangle forces.
(3) Polygon of forces.
(4) 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 of 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.

(4) EQUILIBRIUM OF FORCES.

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

Free body diagram condition of statical equilibrium of a rigid body, body acted upon by a system of concurrent forces and non- concurretnt forces, laws of parallelogram of forces, triangle of forces, poygon 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 intertia and rdius of gyration and relation between them moment of inertia of a Lamina and diffe--rent sections, Moment of inertia at its C.G. Perpendicular axis theorem, parallel axis theorem, M.I. of a symmetrical and unsymmetrical sections at the above axis.

(6) FRICTION.

Introduction to the subject related to the Engineer--ing works, characteristics and conditions to develop a fric--tional force. Types of friction, Limiting equilibrium, Angle of friction, Angle of repose, Laws of friction, equilibrium of a body on an inclined plane, with force acting along the plane, Simple problems on friction when the body is dragged on hrizontal plane and iclined plane.

(7) SIMPLE LIFTING MACHINE :

Inroduction, 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 machime, 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 :

Momontum, 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) $v=u + ft$, (b) $v^2 = u^2 + 2fs$ (c) $s = ut + 1/2ft^2$ 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 retation.

(11) WORK, POWER AND ENERGY.

Definition of work, power, energy, impulse, principle of conservation of mementum, units of the above, work done, work done by a varying force, graphical representation of work done 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,
CIVIL BHOPAL. (68)

PROGRAMME : DIPLOMA IN / 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 Lib crane.comparision of the results by vector diagrams and by Lami's theorem.

(10) To find out :

(a) Velocity ratio.

(b) Mechanical Advantage and

(c) Effeciency of Differential wheel and axle and interpcrate the law of machine Drawgraph.

(11) To find out the velocity ratio, Mechanical advantages and efficiency of single purchase crab and interpcrate 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 interpcrate the result graphically.

(13) To find out the V.R., M. Adv and efficiency of screw Leck demonstrate its working, interpcrate the results graphically.

(14) To find out the V.R. M. Adv. and efficiency of Differential pulley block. Interpcrate the law of machine.Draw Graph.

(15) Measurement of Brake Horse power of an engine by Rope Brake Dynamometer, Drive expression of measuring H.P. with rope Brake Dynamometer.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(69)

PROGRAMME : DILOMA IN CIVIL, 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 Timo Shinko.
(4)	Applied Mechanics.	By Sadhu Sing.
(5)	Applied Mechanics.	By Sharma.
(6)	Applied Mechanics.	By S.N.Junarkar.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(70)

PROGRAMME : DIPLOMA IN CIVIL / MECH. & ELECTRICAL ENGG.
COURSE : ENGINEERING DRAWING.
COURSE CODE NO. : 202.

RATIONALE

Engineering Technician irrespective of his field of operation in an industry is expected to possess a thorough understanding of drawing which includes clear spatial visualisation of objects and the proficiency in reading and interpreting a wide variety of engineering drawings. Besides this i he is also expected to possess a certain degree of drafting skill- depending upon his job functions- in his day -to -day activities. This course of Engineering Drawing for Diploma courses in Mechanical and Electrical Engineering is aimed at developing basic knowledge and skill, of Engineering Drawing.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (71)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL AND ELECTRICAL ENGG.
COURSE : ENGINEERING DRAWING.
COURSE CODE NO. : 202.

S C H E M E OF S T U D I E S.

S.No.	TOPIC	TH.HRS.	PRACT.HRS.	TOTAL HRS.
1.	Introduction to drawing & drawing instruments.	1	-	01
2.	Planning and layout of drawing	1	-	01
3.	Standard convention & symbols in Engg. Drawing practice.	02	-	02
4.	Line & letter printing.	02	-	02
5.	Scales.	02	-	02
6.	Engineering curves.	03(4Plates)	4	07
7.	Dimensioning techniques.	02	-	02
8.	Orthographic projections of points, lines & planes.	04	17(3plates)	21
9.	Projection of solids.	02	05(1plate)	07
10.	Section of solids.	02	05(1plate)	07
11.	Intersection of surfaces.	01	06(1plate)	07
12.	Development of surfaces.	02	05(1plate)	07
13.	Projection of simple machine parts and components.	02	09(1pair)	11
14.	Isometric Projections.	02	05(1 plate)	07
		28	56	84
	Total	28 hrs.	56 hrs. (10 Plates)	84 hrs.

Credits 4

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, (72)
BHOPAL.

CIVIL

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

COURSE : ENGINEERING DRAWING.

COURSE CODE NO. : 202

PREREQUISITE : NIL.

C O N T E N T S.

TOPIC - 1 INTRODUCTION TO DRAWING INSTRUMENTS.

Introduction to drawing equipments, instruments and their uses.

TOPIC -2 PLANNING AND LAYOUT OF DRAWING.

Planning of drawing sheet as per I.S. 696 -1972, Indian standard practices of laying out and folding of drawing.

TOPIC- 3 STANDARD CONVENTIONS AND SYMBOLS USED IN ENGG. DRAWING PRACTICE.

Identification and representation of various symbols used in Mech. Engg. Drawing, Identifi--cation and representation of various symbols used in electrical Engg. Drawing Indentification and representation of various symbols of buil--ding elements, materials and sanitary fittings.

TOPIC- 4 LINES AND LETTER PRINTING.

Different types of lines used in engineering practices, practice problems for representation of each type of line, standard practice for writing single stroke vertical and inclined capital and lower cases letters, standard practice of writing numerals.

(practice to be done on sketch book)

TOPIC -5 SCALES.

Importance of scale in Engineering Drawing, Types of scales- Plain, diagonal and vernier scale, practical problems for constructing various types of scale.

(Practice to be done on sketch book)

TOPIC -6 ENGINEERING CURVES.

Form associated with engineering curves, types of engineering curves, Method of construction of engg. curves, practice problems of drawing various engg. curves.

TOPIC- 7 DIMENSIONING TECH-NIQUES.

Principles, system and arrangement of dimensioning, practice problems as of current method of dimension--ing.

TOPIC- 8 ORTHOGR.PHIC PROJECTION OF POINTS LINES AND PLAN-ES.

Definitions of various terms associated with ortho--graphic projections, planes of projections, quadrants, first and third angle method of projection, practice problems on projection of points projection of line in different positions with respect to H.P.,V.P. and X-Y line, projection of planes in different position with respect to reference planes.

TOPIC -9 PROJECTIONS OF SOLIDS.

Types of solids, terminology, position of solid with respect to reference planes, procedure of drawing projections of solid in different position with respect to reference planes, practice problems to draw projections of solid in different positions.

TOPIC -10 SECTION OF SOLIDS.

General concept of sectioning, planes, auxiliary planes and true shape of section, practice problems for drawing projections and section of solids.

TOPIC-11 INTERSECTION OF SURF.CES.

Definitions of intersection of surfaces and its applications, distinction between line method and cutting plane method, practice problems for drawing lines of intersection of different intersecting solids.

TOPIC -12 DEVELOPMENT OF SURFACES.

Concept and importance of development in Engineering applications stating few important applications, parallel line and radial line method, practice problems.

TOPIC-13 PROJECTIONS OF SIMPLE MACHINE PARTS AND COMPONENTS.

Procedure for drawing projections and sectional views of simple machine components, practice problems of sketching and drawing the projections and sections of simple machine components, assembly drawing of simple machine parts.

TOPIC -14 ISOMETRIC PROJECTIONS.

Limitations of orthographic projections, definitions of the terms Axonometric, Oblique, Isometric and dimetric projections, procedure for preparing isometric oblique drawing of geometrical solids and simple machine parts, practice problems.

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5/75.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (75)

PROGRAMME : DIPLOMA IN CIVIL/MECH. ENGG. & ELECT. ENGINEERING.

COURSE : ENGINEERING DRAWING.

COURSE CODE NO. : 202

PREREQUISITE : NIL.

LIST OF PLATES.

(1)	Engineering curves.	1 plate.
(2)	Orthographic projection of points, lines and planes.	3 plates.
(3)	Projection of solids.	1 Plate.
(4)	Section of solids.	1 Plate.
(5)	Intersection of surfaces.	1 Plate.
(6)	Development of surfaces.	1 Plate.
(7)	Projection of simple machine parts and components.	1 Plate.
(8)	Isometric Projections.	1 Plate.

total plates 10

5/76

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, (76)
BHOPAL.

CIVIL

PROGRAMME : DIPLOMA IN MECH. ENGG. AND ELECT. ENGG.
COURSE : ENGINEERING DRAWING.
COURSE CODE NO. : 202
PREREQUISITE : NIL.

LIST OF REFERENCE BOOKS.

(1) I.S. 696. (Latest revision).
(2) Engineering Drawing
By N.D. Bhatt.
(3) Engineering Drawing & Machine Drawing.
By Dhawan Kumar.
(4) Engineering Drawing
By R.B. Gupta.
(5) Geometrical Drawing.
By P.S.Gill (Publisher- Ketson & Sons.)
(6) Machine Drawing
By P.S. Gill (Publisher- Ketson & Sons.)

5/77

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, (77)
BHOPAL.

PROGRAMME : DIPLOMA IN CIVIL/MECH. ENGG. & ELECT. ENGG.
COURSE : WORKSHOP PRACTICE
COURSE CODE NO. : 203 PREREQUISITE : NIL.

R A T I O N A L E.

The use of workshop operations and processes are advancing day by day with the explosion of technology. Engineering technician, irrespective of his field of operation in industry, is expected to know thoroughly the use of engineering materials, metals, non-metals with reference to their mechanical properties. The proficiency in measurement, wood working , fitting and joining methods is also very necessary for technician.

This course in workshop for Diploma course in Mechanical Engg. and Electrical Engg. is aimed at developing skills in various operations useful in various fields.

5/78

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(78)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL ENGG. & ELECTRICAL ENGG.

COURSE : WORKSHOP PRACTICE

COURSE CODE NO. : 203

S C H E M E O F S T U D I E S.

	Theory	Pract.	Total.
1. Engineering material.			
1.1 Metal	3	-	3
(a) Ferrous			
(b) Non-ferrous.			
1.2 Non-Metal			
- Timber			
- Plastics			
- Ceramics			
2. Measurement.	2	6	8
3. Safety.	1	-	1
4. Wood working (carpentry)	2	21	23
5. Metal working.	3	33	36
5.1 Fitting			
5.2 Smithy.			
5.3 Sheet metal			
6. Joining Methods.	3	24	27
6.1. Welding			
6.2. Soldering & Brazing.			
6.3. Riveting.			
	14	84	98

Credits - 4

5/79

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.

(79)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL & ELECTRICAL ENGG.
COURSE : WORKSHOP PRACTICE
COURSE CODE NO. : 203
PREREQUISITE : NIL.

C O N T E N T S.

1. ENGINEERING MATERIALS :

Classification- Metals and Non-metals
Metals - Ferrous(Pig iron, Wrought iron, Cast Iron, Steel, Alloy steels), Non-ferrous metals(Copper, ... Aluminium, Tin Zinc, Lead)
Non-metals(Timber, Plastic and Ceramics)
-Physical, chemical and mechanical properties, fields of application.

2. MEASUREMENT.

Standards of measurement, Workshop measurements- Measuring devices- Listing, Areas of application with reference to precision.

3. SAFETY :

Definition, need, Introduction to safety measures commonly employed in workshop.

4. WOOD WORKING. :

Listing of carpentry tools and machanics and their uses, various wood working operations, wood joints types and use.

5. METAL WORKING. :

Introduction, Listing of tools and operations performed in Fitting, smithy and sheet metal shops and fields of application.

6. JOINING METHODS. :

Introduction, joining methods in Engineering field Welding, soldering, Brazing and Riveting- overview of processes involved, limitation, tools and equipment employed.

5/80

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL. (80)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL ENGG. & ELECTRICAL ENGG.

COURSE : WORKSHOP PRACTICE

COURSE CODE NO. 203

PREREQUISITE : NIL.

LIST OF PRACTICALS.

(1) Measurement

Identification and use of the various measuring tools & instruments.

1.1 Linear measurements and measuring devices.

1.2 Angular measurements and measuring devices.

1.3 Other measuring tools such as surface plate, surface gauge, plate gauge, factor gauge, thread gauge etc.

2. Wood working (Carpentry shop)

2.1 Identification of carpentry tools and their uses.

2.2 Perform various wood working operations.

2.3 Identifications of various carpentry joints and their preparations.

3. Fitting shop.

3.1 Identification of various tools used and the operations performed in fitting shop.

3.2 Perform various fitting operations.

3.2.1 Marking of jobs as per dimension.

3.2.2 Sawing.

3.2.3 Chipping.

3.2.4 Filling

3.2.5 Taping

3.2.6 Reaming

3.2.7 Drilling

4. Smithy shop

4.1 Identification of various tools and equipments used & their use.

(81)

4.2	Perform various smithy operations.
4.2.1	Upsetting.
4.2.2.	Drawing down.
4.2.3.	Bending
4.2.4.	Setting down
4.2.5.	Welding.
4.2.6.	Cutting.
4.2.7.	Punching.
4.2.8.	Fullering.
5.	Sheet metal.
5.1.	Identification and use of the various tools.
5.2.	Perform various sheet-metal operations.
5.2.1.	Shearing.
5.2.2.	Bending.
5.2.3.	Drawing.
5.2.4.	Squeezing.
5.2.5.	Marking on sheet.
5.2.6.	Snipping.
5.2.7.	Grooving.
6.	Welding shop.
6.1.	Identification and use of the various tools and equipments.
6.2.	Perform the arc welding and gas welding operations.
6.3.	Perform the soldering and Brazing operations.

5/82

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, (82)
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGG. & ELECTRICAL ENGG. CIVIL

COURSE : WORKSHOP PRACTICE

COURSE CODE NO. : 203

PREREQUISITE : NIL.

LIST OF REFERENCE BOOKS.

(1) Workshop Technology (Vol.I)
Hajara & Choudhary

(2) Workshop Technology - (Vol.I & II)
Chapman

(3) Manufacturing process (Vol.I)
Dalela.

(4) Materials and Manufacturing.
Lindberg Processes.

5/83

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(83)

* *

THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING
MECHANICAL ENGINEERING
AND
ELECTRICAL ENGINEERING
UNDER
MULTIPOINT ENTRY AND CREDIT SYSTEM.

* *

DETAILED SYLLABUS

SOFT CORE COURSES FOR MECHANICAL AND ELECTRICAL

301 - COMPUTER APPLICATION
302 - ENVIRONMENTAL ENGINEERING
303 - ELEMENTS OF CIVIL ENGINEERING
304 - MARKETING MANAGEMENT
305 - NON CONVENTIONAL SOURCES OF ENERGY.
306 - ENTREPRENEURSHIP
307 - MATHEMATICS III.
(*) 308 - ELEMENTS OF MECH.& ELECT. ENGG.

* *

Note : (*) only for Civil engg. course

* *

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.

5/84

PREFACE

In Madhya Pradesh most of the Polytechnics offer straight joacketed Diploma programmes in Civil, Mechanical, Electrical and Electronics & Tele Communication Engg. Curriculum is is the most crucial input in a technical education, hence, initiating to develop a need based curriculae 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 apportunity for taking alternative courses appropriate to their capability.

The National policy on Education, threfore, 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. Govt. 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+

(Contd..2)

(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 Teachers Training Institute, Bhopal. The first workshop for preparing the syllabus of the above three disciplines was conducted at TTTI, 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 MPECS 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 overlapping of the content.
(d) Relevance of the content.
(e) Prerequisite of the content.

(Contd...)

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

We are highly grateful to the Director Technical Education and prof. C. A. Keshwani, 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 prof. 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.

Sd/-
Secretary,
M.P.Board of Technical Education,
Bhopal.

5/87

L I S T O F P A R T I C I P A N T S.

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 Polytechnic, 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.C. 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. Ramanna.	
(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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5/88

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.

SCHEME OF STUDIES & EXAMINATION OF DIPLOMA IN CIVIL, MECHANICAL & ELECTRICAL ENGINEERING.
(M.P.B.C.S.)

w.e.f. August/September, 1992.

SOFT CORE

S.No.	Code No.	Course.	Pre-requisite.	Hours/Week Th.	Pr.	Credits	Sessional Term Work	Sessional Lab work	Progressive Assessment I	Progressive Assessment II.	Board Exam. Paper	Theory Dur.	Theory Marks.	Pract./Viva Pr.Dur.	Pract./Viva Marks	Remarks
		1 SOFT CORE.														
1.	301	Computer Application.	-	2	2	3	20	20	10	10	1	3 Hrs.	100	1	3 Hrs. 50	
2.	302	Environmental Engg.	-	3	-	3	20	-	10	10	1	3 Hrs.	100	-	-	-
3.	303	Elements of Civil Engg.	-	2	2	3	20	20	10	10	1	3 Hrs.	100	1	3 Hrs. 50	
4.	304	Marketing Management.	-	3	-	3	20	-	10	10	1	3 Hrs.	100	-	-	-
5.	305	Non Conventional Source of Energy.	-	2	2	3	20	20	10	10	1	3 Hrs.	100	1	3 Hrs. 50	
6.	306	Entrepreneurship	-	3	-	3	20	-	10	10	1	3 Hrs.	100	-	-	-
7.	307	Maths. III	-	3	-	3	20	-	10	10	1	3 Hrs.	100	-	-	-
8.	308	Elements of Mech. & Elect. Engg.	-	3	-	3	20	-	10	10	1	3 Hrs.	100	-	-	-

TOTAL CREDITS 12

(1) Any four courses will be offered by each student.

(2) Code No. 308, i.e. Elements of Mechanical and Electrical Engineering subject is only for Civil Engg. Course.

5/89

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (83)

PROGRAMME : DIPLOMA IN ~~MECHANICAL~~ CIVIL ENGG./ELECTRICAL ENGG.

COURSE : COMPUTER APPLICATION.

COURSE CODE NO. : 301

PREREQUISITE : NIL.

R A T I O N A L E.

As there is vast development in working of modern trends. For fast and accurate working now computer has come in almost every field. In the subject we have given basic idea of the micro Processor and its programming, because it is now being used in control system. In the course students will come to know about computers and their field of application, idea about flow charting and programming in FORTRAN language which is very useful for scientific and engineering applications. In the course the idea about word-star dbase and spread-sheet is also included because these are very useful for commercial works. This course also covers the course which is a prerequisite for computer engineering.

5/70

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, (30)
BHOPAL.

PROGRAMME : DIPLOMA IN CIVIL/TECHNICAL /ELECTRICAL ENGG.
COURSE : COMPUTER APPLICATION.
COURSE CODE NO. : 301
PREREQUISITE : NIL.

SCHEME OF STUDIES

S.No.	TOPIC	TH.HRS.	PR.HRS.	TOTAL.
(1)	Introduction to micro-processor.	4	4	8
(2)	Introduction to computers.	6	2	8
(3)	System software.	2	2	4
(4)	Basic concept of programming.	4	2	6
(5)	Fortran programming.	11	14	25
(6)	Introduction to application packages.	5	8	13
	Total	32	32	64

Credit - 3

Note :- This course 301 is common to DCTM/DME/DEE Programme.

5/91

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, (91)
BHOPAL.

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.
COURSE : COMPUTER APPLICATION.
COURSE CODE NO. : 301

PREREQUISITE : NIL.

C O N T E N T S.

TOPIC NO. 1 : Introduction to microprocessor : Achitecture of microprocessor. Organisation of microprocessor 8085/8086 Arithmetic and logic unit, control unit Registers, data input and out put. Instruction set of 8085 and programming for addition, subtraction and data transformation.

TOPIC NO.2 : Computer hardware and software, Architecture of computer, CPU, Input and output devices. Memory units, main memory and secondary memories. Classification of computers. Mico (PC,PC/xy and AT), mini Main- fram and super computer, their elementry idea, comparision and field of applications.

TOPIC NO.3 SYSTEM SOFTWARE : Introduction to system software and applications. Elementry idea about disc. operting system.

TOPIC NO. 4. Basic concept of programming :- Introduction to programming, programme phases, programme definition and documentation, Flow charts, programme coding, machine language, Symbolic language. High level languages, Definition, types and specific applications.

TOPIC No. 5 FORTRAN PROGRAMMING : Introduction, Algorthm, Fortran character set, numbers, variable names, statements and commands, type declaration state--ment, arithmatic operations, assignment state--ments, Input and output statements, looping and branching with unconditional and conditional statements, Do-statements, termination statements, array and subroutines. Simple programming for engineering and mathematical problems.

TOPIC NO. 6 Introduction to application packages. : Elementry idea of word star , Dbase and spread sheet and their field of application and opera-tional commands.

5/93

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. (93)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL / ELECTRICAL ENGG.

COURSE : COMPUTER APPLICATION.

COURSE CODE NO. : 301

PREREQUISITE : NIL.

LIST OF EXPERIMENTS.

(1) To study a microprocessor 8085

(2) To write assemmbly language programme for addition, subtraction and data transfer.

(3) Practice of general command of ms. Das.

(4) To draw flow charts and analyse the problems given.

(5) To write simple programs in fortran language.

(6) Practice on wordstar, dbase and spread sheet.

5/94

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
CIVIL BHOPAL.

(94)

PROGRAMME : DIPLOMA IN MECHANICAL / ELECTRICAL ENGG.
COURSE : COMPUTER APPLICATION
COURSE CODE NO. : 301
PREREQUISITE : NIL.

LIST OF REFERENCE BOOKS.

(1) Introduction to Microprocessor - A.P. Mathur.
Pub. Tata - McGraw Hill, N. Delhi.

(2) Microprocessor with application in process control-
S. Ahson. Pub. Tata Mc-Graw Hill, N. Delhi.

(3) Mini Computer systems.
- Richard H. Eckhouse.
Pub. Prentice Hall of India.

(4) Fortran 77 Programming
-schaum's Outline Series.

(5) Introduction to Fortran 77 and Personal Computer
- R.H. Hammond.
- Rogers and Cuffenden.
Pub. McGraw Hill.

(6) Digital Computer - Malvino.

(7) Programming with Fortran 77 By Rankumar
Pub. McGraw Hills.

(8) Computer and application - Price.
Software, An introduction
Pub. Half Samuders.

(9) Understanding FORTRAN 77 with structural
problem solving . Michel Boillot
Pub. Jairo Publishing House.

5/95

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(95)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL / ELECTRICAL ENGG.
COURSE : ENVIRONMENTAL ENGINEERING.
COURSE CO-DE No. 302
PREREQUISITE : NIL.

R A T I O N A L E

Engineers and Scientists from a number of related disciplines have been involved over years in the develop-ment of an academic basis for the understanding and management of the environment.

The purpose of keeping the Environment Engineering in soft core is to introduce a unique approach to the overall concept of environmental engineering an approach that emphasizes the relationship between the principles observed in natural purification processes and those employed in engineered processes.

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5/96

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(96)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG.
COURSE : ENVIRONMENTAL ENGINEERING.
COURSE CODE NO. : 302
PREREQUISITE : NIL.

SCHEME OF STUDIES

S.No.	TOPIC.	TH. HRS.	PR. HRS.	TOTAL HRS.
(1)	Introduction	2	-	2
(2)	Air Quality, Definitions, characteristics and perspectives.	5	-	5
(3)	Meteorology and natural purification processes.	6	-	6
(4)	Engineered systems for Air pollution control.	6	-	6
(5)	Engineered system for Resource and Energy recovery.	5	-	5
(6)	Noise pollution and control.	5	-	5
(7)	Industrial waste.	6	-	6
(8)	Environment & Pollution control laws.	6	-	6
(9)	Global warming.	1	-	1
(10)	Air pollution from thermal power plants etc.	4	-	4
(11)	Water contamination in ocean.	2	-	2
		48	-	48

Credits - 3

Note:- This course 302 is common to DCTM/DME/DEE.Programme.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION
BHOPAL.

5/97

(97)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : ENVIRONMENTAL ENGINEERING.
(Common to Civil, Mechnical & Elect. programmes.

COURSE CODE NO. : 302

PRE-REQUISITE : NIL.

TOPIC-1: INTRODUCTION:

The Enviroment, the impact of human beings upon the environment, the impact of the Environment upon human beings, Improvement of Environmental Quality, the role of the Environmental engineer.

TOPIC-2: Air Quality : Definitions, Characteristic & prespectives.

AIR POLLUTION - Historical overview, global Implication of Air pollution, Units of measurement, sources of pollutents.

CLASS-IFICATION OF POLLUTANTS- Particulates, hydrocarbons, carbon monoxide, Oxides of sulphur, Oxides of Nitrogen, photochemical oxidents, Indoor air pollution Measure--ments of above pollutents.

Air Quality management concepts.

TOPIC-3: METEOROLOGY & NATURAL PURIFICATION PROCESSES :

Elemental properties of the atmosphere- Scales of motion, heat pressure, wind, moisture, relative humidity.

Devices used for the measurement of above properties.

Influence of Meteorological phenomena on air quality- & dispersion, Pressure system & Dispersion winds & dispersion moisture and dispersion, modeling.

Effects of air pollution on metererological conditions-Changes on the Mesoscale & Microscale, changes on Macroscale.

TOPIC-4: ENGINEERED SYSTEMS FOR AIR POLLUTION CONTROL :

Atmospheric cleansing processes, Approaches to contami--nant control.

Central devices for particulate contaminants-Gravita--tional settling chambers, centrifugal collectors, wet collectors, Febric filters (Baghouse filters) Electro--static precipitators (ESP) control devices for gaseons contaminants-Absorption, absorption, condensation, combustion, Automative emission control.

TOPIC-5: ENGINEERED SYSTEMS FOR RESOURCE AND ENERGY RECOVERY.

processing techniques- Mechanical size alteration, Mechanical component separation, Megnetic and Electro-mechanical separation, Drying and Dewatering.

Materials recovery systems - Materials specifications, process--ing and recovery systems.

Recovery of bi-ological conversion products-Composting (Aerobic conversion), Anaerobic Digestions.

Recovery of thermal conversion products-Combustion of waste materials, Incineration with heat recovery, use of Refuse Derived Fuels (RDF), Gasification, pyrolysis.

Recovery of energy from conversion products-Energy-recovery systems, Efficiency-factors, Determination of Energy output and efficiency.

Materials and Energy- Recovery systems.

TOPIC-6: NOISE POLLUTION AND CONTROL:

Sources of noise pollution, control of noise pollution, unit of noise measurement, Noise control devices and their working principles. Noise intensity level-allow--able limit for different situations. Noise measurement, The problem of noise pollution and legal measures for its control.

TOPIC-7: INDUSTRIAL WASTE :

Industrial waste Treatment-Economics of waste-Treatment, Benefits of pollution abatement (primary, secondary and intangible benefits), difficulties in achieving, pollution abatment through industrial waste treatment, theories of waste treatment volume reduction, strength reduction, neutralization and proportioning, treatment of specific- industrial waste such as textile, dairy, paper and pulp, and distillery wastes.

TOPIC-8:ENVIRONMENT & POLLUTION CONTROL LAWS. (91)

Air (prevention and control of pollution) Act,1981 & Air (Prevention and control of pollution) Rules, 1982 - Short title, extent and commencement,difini--tions. The Environment (protection) Act,1986 - Short title, extent and commencement, Definitions - Measures to protect and improve environment.

TOPIC-9:Global warming- Reasons.

TOPIC-10:Air pollution from Thermal Power plants,Nuclear power plants,Fertilizer and chemical plants, Acid rain. Methods of prevention.

TOPIC-11:Water contamination in ocean - Reasons, its effects, method of prevention.

* * *

5/100

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(100)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : ENVIRONMENTAL ENGINEERING.

COURSE CODE NO: 302

PREREQUISITE : NIL.

REFERENCE BOOKS.

1. Air pollution by Perkins.

2. Liquid waste of industry, theories, practices and treatment by Nelson L Vamerow.

3. Management of solid waste in Developing Countries by Flint off.

4. Environmental Engineering (International Edition) by Peavy, Howards.
(McGraw Hill Series in Environmental Engineering)

5. Air pollution - its origin and Control by by Kenoth work and Warner.
(W.H.O. Publication)

6. Industrial Waste by Namit.

7. Thermal Environment by Burgess H.Jennings.

8. Environment & Pollution Control Laws by Vijjay Malik (EBC publishing (PVT.)Ltd: Lucknow.

9. Environment protection - Problems, policy Administration, New Edited by Peras Diwan Deep & Deep Publications.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(104)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : ELEMENTS OF CIVIL ENGINEERING.

COURSE CODE NO : 303

PRE-REQUISITE : NIL.

RATIONALE.

The course of Elements of Civil Engineering has been included under MPECS, Soft core in the field of Mechanical and Electrical Engineering with a view to understand the basic knowledge of survey and construction techniques required to execute the work at fields for Mechanical and Electrical Technicians.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(102)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : ELEMENTS OF CIVIL ENGINEERING.

COURSE CODE NO. : 303

PRE-REQUISITE : NIL.

SCHEME OF STUDIES.

S.No.	TOPICS.	DURATION IN HRS. THEORY	PRACTICAL	TOTAL
1.	Chain Survey.	4	4	8
2.	Compass Survey.	4	4	8
3.	Levelling.	4	8	12
4.	Elementary knowledge for building construction.	2	2	4
5.	Properties, uses and selection of materials used in construction of building.	4	-	4
6.	Strength of concrete.	2	-	2
7.	Selection of site for Industrial sheds.	1	2	3
8.	Interpretation of Civil Engineering Drawing.	4	4	8
9.	Building byelaws for Industrial sheds.	3	-	3
10.	Layout of Industrial sheds.	2	8	10
11.	Machine foundation.	2	-	2
		32	32	64

Credits - 3

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(103)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING..

COURSE : ELEMENTS OF CIVIL ENGINEERING.

COURSE CODE NO. : 303

PRE-REQUISITE : NIL.

C O N T E N T S

TOPICE 1 : CHAIN SURVEY

Aim of survey, Equipment used for chain survey.

Chain - 20m, 30m.

Tape - 15m, 30m, Types of tape-Metallic tape
Sheet tape.

Ranging Rod.

Arrows.

Methods of Ranging-Direct Ranging, Indirect Ranging field book entry.

TOPIC 2 : Compass survey

Prismatic compass, surveyor's compass, use of compass for measurement of bearings, definition of bearing, types of meridians, whole circle bearing, Quadrantal bearing system, Conversion of W.C.B to R.B. and vise-versa.

TOPIC 3 : LEVELLING:-

Dumpy level - its components

Levelling staff.

Different definitions used in levelling.
Line of collimation, Bench Mark, Back sight
Intermediate sight, Foresight, Reduced level,
Filling of level book, level page.

TOPIC 4 : ELEMENTARY KNOWLEDGE OF MATERIALS FOR BUILDING CONSTRUCTION:

Name the various Engineering materials used for building construction. Like-stone, Bricks, Cement, Timbers, Steel, Glass, P.V.C. Materials, Insulating Materials,

Roof covering materials. like G.I. sheets, A.C. sheets- their classification and area of application, use of I.S. specifications of each.

TOPIC 5 : PROPERTIES AND USES OF BUILDING MATERIALS:

Properties of good building bricks, Fireclay Bricks, use of cement as binding material for preparation of morter, concrete etc.

Concrete- a mixture of coarseaggregate, Fin sand (Fine aggregate), cement water cement Ratio: used for laying foundation for erroction of machines, Errection of High voltage line towers etc.

Use of Timber, Use of steel, Various types of sections like T-Section, chann l section, Angle section, plates, I Section.

TOPIC 6 : STRENGTH OF CONCRETE:

Grading of concrete i.e. proportion of cement, Sand, Coarse aggregate ratio, Percentage of water required for preparation of concrete and its effect on stren--gth.

Placing of concrete in the form work.

Curing of concrete. Different periods according to position of placement.

TOPIC 7 : SELECTION OF SITE FOR INDUSTRIAL SHEDS :

1. Location of Industrial Area-Rular, Urban;
2. Linking of Industrial Area with inhabited area through communication linkage i.e. Road or Railway.
3. Sources of water supply.
4. Availability of industrial land away from populated area.

TOPIC 8 : INTERPRETATION OF CIVIL ENGINEERING DRAWING :

Selection of suitable line plan according to suitability and requirement of Industry.

Different types of shed/Roof covering materials.
Provision of suitable environmental conditions.

TOPIC 9 : BUILDING BYELAWS FOR INDUSTRIAL SHEDS :

Byelaws to be adopted from Laghu Udyog Nigam applicable for industrial sheds.

TOPIC 10: LAYOUT OF INDUSTRIAL SHEDS :

Laying practice on the basis of working drawing as mentioned in tipic 8.

TOPIC 11: MACHINE FOUNDATION :

For installation of machine. Form work required according to layout plan of machines. Position of foundation bolts.

Placing of concrete and its preparation as per topic 6.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(106)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : ELEMENTS OF CIVIL ENGINEERING.

COURSE CODE NO : 303

PRE-REQUISITE : NIL.

LIST OF EXPERIMENTS.

1. Chain survey by Direct Ranging.
2. Chain and compass Traverse.
3. Determination of Redused level of different points. (Shot levelling)
4. Testing of cement concrete for compressive strength and workability.
5. Intial and final setting time test of cement.
6. Reading of Civil Engineering Drawing.
   Related to Industrial sheds (Standrad Drawings)
   Report the bye-laws used.
7. Layout practice of Industrial sheds on the basis of reading of drawing.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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(107)

PROGRAMME. : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : ELEMENTS OF CIVIL ENGINEERING.

COURSE CODE NO : 303

PRE-REQUISITE : NIL.

SUGGESTED REFERENCE BOOKS

1. Surveying Vol. I By Hussain.
2. Surveying Vol-I By Kanetkar.
3. Surveying Vol.I. By Punmia.
4. Engineering Material. By Rangwala.
5. Building bye laws of Laghu Udyog Nigam.
6. Civil Engineering Drawing By Leo-Mallic.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(108)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : MARKETING MANAGEMENT.

COURSE CODE NO : 304

PRE-REQUISITE : NIL.

R A T I O N A L E.

In the days of competitive business, a course in marketing management is of great importance to the entre-preneures, industrialist and to the persons working in marketing related departments. Now a days it is said, that to produce something is not difficult, but to make people come forward to buy it, is very difficult. This point itself emphesizes the need and role of this course.

Marketing is a very basic function and it can be seen in isolation from other activities of the business. It begins before the product exists and continues long after the product is sold. It is the discipline used by business to convert people's need into profitable company opportunities.

The high technology won't be bought until it is shaped to meet the wants of specific consumer groups and consumers Co Ltd; in a fashion and at a price and with levels of service that are sufficient to motivate the market.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(109)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : MARKETING MANAGEMENT.

COURSE CODE NO : 304

RE-REQUISITE : NIL.

SCHEME OF STUDIES.

S.NO.	TOPIC.	THEORY	PRACT/TUTORIAL	TOTAL.
1.	Marketing and its application.	03	-	03
2.	Marketing system and Environment.	05	-	05
3.	Marketing planning and organisation.	10	-	10
4.	Understanding consumers.	04	-	04
5.	Product Management.	05	-	05
6.	Marketing strategies.	05	-	05
7.	Marketing Functions.	12	-	12
8.	Market measurement Distribution and control Strategy.	04	-	04
	TOTAL:	48	-	48

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL/ELECTRICAL/CIVIL ENGINEERING. (110)

COURSE : MARKETING MANAGEMENT.

COURSE CODE NO : 304

PRE-REQUISITE : NIL.

1. MARKETING AND ITS APPLICATION.
   - Introduction to Marketing.
   - Role of marketing in today's organization
   - Concept of marketing:- Needs, wants and demands, components and Basic characteristics of objectives of marketing, significance and Benefits of marketing, Essentials of modern Marketing.

2. MARKETING SYSTEM AND INVIRONMENT :
   Marketing system : Business marketting Institutions, produces and manufacturers, Intermediaries, competitiors, Facilitating Institutions and Public.
   MARKETING ENVIRONMENT :
   Demographic Environment, Economic Environment Political environment Physical envirohment, Technological environment and socio and Cultural environment, competitive Environment.

3. MARKETING PLANNING AND ORGANISATION :
   NATURE AND CONTENT OF A MARKETING PLAN :- Executive summary, current marketing situation, apportunity and Issue analysis objectives, Marketing strategy, Action programs projected profit and loss statement, control, planning a marketing Mix. Elements of a marketing Mix.
   MARKET SEGMENTATION : General approach, pattern, procedure Bases for segmenting consumer and industrial markets, requirements for effective segmentation.
   MARKETING ORGANISATION:-
   Structure, types, Relations with other departments, Departments of marketing unit, Function of the marketing

MARKETING RESEARCH AND ITS APPLICATION: Scope, process, significance and objectives of marketing research characteristics of a good marketing research, procedures in marketing research.

4. UNDERSTANDING CONSUMERS :

Major factors influencing consumer be hevious :- Cultural, Social, personal and Psychological factors, Buying Decision process Types of Buying behaviour, India consumer markets.

5. PRODUCT MANAGEMENT :

What is a product, Product classification schemes, Product mix and product line decisions, service product decisions- nature characteristics and classification of services, Extent and importance of marketing in the service sector product life cycle.

DEVELOPMENT OF NEW PRODUCTS : Planning, product life cycles, idea generation and screening, concept development and test--ing, business analysis, product development and market testing., Branding and packaging.

6. MARKETING STRATEGIES :

Marketing strategies in different stages of product life cycle: Introduction stage, growth stage, Maturity stage, Decline stage Market-leader, Market -Challenger and Market follower strategies.

Pri-cing policies and practies:-

Setting the price, Modifying the price, initiating and responding to price changes.

7. MARKETING FUNCTIONS : Introduction, classification, marketing.

Marketing communications :- Process, objectives.

ADVERTISING : Definition and objectives, Types of advertis--ing, Pre-requisites of advertising Deciding on the advertising budget:- Soles response and Decay model, Adaptive control model and competative share model deciding on the message :- Message generation, message evaluation and selection message execution.

Deciding on the media :- Deciding on the reach, frequency and impact.

Selection of major media types, selecting specific media vehicles, Deciding an media timing, Evaluation of effectiveness of advertising communication effect research. Sales effect research.

SALES PROMOTION : Objectives, Tools of sales promotion, Development, presentation, Implementation and control of sales promotion programme, Evaluation of sales promotion programme.

Publicity : Objectives, Selection of publicity message and vehicle, Implementation and evaluation of publicity programmes.

8. MARKET MEASURMENT, DISTRIBUTION AND CONTROL STRATEGY :

Demand Fore casting :- Objectives, Estimate of current and Future demand, Distribution strategies, objectives, signifinance, types. Marketing channels : Definition and types of channels, Factors affecting the choice of channels.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(113)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : MARKETING MANAGEMENT.

COURSE CODE NO : 304

PRE-REQUISITE : NIL.

LIST OF REFERENCE BOOKS.

1. Marketing Management
   -Analysis,Planning and control — Philip Kotler.
   Pub.Prentice Hall of India,N.Delhi.

2. Principles and practice of
   Marketing in India. — -C.B.Mamoria.
   — R.L. Joshi.
   Pub.Kitab Mahal,Allahabad.

3. Contemporary marketing — Louis & Boone
   Pub: Dryden Press Hinsdale, — David L Kurtz.
   Illinois.

4. Essential of Management — Koontz.
   Pub. McGraw Hill.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL/ELECTRICAL ENGINEERING. (114)

COURSE : NON-CONVENTIONAL SOURCES OF ENERGY.

COURSE CODE NO : 305

PRE-REQUISITE : NIL.

RATIONALE.

The power demand in country is increasing at a very fast rate and power production is not able to keep pace with the power demand. The resources required for the generation of power are gradually exhausting. Therefore it becomes necessary to investigate the possibility of producing energy from non-conventional sources. Researches and efforts are being made to utilize the non-conventional sources of energy for power generation which in turn can meet the power demand.

Looking to the need, the course non-conventional source of energy has been introduced in the soft core courses under multi point entry and credit system.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.

(115)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : NON-CONVENTIONAL SOURCES OF ENERGY.

COURSE CODE NO : 305

PRE-REQUISITE : NIL.

SCHEME OF STUDIES.

S.No.	TOPIC.	LECT.HRS.	PR.CT./T.U.HRS.	TOTAL HRS.
1.	Introduction.	02	-	02
2.	Wind energy.	04	04	08
3.	Direct energy conversion system.	08	10	18
4.	Solar energy.	07	08	15
5.	Bio-mass (Gobar gas plants)	04	06	10
6.	Tidal and Geo-thermal.	04	04	08
7.	Ocean thermal energy.	01	-	01
8.	River energy.	01	-	01
9.	Incenerators plant.	01	-	01
	TOTAL :	32	32	64

CREDITS - 3

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.

(116)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : NON-CONVENTIONAL SOURCES OF ENERGY

COURSE CODE NO : 305

PRE-REQUISITE : NIL.

C O N T E N T S.

TOPIC 1. INTRODUCTION:

Concept and need of primary and secondary energy sources, Necessity of harnessing non-conventional sources of energy. Difference between conventional and non-conventional sources of energy. Concept of solar, wind, Biogas, Ocean, Tidal, Geothermal, Hydrogen, fuel cells, MHD, Thermionic converter, Thermoelectric Power etc. and their practical applications.

TOPIC 2. WIND ENERGY : Formation of wind, concept of wind energy, classification of wind mills, applications of wind mills. Advantages and disadvantages of wind energy, Mean wind speed, power coefficient, Mechanical power, speed ratio, local speed ratio, Tip speed ratio, Torque, Torque cofficient. Basic components of simple wind mill, construction and working of wind mill. Merits and demerits of vertical and horizontal wind mills. Wind map of India.

TOPIC 3. DIRECT ENERGY CONVERSION SYSTEM : Definition, principle of different direct conversion schemes-fuelcell, MHDG, Thermoelectric converter, Thermionic converter, working of H_2-O_2 fuel cells, Advantages and disadvantages of fuel cells. Fuel cells and conventional battery. Requirements of fuel cell, electrode, electrolyte and fuel. Advantages, application and limitations of fuel cell. Construction and working of MHDG- advantages of MHDG. Reversible and irreversible thermoelectric effects. Definition of the seebeck effect, the pettier effect, the Thomson effect, Joule effect and conduction effect. working of thermoelectric converterfigure of merit, principle of thermionic, converter. Analogy between ... etc.

Thermoelectric and thermionic converters. Thermionic effect and work function of a metal.

TOPIC 4. SOLAR ENERGY :- Concept, Applications of solar energy. Sun characteristics, Solar constants, Basic earth angles, Solar azimuth angle, spectral distribution of solar fuse, Direct, diffuse and total radiation, solar collector, components of flat plate solar collector and their functions. Working principle of a flat plate collector, sources of losses from a plate collector, Collector efficiency, concentrating type solar collector-classification. Advantages and disadvantages of concentrating collectors over flat plate type collectors. Necessity of orientation system in focussing type solar collector. Performance of concentrator, Solar water heater. Construction and working of flat plate type solar cooker with reflector. Solar room heating system, elements of solar heating passive, active systems, Solar cooling system for air conditioning, construction and working of solar cell for street lighting.

TOPIC 5. BIO-GAS : (Gober Gas Plants)

Concept of Bimass, Biomass resources, formation of fuel gas from decomposition of biomass, Generation of biogas. Classification of biogas plants, working of gober gas plants, Elements of gober gas plants and their function. Method of starting the gober gas plant, capacity, charging the plant, scum formation, disposal of slurry, advantages and disadvantages of floating drum type plant. Practical situations for installation of gober gas plants.

TOPIC 6. TIDAL AND GEOTHERMAL :

Definition of tide, production of tides-high and low tider, tidal range, components of Tidal power plant operation method of utilisation of tidal energy selection of site for tidal power plant, Advntages and disadvantages of Tidal power generation, Possibility of using tidal energy in India, concept of Geothermal energy-Classification, uses, main type of turbines used for Geothermal energy conversion. Advantages and dis-advantages of geothermal energy, Applications of Geothermal energy. Factor for selection of Geothermal power plants. Availability of geothermal energy sources in India.

TOPIC 7. OCEAN THERMAL ENERGY-Availability, usefulness, conversion, OTEC machines.

TOPIC 8. RIVER ENERGY- Nature, Quantification of river energy.

TOPIC 9. Inceranators plant - Energy from organic waste. Description and working of plant.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN CIVIL/TECHNICAL ENGINEERING. (118)

COURSE : NON-CONVENTIONAL SOURCES OF ENERGY.

COURSE CODE NO : 305

PRE-REQUISITE : NIL.

SUGGESTED LIST OF EXPERIMENTS.

1. Study of Solar Cooker.
2. Study of Solar Water heater.
3. Study of Solar Water still unit.
4. Study of Solar Photo-Voltaic Cells.
5. Study of wind mill (Vertical/Horizontal)
6. Study of Gober Gas Plant (Janata/Community Model)
7. Study of Bio Gas Plant.
8. To compare the effectiveness/preformance of Fibre Glass made Solar Cooker and G.I. Sheet made Solar Cooker.
9. To compare the performance of Solar Water heater by covering its Surface by 1/4,1/3,1/2 using Card Board.
10. Visit to places where:
    1. Tidal and Geothermal Power Plant.
    2. Gober Gas Plants/Bio-Gas Plants.
    3. Ocean Thermal energy conversion machines.
    4. Incenerator Plants.

are still installed. The students are advised to note/observe the working of the plant, capacity of the plant, layout of the plant, man power employed, problems being faced by the plant personnel etc. and submit the report in brief and discuss the issue/problems involved relevent to the plant in the class.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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(113)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : NON-CONVENTIONAL SOURCE OF ERENGY.

COURSE CODE NO : 305

PRE-REQUISITE : NIL.

REFERENCE BOOKS.

1. An atlas of Renewable Energy Resources in the UK and North America.
   - Julian Mustoe.
   Pub. John Wiley & sons.

2. New sources of energy and power
   by Egon Larsen
   Frederick Muller Limited, London Publication

3. Solar Energy Utilization
   by G.D. Rao
   Khanna Publisher

4. Energy from Biomass
   by Plaz
   Elsevier Applied Science Publishers.

5. Non Conventional Energy sources
   by G.D. Rao
   Khanna Publishers.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING. (120)

COURSE : ENTERPRENEURSHIP.

COURSE CODE NO : 306

PRE-REQUISITE : NIL.

RATIONALE.

Since long enterpreneurship has been recognised as an essential ingradient of economic development. Concept of enterpreneurship has varied from time to time to suit the changing ethos of socio-economic reality. It was applied to business for the first time in 18th century, to designate a dealer who buys and sells goods at uncertain prices. Later on an enterpreneur was considered a dynamic agent of change; or the catalyst who transformed increasingly physical, natural and human resources, into corresponding production possibilities. In recent years, managerial aspects of enterpreneurship are being emphasized. It employs innovativeness, an urge to take risk in the face of uncertainties, and intuition, i.e. a capacity of seeing things in a way which afterwards proves to be true.

The course is kept in soft core under DCS, DME and DEE to bring to surface certain common characteristics such as perception of economic opportunity, technical and organisational skills, managerial compertance, and motivation to achieve result.

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NOTE:- This course is common to DCTM, DME and DEE programme.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : ENTREPRENEURSHIP.

COURSE CODE NO. : 306

PRE-REQUISITE : NIL.

SCHEME OF STUDIES :

S.No.	Topic.	Theory	Pract/Lab.	Total
1.	Entrepreneurship-His qualities and functions.	4	0	4
2.	Small scale industry-its growth and significance.	6	-	6
3.	Support Agencies for promoting and developing entrepreneurship.	6	-	6
4.	Planning an Industrial Unit.	6	-	6
5.	Achievement motivation.	4	-	4
6.	Project cost and its financing.	8	-	8
7.	Planning and preparing of project Report.	14	-	14
	TOTAL :	48	-	48

Credit - 3

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(122)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : ENTERPRENEURSHIP. Th.Hrs.48,Total Hrs.48

COURSE CODE NO : 306 Credits - 3

PRE-REQUISITE : NIL.

TOPIC-1.ENTERPRENEUR : HIS QUALITIES AND FUNCTIONS - Concept of entrepreneurship,Types of entrepreneur, Qualities of an entrepreneur, Example of entrepreneurship.

TOPIC-2.SMALL SCALE INDUSTRY : ITS GROWTH AND SIGNIFICANCE. Definition of SSI and ancillary,growth of SSI in India, in different sectors. Government policies for SSI importance of SSI,Contribution of SSI in economic development. Entrepreneurship in an Industrially backward areas.

TOPIC-3.SUPPORT AGENCIES FOR PROMOTING AND DEVELOPING ENTREPRENEURSHIP : Government and non-Government schemes, Non institutionalised benefits and incentives,Infra-structures, Technical consultancy,Marketing-Government institutionalised,private, requirements for setting up an industrial unit, various organisation fulfilling the requirements. Entrepreneurship promotional schemes of Government like Trysem IRDP, NREP

TOPIC-4.PLANNING AN INDUSTRIAL UNIT : Project environment, Project selection Factors of selection, Tools for selections,Limitation of selection, Market surveys and Analysis, Project formulation and scheduling,projections and economic indicators, process formalities for setting up of a SSI.

TOPIC-5.ACHIEVEMENT MOTIVATION : Objectives, goals and motivation, Importance of the objectives,Need for achievement motivation,Reinforcement with the help of games, quizzes, and films, planning process-result oriented.

TOPIC-6.PROJECT COST AND ITS FINANCING :

Estimation of cost production, cost volume profit relationship at different levels, Financial concepts of business, Institutionalised and non-institutionalised sources, Fund flow statements, Model loan application form with check list for appraisal.

TOPIC-7.PLANNING AND PREPARING OF PROJECT REPORT :

Selection of Project, scheduling of activities involved, Model format, preparation of action plan for implementation, preparation of project. Project planning cases- illustrate some real cases.

In addition to above, the students are advised to-

(i) Visit few small scale Industries situated in the city, nearby industrial area.

(ii) discuss the problems related to SSI with Entrepreneurs.

(iii) Collect information about the market rates, quality quantity of the goods of their choice.

(iv) develop logical and analytical approach to purchase the raw materials/finished goods.

(v) Prepare a projedt report for the industry they are willing to start.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(124)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING.

COURSE : ENTERPRENEURSHIP.

COURSE CODE NO : 306

PRE-REQUISITE : NIL.

LIST OF REFERENCES

(1) Project Engineering and Management
- A.K. Sinha.
&
Rama Sinha.

(2) Developing New Entrepreneurs
-Entrepreneurship Development Institute of India.

(3) Developing Entrepreneurship - A hand Book
- Vedal Praech
- T.V. Rao.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, (125)
BHOPAL.

D E T A I L E D C U R R I C U L U M.

COURSE : MATHEMATICS - III.

COURSE CODE NO : 307

PRE-REQUISITE : 107 MATHS.I AND
108 MATHS.II.

CATEGORY : SOFT CORE.

DIPLOMA PROGRAMME IN
CIVIL/TECHNICAL AND ELECTRICAL ENGINEERING.
(UNDER MULTI POINT ENTRY AND CREDIT SYSTEM)

DEVELOPED BY-

STATE CURRICULUM DEVELOPMENT CENTRE
M.P.BOARD OF TECHNICAL EDUCATION, BHOPAL.

IN COLLABORATION WITH-

TECHNICAL TEACHERS' TRAINING INSTITUTE, BHOPAL.

SPONSORED BY-

DIRECTORATE OF TECHNICAL EDUCATION, BHOPAL.

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P R E F A C E.

(126)

The Curriculum of the Course MATHEMATICS-III of SOFT CORE category of Diploma Programme in Civil/Mechanical/Electrical engineering under Multi Point Entry and Credit system was developed in a workshop organised by state Curriculum Development Centre with the assistance of Technical TEachers Training Institute, Bhopal from 20th July,91 to 2.8.91.

The curriculum included objectives at knowledge, comprehension and application levels, so that a proper understanding of the concepts, principles, rules and relationships can be imparted to the students. Only sample specific objectives have been given, however, more number of specific objectives can be framed by the subject teacher to cover the general objectives.

Comments and healthy criticism from feculty members are however welcome, so that if required the prepared curriculum can be reviewed and revised periodically.

We are highly grateful to the Director of Technical Education, Bhopal for his valuable guidance, encouragements and active cooperation in the curriculum development work.

Thanks to Professor S.A. Balu, Principal, T.T.T.I., Bhopal, Prof. V.M. Kapse and other C.D.C. faculty of T.T.T.I.,Bhopal. It is out of their valuable suggestions and long term experience in curriculum development, that this curriculum is in the hands of the user.

We always aspire to improve this.

Sd/-
(AJEET SINGH)
SECRETARY,
M.P. BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(127)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL & ELECTRICAL ENGG.

COURSE : MATHEMATICS-III.

COURSE CODE NO : 307

PER-REQUISITE : 107-MATHS. I AND
108-MATHS.II.

L I S T O F P A R T I C I P A N T S.

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3. Smt. A.Rane,
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T.T.T.I. FACULTY.

1. Dr. K.C. Sabherwal.
2. Dr. M.K. Shrivastava.

C.D.C. FACULTY.

1. Shri A. Ratnaparkhi — Joint Director
2. Shri K.K. Jain — Deputy Director.
3. Shri C.P. Bhargava — Deputy Director.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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(128)

PROGRAMME. : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG.

COURSE : MATHEMATICS-III.

COURSE CODE NO : 307

PRE-REQUISITE : 107 MATHS. I AND
108 MATHS. II.

I N D E X

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL. (123)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG.

COURSE : MATHEMATICS-III.

COURSE CODE NO : 307

PRE-REQUISITE : 107 MATHS. I AND 108 MATHS. II.

R A T I O N A L E.

Mathematics is the language for engineer's and scientists. It works as a tool with the help of which many complex engineering problems can be understood and solved. To understand difficult concepts in higher engineering courses and to solve many problems of design and development a good back ground in mathematics is necessary. The mathematics courses provided at foundation level are not sufficient to solve problems of design as those courses are the core courses common for all the branches of engineering and the topics selected provide a minimum level of competancy. The mathematics course at a soft core level is therefore required particularly for courses of diversified category. Keeping in view this requirement for engineering diploma programmes of Civil, Mechanical and Electrical engineering this course in Mathematics (Maths. III) has been designed. Topics included here pertain to applications of differential and integral calculus and differential equations.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, (130)
BHOPAL.

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL & ELECTRICAL ENGG.

COURSE : MATHEMATICS-III.

COURSE CODE NO : 307

PRE-REQUISITE : 107 MATHS. I AND
108 MATHS. II.

SCHEME OF STUDIES.

TOPIC NO.	CONTENT.	HOURS THEORY	PRACTICAL	TOTAL
1.	Differential Calculus	17	-	17
2.	Integral Calculus	16	-	16
3.	Differential Equations.	15	-	15
	TOTAL	48	-	48

CREDITS - 3

SCHEME OF EXAMINATION.

COURSE : MATHEMATICS-III.

COURSE CODE NO : 307

Hours per week Theory	Pract.	Cre-dits	Sessional Term work.	Lab work.	Progressive Assessment. I	II	Theory Paper Board Paper	Exam. Durn. in Hrs.	Th. Mks.	Practical Pr. Durn. Hrs.	Marks.	REMARKS.
3	-	3	20	-	10	10	1	3	100	-	-	-

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(131)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG.

COURSE : MATHEMATICS- III.

COURSE CODE NO : 307

PRE-REQUISITE : 107 MATHS. I AND
108 MATHS. II.

C O N T E N T S.

TOPIC NO. 1 : DIFFERENTIAL CALCULUS.

(i) Simple applications.

(ii) Successive differentiation.

(iii) Tangent and Normal.

(iv) Curvature.

(v) Maxima and Minima.

(vi) Partial differentiation.

TOPIC NO. 2 : INTEGRAL CALCULUS :

(i) Integration of rational and irrational functions.

(ii) Definite integrals.

(iii) Gamma Functions.

(iv) Area of Curves.

(v) Volume of Solids of revolution.

(vi) Moment of Inertia.

(vii) Simpson's Rule.

(viii) Work done

(ix) Mean value and R.M.S. value of a function.

TOPIC NO. 3 : DIFFERENTIAL EQUATIONS :

(i) Introduction.

(ii) Differential Equations of first order and first degree.

(iii) Differential Equations of second order and first degree with constant coefficients.

(iv) Differential Equations of third and fourth order and of first degree.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL. (132)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG.

COURSE : MATHEMATICS- III.

COURSE CODE NO : 307

PRE-REQUISITE : 107 MATHS.-I AND 108 MATHS. II.

DETAILED CURRICULUM.

S.No.	General/Sample specific objectives.	Specific treatment, if any.
1.1	APPLY THE CONCEPT OF SUCCESSIVE DIFFERENTIATION FOR SOLVING ENGG. MATHE-MATICAL PROBLEMS.	
1.1.1	State second and higher order derivatives.	
1.1.2	State the various nona-tions used for the higher derivatives.	Explain the meaning of
1.1.3	Compute the n^{th} derivative of given functions.	n^{th} derivatives of functions as e^{ax}, $\log_e (a+x)$ $\sin (ax + b)$...etc. be explain-ed clearly.
1.1.4	State Leitnitz Theorem.	
1.1.5	Explain Leitnitz Theorem for successive. differen-tiation of product of two functions.	Solve simple problems on Leitnitz Theorem.
1.1.6	Solve given Engg. Mathematical problems using successive differentiation.	Few more problems be given for home work like give equation to elastic curve of a cantile-ever beam of length 1 and uniform weight 'w' Kg/m $Y = \frac{w}{24EI}(41x^3 - 61^2x^2 - x^4)$ Calculate the bending moment $(EI, \frac{dy^2}{dx^2})$ and the shearing force $(EI, \frac{d^3y}{\ldots^3})$ at a distance 'x' meter from the fixed end of the beam. The distance covered by a a particle, falls from rest under gravity in resisting medium at any instant 't' is

S.No.	General/Sample specific objectives.	Specific treatment, if any.
		given by $x = \frac{1}{K}(gt - g^{-Kt}) + C_2$ where K, G_1, C_2 and g are contants. compute $\frac{dx}{dt}$ and $\frac{d^2x}{dt^2}$ and show that $\frac{d^2x}{dt^2} + K, \frac{dx}{dt} - g = 0$
1.2	APPLY THE CONCEPT OF HIGHER ORDER DERIVATIVES TO ENGINEERING PROBLEMS.	
1.2.1	Explain the derivative from for the following as a rate measures. (a) Velocity. (b) Acceleration. (c) Angular velocity. (d) Angular Acceleration. (e) Volume.	
1.2.2	Solve problems based on 1.2.1 above.	
1.2.3	Explain Errors and Approxi-mation.	
1.2.4	State the Approximation formula.	$\text{Lim}\,\delta x \to 0 \frac{\delta y}{\delta x} = \frac{dy}{dx}$
1.2.5	Solve problems on Approximation.	
1.2.6	Explain (A) Absolute Error (B) Relative Error (C) Percentage Error	State clearly the meaning of (A) $\lvert \delta x \rvert$ (B) $\delta x / x$ (C) $\delta x \times 100$
.2.7	Compute the error in one variable when the error in the depending variable is given.	
.3	UNDERSTAND TANGENT AND NORMAL.	
.3.1	Explain Geometrical meaning of dy/dx.	

S.No.	General/sample specific objectives.	Specific treatment, if any.
1.3.2	State the equation of tangent and normal at a given point on a given curve.	Explain the tangent as limiting case of secant. Give geometrical meaning of dy/dx as slope of the tangent.
1.3.3	Derive the equation of tangent and normal montioned in (1.3.2) above.	
1.4	APPLY THE CONCEPT OF TANGENT AND NORMAL FOR FINDING SLOPE & EQUATIONS OF TANGENT & NORMAL TO A GIVEN CURVE.	
1.4.1	Given $Y = f(x)$ at a given point (x_1, Y_1) find slope and equations to tangent and normal to the curve.	
1.4.2	Find the point of contact of the tangent to the curve $y = f(x)$, when tangent is parallel or perpendicular to x - axis.	
1.5	APPLY THE CONCEPT OF CURVATURE.	
1.5.1	Explain the following:- (a) Curvature. (b) Centre of curvature. (c) Radius of curvature. (d) Curvature of circle.	
1.5.2	State and prove cartesian formula for Radius of Curvature.	$\rho = \frac{\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}}{\frac{d^2y}{dx^2}}$
1.5.3	For the given function $y = f(x)$, calculate the curvature and radius of curvature.	
1.6	APPLY THE CONCEPT OF MAXIMA AND MINIMA OF A FUNCTION TO A PROBLEM.	
1.6.1	Explain that $\frac{dy}{dx} = 0$ is necessary but not a sufficient condition for maxima and minima.	
1.6.2	Distinguish between maxima and minima	
1.6.3	Explain the necessary and sufficient conditions for a maxima and a minima.	
1.6.4	State working rule to evaluate maximum and minimum value of a function.	
1.6.5	Describe the properties of Maxima and Minima.	

S.No.	General/Sample Specific objectives.	Specific treatment, if any.
1.6.6	Solve given problem of Single variable on maxima and minima.	Illustrate some examples like the horsepower transmitted by a belt moving at velocity is proportional to $fb - \frac{W}{g}b^3$, (where f is maximum allowable stress, W is weight of belt) The velocity for the maximum horsepower can be given as $b = +\sqrt{\frac{fg}{3w}}$
1.7	SOLVE PROBLEM ON PARTIAL DIFFERENTIATION.	
1.7.1	State the meaning and notations of partial differentiation viz fx, fy, fxx, fyy, fxy, fyx.	
1.7.2	Solve simple problems on partial differentiation.	Illustrate by suitable examples.
1.7.3	State Euler's theorem.	Explain that for a given function. $u = f(x,y,z)$ the partial differentiation is carried out as
1.7.4	Solve simple problems on Euler's Theorem.	$x\frac{du}{dx} + y\frac{du}{dy} + z\frac{\partial u}{\partial z} = nu$

S.No.	General/Sample specific objectives.	Specific treatment, if any.
TOPIC NO. 2 : INTEGRAL CALCULUS.		
2.1	APPLY THE CONCEPT OF THE INTEGRATION OF RATIONAL AND IRRATIONAL FUNCTIONS.	
2.1.1	State the standrad formula of integration.	
2.1.2	State the formula for Integration by parts.	
2.1.3	Explain the process of Integration by method of substitution.	Illustrate the examples and $\int \frac{f'(x)}{f(x)}\,dx$ $\int [f(x)]^n f'(x)\,dx$
2.1.4	Explain the process of Integration by parts.	
2.1.5	Compute the integration rational functions . e.g $\int \frac{1}{ax^2+bx+c}\,dx$ and $\int \frac{px+q}{ax^2+bx+c}\,dx$	Illustrate the examples $\frac{1}{x^2+a^2}\,dx$
2.1.6	Compute the Integration of irrational functions e.g. $\int \frac{1}{\sqrt{ax^2+bx+c}}dx$, $\int \frac{px+q}{\sqrt{ax^2+bx+c}}dx$, $\int \sqrt{ax^2+bx+c}\,dx$	Illustrate $\int \frac{1}{\sqrt{x^2+a^2}}dx$ $\int \sqrt{x^2+a^2}\,dx$
2.2	APPLY THE CONCEPT OF DEFINITE INTEGRAL TO SOLVE PROBLEMS.	
2.2.1	Define definite integral	
2.2.2	Distinguish between definite and indefinite integrals.	
2.2.3	Change the limits of definite integrals by proper substitution.	$\int_a^b f(x)dx$
2.2.4	Compute the definite integrals.	Illustrate $\int_a^b f(x)\,dx$

S.No.	General/Sample specific objectives.	Specific treatment, if any.
2.25	State the properties of definite integrals.	(i) $\int_a^b f(x)\,dx = \int_a^b f(t)\,dt$ (ii) $\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$ (iii) $\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$, $a < c < b$ (iv) $\int_0^a f(x)\,dx = \int_0^a f(a-x)\,dx$ (v) $\int_{-a}^{a} f(x)\,dx = 0$, if $f(x)$ is an odd function. $= 2\int_0^a f(x)\,dx$, if $f(x)$ is an even function. (vi) $\int_0^{2a} f(x)\,dx = 0$, if $f(2a-x) = -f(x)$ $= 2\int_0^a f(x)\,dx$, if $f(2a-x) = f(x)$
2.2.6	Compute the definite integrals by applying the properties of definite integrals.	Solve $\int_0^{\pi/2} \log \sin x\,dx$
2.2.7	State the formula	Illustrate $\sqrt{p+1} = p\sqrt{p} = \lfloor p$ and $\sqrt{\nu_2} = \sqrt{n}\,\sqrt{1} = 1$
2.2.8	Compute the integrals by using gamma functions. $\int_0^{\pi/2} \sin^m x \cos^n x\,dx = \frac{\sqrt{\frac{m+1}{2}}\sqrt{\frac{n+1}{2}}}{2\sqrt{\frac{m+n+2}{2}}}$	Solve $\int_0^{\pi} x \sin^3 x \cos^2 x\,dx$ $\int_0^1 x^{3/2}\sqrt{1-x}\,dx$
2.3	APPLY THE CONCEPTS OF INTEGRATION FOR FINDING THE AREA OF CURVES, VOLUME OF SOLID & OF REVOLUTION AND MOMENT OF INERTIA.	Explain derivation, area $= \int_a^b f(x)\,dx$ where $y = f(x)$ and $x = a$, $x = b$
2.3.1	State the formula for area of curves.	Illustrate $A = \int_a^b f(x)\,dx$ and $A = \int_c^d f(y)\,dy$

S.No.	General/Sample specific objectives.	Spedific treatment, if any.
2.3.2	Compute the area of standard curves, VOZ, circle and Ellipse.	
2.3.3	State the formuls for volume of solids of revolution.	Illustrate $V = \pi \int_a^b y^2 \, dx$ $V = \pi \int_c^d x^2 \, dy$
2.3.4	Compute the volume of sphere, Ellipsoid and cone.	
2.3.5	State moment of inertia and radius of gyration viz $M.I. = \sum mr^2$ $= mk^2$, k is radius of gyration.	
2.3.6	Compute the moment of inertia of a thin rod about an axis perpendicular to one of its ends and abour the axis perpendicular to its middle point.	
2.3.7	Compute the moment of inertia of a rectangular limina about its length and breadth.	
2.3.8	Compute the moment of inertia of a circular disc about an axis normal to it and passing through its centre.	
2.3.9	State the Simpson's rule.	Illustrate $A = \int_a^b f(x) \, dx$ $= \frac{h}{3}\left[y1+y1+4S_c+2S_o\right.$ and $h = \frac{b-a}{2n}$ where $(2n+1)$ is the number of ordinates.
2.3.10	Compute the numerical integration viz $\int_1^2 \log x \, dx$, $\int_0^1 \frac{1}{x} \, dx$	

S.No.	General/Sample specific objectives.	Specific treatment, if any.
2.4	APPLY THE CONCEPT OF WORK DONE BY A FORCE TO VARIOUS SITUATIONS.	
2.4.1	Define work done by a force.	Illustrate $W = \int_a^b F.\,dx$
2.4.2	Explain the procedure for obtaining work done by integration.	
2.4.3	Compute work done by a force using integration method for the given problem.	
2.5	APPLY THE CONCEPT OF THE MEAN VALUE OF A FUNCTION WITH IN THE GIVEN RANGE FOR A GIVEN PROBLEM.	Illustrate $\text{M.V.} = \frac{\int_a^b f(x)\,dx}{b-a}$
2.5.1	Compute the mean value of a function by integration.	
2.5.2	State the formula for R.M.S. Value.	Illustrate $\text{R.M.S. Value} = \sqrt{\frac{\int_a^b y^2\,dx}{b-a}}$
2.5.3	Compute the R.M.S. value of a function within the given range for a given problem.	

S.No.	General/Sample specific objectives.	Specific treatment, if any.
3.1	KNOW THE DIFFERENTIAL EQUATIONS.	
3.1.1	State that a differential equation is an equation which involves dirivatives.	Illustrate all varieties of differential equations such as (1) $\frac{dy}{dx} = x + y$ (2) $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = o$ (3) $x\frac{dy}{dx} + y = 3$ (4) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + y^2 = \cos x$ (5) $(y^{11})^2 + (y^1)^3 + 3y = x^2$ (6) $\left\{1 + \left(\frac{dy}{dx}\right)^2\right\}^{3/2} = K\frac{d^2y}{dx^2}$
3.1.2	Define differential equations.	
3.1.3	Define order of differen--tial equation.	Illustrate by suitable examples.
3.1.4	Define degree of differential equation.	Illustrate by suitable exmaples.
3.1.5	Describe origin of differential equations considering geometrical problems, physical problems, primitives.	
3.2	APPLY THE CONCEPT OF ORDINARY DIFFERENTIAL EQUATIONS FOR SLOVING VARIOUS PROBLEMS.	Distinguish between ordinary and partial differential equations.
3.2.1	State the forms of ordinary differential equation viz (a) Variables are separable $f(x)\,dx = F(y)\,dy$ (b) Homogeneous differential equation $\frac{dy}{dx} = \frac{f1(x1y)}{f2\ (x,y)}$ where f1 and f2 are homogeneous functions of same degree. (c) Exact differential eugations $Mdx + Ndy = 0$ where M and N are functions of x and y	Give condition for exactness.

S.No.	General/Sample specific objectives.	Specific treatment, if any.
	(d) Linear differential equation $\frac{dy}{dx} + Py = Q$ where P and Q are functions of x.	Introducet the concept of integrating factor for linear differential equation.
3.2.2	Explain the procedure for solving each type of differential equations stated in 3.2.1 above.	
3.2.3	Solve the given differential equations by using methods explained in 3.2.2 above.	Problems covering all types of differential equations may be given for getting their solutions and also illustrate by suitable engineering problems such as. The current i in a circuit having a resistance R and inductance L and e.m.f. E is given by $L\frac{di}{dt} + Ri = E$ If initially the current be zero find i at any time t.
3.3	SOLVE SECOND ORDER FIRST DEGREE DIFFERENTIAL EQUATIONS WITH CONSTANT CO-EFFICIENTS.	
3.3.1	Explain 'D' as a differential operatorand D^{-1} as an integral operator.	

S.No.	General/Sample specific objectives.	Specific treatment, if any.
3.3.2	State the following forms of differential equations (a) $\frac{d^2y}{dx^2} + a\frac{dy}{dx} + by = 0$ (b) $\frac{d^2y}{dx^2} + a\frac{dy}{dx} + by = F(x)$	
3.3.3	Explain the cases of failure when (1) $F(x) = e^{ax}$ (2) $F(x) = \sin ax, \cos ax$	
3.3.4	Explain the procedure for solving differential Equations stated in 3.3.2 (a). Considering all types of roots of auxiliary Equation for calculating complementary function.	Emphasize that solution is only complementary function.
3.3.5	Explain the procedure for solving the differential Equation stated in 3.3.2 (b) considering the following cases for calculating Particular Integral. (a) $F(x) = e^{ax}$ (b) $F(x) = \sin ax, \cos ax$ (c) $F(x) = x^m$ $(m = 0, 1, 2)$ (d) $F(x) = V.e^{ax}$ where $V = \sin bx, \cos bn, n^m$	Emphasize that arbitrary constants occur only in complementary function & solution is sum of complementary function and particular Integral.
3.3.6	Distinguish between complementary function and particular Integral.	
3.3.7	Solve the given differential Equations using methods explained in 3.3.4 and 3.3.5	Problems. Covering all types of differential equations may be given for getting their solutions and engineering problems such as The bending moment $M = EI \frac{d^2y}{dx^2}$ at a distance x from the fixed end is W (l-x). Find the maximum deflection of the beam.

S.No.	General/Sample specific objectives.	Specific treatment, if any.
3.3.8	Explain the procedure for solving differential Equation in cases of failure stated in 3.3.3	
3.3.9	Solve the Equations using methods explained in 3.3.8	
3.3.10	Solve miscellaneous differential equations using appropriate methods.	Problems covering all types of differential Equations both linear and second order may be given as home-task.
3.4	SOLVE THIRD AND FOURTH ORDER AND FIRST DEGREE DIFFERENTIAL EQUATIONS WITH CONSTANT CO-EFFICIENTS	
3.4.1	State the following forms of differential Equations (a) $\frac{d^3y}{dx^3} + a\frac{d^2y}{dx^2} + b\frac{dy}{dx} + cy = 0$ (b) $\frac{d^4y}{dx^4} + a\frac{d^3y}{dx^3} + b\frac{d^2y}{dx^2} + C\frac{dy}{dx} + dy = 0$	
3.4.2	Explain the procedure for solving differential equations stated in 3.4.1 considering all types of roots of Auxiliary Equation for Calculating complementary Function.	Emphasize that Solution is only complementary function.
3.4.3	Solve the given differential Equations using methods explained in 3.4.2	

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG.

COURSE : MATHEMATICS- III.

COURSE CODE NO : 307

PRE-REQUISITE : 107 MATHS.-I AND 108 MATHS. II.

LIST OF REFERENCE BOOKS.

(1) Differential Calculus — By G. Prasad } Phothishala Allahabad.
(2) Integral Calculus — By G. Prasad }

(3) Mathematics for Polytechnic Vol. II. — T.T.T.I., BHOPAL.

(4) Applied Mathematics Vol. II. — Deepak Prakashan, Gwalior.

(5) Applied Mathematics Vol. II. — Popular Book Depot, Bhopal.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL AND ELECTRICAL ENGINEERING.

COURSE : MATHEMATICS- III.

COURSE CODE NO : 307

Curriculum analysis indicates the weightage to be given for different topics of this course at knowledge, comprehension and application level for the purpose of assessment.

Topic No.	Percentage assessment for the topic	% age	Percentage assessment at three level Knowledge	Comprehension	Application.
1	Differential Calculus	30	8	14	8
2	Integral Calculus	40	10	12	18
3	Differential Equations	30	07	15	08
	TOTAL	100%	25	41	34

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M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL. (146)

PROGRAMME : DIPLOMA IN CIVIL ENGINEERING.

COURSE : ELEMENTS OF MECHANICAL AND ELECTRICAL ENGG.

COURSE CODE NO : C-308

PRE-REQUISITE : NIL.

RATIONALE.

The course envisages the student of Civil Engg. to know the elementary idea of Mechanical and Electrical engg. He must be exposed with the general idea of various electrical connections, electrical measurements and safety treatment while using electrical power and Mechanical processes and equipment as employed in construction works.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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PROGRAMME : DIPLOMA IN CIVIL ENGINEERING.

COURSE : ELEMENTS OF MECHANICAL & ELECTRICAL ENGG.

COURSE CODE NO : C- 308

PRE-REQUISITE : NIL.

SCHEME OF STUDIES

(A) MECHANICAL ENGINEERING.

S.No.	TOPICE.	DURATION IN HRS. Theory	Pract.pTut.	TOTAL.
1.	Farbication processes.	4	6	10
2.	I.C.Engines.	4	2	6
3.	Air compressors.	2	2	4
4.	Mechanical drives.	2	2	4
5.	Material handling equipment.	2	2	4
6.	Hydraulic pumps.	2	2	4
		16	16	32

(B) ELECTRICAL ENGINEERING.

1.	D.C. Circuits.	2	2	4
2.	A.C. Circuits.	3	2	5
3.	D.C.Machines.	2	2	4
4.	A.C. Machines.	2	2	4
5.	Measurements.	2	4	6
6.	Types of wiring.	3	4	7
7.	Safety in using electricity.	2	-	2
		16	16	32

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
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PROGRAMME : DIPLOMA IN CIVIL ENGINEERING.

COURSE : MECHANICAL ENGINEERING (SECTION A)

COURSE CODE NO : C- 308

PRE-REQUISITE : NIL.

C O N T E N T S.

TOPIC-1: FABRICATION PROCESSES :

Introduction, Types. Welding, types (arc and gas welding only) equipment and tools used, field of application, process description, fitting- shearing (cutting, filing, chipping, drilling and taping, operation, tools and equipment used.

Sheet metal operations - Shearing, bending, drawing.

Carpentry - Tools and equipment used, wood joints and their field of application.

TOPIC-2: I.C. ENGINES :-

Definition, classification, Constructional and operational details of two and four stroke petrol and diesel engines. Parameters for determining B.H.P., I.H.P. and mechanical efficiency, specification of an engine.

TOPIC-3: AIR COMPRESSORS:-

Function, constructional and operational details of reciprocating compressor and its field of application, specification of compressor.

TOPIC-4: MECHANICAL DRIVES:-

Introduction, types- Belt, rope, chain and gear. slip length of belt in case of open and cross belt, H.P. transmitted in belt and rope drive.

TOPIC-5: MATERIAL HANDLING EQUIPMENT :-

Introduction, types of devices used, field of application.

TOPIC-6: HYDRAULIC PUMPS :

Introduction, classification, Constructional and operational details of reciprocating, centrifugal and rotary pumps and their limitations. Parameters required for determination of horse power, Specification and selection of each type.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
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PROGRAMME : DIPLOMA IN CIVIL ENGINEERING.

COURSE : ELECTRICAL ENGINEERING (SECTION B)

COURSE CODE NO : C- 308

PRE-REQUISITE : NIL.

C O N T E N T S.

TOPIC-1: D.C. CIRCUITS :

Concept of electricity, Current, voltage, Resistance, power, Energy, Ohm's Law, Laws of resistance, series and parallel circuits Kirchhoff's law.

TOPIC-2: A.C. CIRCUITS :

Concept of A.C. Vector representation of a.c. quantity, Phase, Phase difference, R,L, C series circuits, power factor, Power single phase and three phase supply system.

TOPIC-3: D.C. MACHINES :

Principle, construction, classification characteristics and applications.

TOPIC-4: A.C. MACHINES :

General idea of Transformer, Alternator, Induction motor and their applications.

TOPIC-5: MEASURMENT :

Elementary idea of ammeter, voltmeter, wattmeter, energymeter, frequency meter, power factor meter, Earth tester, Megger multimeter and their connections.

TOPIC-6: TYPES OF WIRING :

Different types of demestic and industrial wiring and their a

TOPIC-7: SAFETY IN USING ELECTRICITY :

Electric shock and its prevention and shock treatment, Earthing.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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(150)

PROGRAMME : DIPLOMA IN CIVIL ENGINEERING.

COURSE : ELMENTS OF MECHANICAL AND ELECTRICAL ENGG.

COURSE CODE NO : c- 308

PRE-REQUISITE : NIL.

SECTION A - MECHANICAL ENGINEERING.

LIST OF EXPERIMENTS.

1. To prepare joint using are and gas wleding separately.
2. To perform various fitting operations.
3. To prepare wood joints.
4. Study of two/four stroke petrol/diesel engines.
5. Study of air compressor.
6. To identufy different mechanical drives used in the workshop.
7. To identify and handling equipment used in the field (Field trip to be arranged)
8. Study of hydraulic pumps.

SECTION B - ELECTRICAL ENGINEERING.

1. To verify Ohm's Law.
2. To verify Kirchhof's Law.
3. To connect ammeter, voltmeter and wattmeter and to measure the power.
4. To connect R,L,C in the circuit and to find power factor. Draw the vector diagram.
5. Connection and use of megger, Multimeter.
6. Study of various types of wiring and accessories.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

5/151

PROGRAMME : DIPLOMA IN CIVIL ENGINEERING. (151)

COURSE : ELEMENTS OF MECHANICAL AND ELECTRICAL ENGG.

COURSE CODE NO : C-308

PRE-REQUISITE : NIL.

SECTION (A) MECHANICAL ENGINEERING.

REFERENCE BOOKS.

1. Workshop Technology by Hazra and Choudhary.
2. Heat-Engines by Patel and Karamchandani Vol. II.& III.
3. Theory of Machines by Abdulla Shariff.
4. Hydraulic Machines by R.S. Khurmi.

SECTION (B) EIECTRICAL ENGINEERING.

REFERENCE BOOKS.

1. Electrical Technology By B.L. Theraja.
2. Electrical Technology By S.L. Uppal.
3. Electrical Technology By H. Colton.
4. Basic Electrical Engg. By J.B. Gupta.

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: कार्यालय सचिव, मध्यप्रदेश तकनीकी शिक्षा मंडल :
कार्यालय परिसर, ब्लाक 6/4,
गौतम नगर, भोपाल-462 023.

मंडल/स्टेनो/शैक्ष/97/506 /भोपाल, दिनांक 6/2/ -1997.

प्राचार्य,
समस्त पोलीटेकनिक संस्थाएँ
(महिला पोलीटेकनिक सहित)

(2) कमांडिन्ट,
केन्द्रीय मोटर परिवहन स्कूल,
सीमा सुरक्षा बल, टेकनपुर,
ग्वालियर, मध्यप्रदेश.

विषय:- मध्यप्रदेश तकनीकी शिक्षा मंडल द्वारा विभिन्न परीक्षाओं के उत्तीर्ण में आने वाले प्रश्नपत्रों की संख्या में कमी करने के संबंध में-
- विभिन्न डिप्लोमा पाठ्यक्रमों के विषय एप्लाईड केमिस्ट्री, एप्लाईड केमिस्ट्री-1 एवं एप्लाईड केमिस्ट्री-2 की मई-जून, 1997 में आयोजित होने वाली परीक्षा से एक ही दिनांक एवं एक ही प्रश्नपत्र के माध्यम से परीक्षा संचालित करने के संबंध में ।

संदर्भ:- इस कार्यालय का पत्र क्रमांक मंडल/स्टेनो/96/985/शैक्ष, दिनांक 27 मार्च, 1996.

विषयान्तर्गत एवं संदर्भित आप के अनुक्रम में सूचित है कि मध्यप्रदेश तकनीकी शिक्षा मंडल की शैक्षणिक परिषद ने अपनी बैठक दिनांक 9 एवं 10 फरवरी, 1996 में लिये गये निर्णयानुसार अब एप्लाईड मेकेनिक्स विषय के पश्चात् विभिन्न पाठ्यक्रमों के विषय एप्लाईड केमिस्ट्री, एप्लाईड केमिस्ट्री-1 एवं एप्लाईड केमिस्ट्री-2 की समकक्षता निर्धारित की गई है । परिशिष्ट-1 में यह दर्शाया गया है कि एप्लाईड केमिस्ट्री विषय किन- किन पाठ्यक्रमों में समान है तथा उसकी पाठ्यचर्या परिशिष्ट-2 में दर्शाई गई है । इसी प्रकार एप्लाईड केमिस्ट्री-1 विषय किन-किन पाठ्यक्रमों में समान है उसे परिशिष्ट-3 पर दर्शाया गया तथा उसकी पाठ्यचर्या परिशिष्ट-4 में दर्शाई गई है । इसी प्रकार एप्लाईड केमिस्ट्री-2 किन-किन पाठ्यक्रमों में समान रखा गया है उसकी सूची परिशिष्ट-5 में दर्शाई गई है तथा पाठ्यचर्या परिशिष्ट-6 में दर्शाई गई है ।

परिशिष्ट-2, 4 और 6 में दर्शाई गई पाठ्यचर्या के अनुसार जनवरी, 1997 के प्रारंभ सत्र में नियमित छात्रों को अध्ययन कराया जावे तथा उसी पाठ्यचर्या के आधार पर परीक्षायें मई-जून, 1997 में एक ही प्रश्नपत्र के माध्यम से संचालित की जावे । अपुनरीक्षित पाठ्यक्रमों के छात्रों को भी तदनुसार सूचित किया जावे ताकि वे नये पाठ्यक्रम के अनुसार अपना अध्ययन करते हुए ही मई-जून, 1997 में आयोजित परीक्षा में सम्मिलित हो सकें ।

क्रमशः // 2

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// 2 //

यहाँ यह पुनः उल्लेख है कि परिशिष्ट-2 ,4 एवं 6 में दर्शाए प तत्काल प्रभाव से प्रभावशील किये जाये और इसी आधार पर पुरी में संचालित की जावेंगी । प्रश्नपत्रोंका पैटर्न (वर्तमान में प्रभावशील 10 प्रश्न जो अनिवार्य है) वही होगा जो कि नियमित पाठ्यक्रम के उपयोग में लाया जा रह फिर भी आपके सुलभ संदर्भ हेतु इस पैटर्न के प्रश्नपत्र की एक प्रति उदाहरणार्थ एवं अवलोकनार्थ संलग्न है ।

कृपया उपरोक्त विषय पढानें वाले शिक्षकों /नियमित छात्रों तथ भूतपूर्व छात्रों को तदनुसार तत्काल सूचित करें एवं भूतपूर्व छात्रों को यह भी सख्त दी जावे कि परिशिष्ट-2,4 एवं 6 में दर्शाए गए पाठ्यक्रम के अनुसार ही परीक्षा तैयारी कर आगामी परीक्षा में सम्मिलित हों । इस आशय की सूचना शिक्षकों, नि छात्रों एवं भूतपूर्व छात्रों को देते हुए उनसे हस्ताक्षर भी करा लिये जावें ताकि भवि वे यह न कह सके कि उन्हें किसी तरह की जानकारी नहीं दी गई है ।

इस पत्र की पावती लौटती डाक से प्रेषित करें ।

प्रेः सचिव,
मध्यप्रदेश तकनीकी शिक्षा मंडल
भोपाल.

संलग्नः- परिशिष्ट, 1, 2, 3, 4, 5, 6.

पृ0क्र0मंडल/रूटेनो/शिक्ष/97/ /भोपाल, दिनांक 19

प्रतिलिपिः-

अधीक्षक, गोपनीय/ परीक्षा/ उपविभाग, को सूचनार्थ एवं आवश्यक कार्यवाही हेतु अग्रेषित ।

प्रेसचिव,
मध्यप्रदेश तकनीकी शिक्षा मंडल,
भोपाल.

/सोनवणे/

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(1)

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

llabus/Content out lines for the subject "Applied Chemistry"
(Paper code no — 0015)
(Made comman to various disciplines as per appendix-1)

CONTENTS

ATOMIC STRUCTURE AND RADIO ACTIVITY.	- Discovery of Electron Nucleus, Proton & Neutron - Rutherford & Bohrs model of atom; shells. - Bohrs Burry schme of filling of of electrons in various orbits. - Idea of S.p.d.f.orbitals. - Electrovalency - ~~α.β.~~ & γ. rays - Theory of Radio activity. - Group displacement law. - Half life period (Numericals) - Fussion & Fission.
CHEMICAL EQULLIBRIUM	- Rate of reaction, factors effecting rate of reaction, Reversible r reaction. - Law of mass action & its applic- on to reversible reactions. - Le-Chateliers Principle. - Effect of temprature, pressure & concentration in Chemical equilibrium of NH3, HI, pcl5
ELECTRO CHEMISTRY	- Explanation of electrolysis. - Faraday's laws of electrolysis. - Numerical Problems on Faraaday's laws. - Electroplating of copper and Nickel Electrotyping, Electrofining and sising, Determination of equivalant weight of metals.

SURFACE CHEMISTRY AND ITS APPLICATION.	- True solution, collidal solution and suspension, lyiohobie and lyophillic colloids, optical and electrical propertics of colloids Coagulation, coagulants, gold number applications, Smoke precipitator, meaning and examples of emulsion and gels synerisis of Gels.
METAL AND ALLOYS	- Physical and chemical properties of metals, copper, zine, iron, alluminium, lead, tin, cromium, nickel, megnate, magnetium. - General principles of metallurgy. - Mineral, ores, chief ores. - Ore dressin, roasting, smelting, bassemerisation, fluxes, purification. - Extraction of metal copper, alluminium, iron, zinc & lead. - Explanation of alloying purposes, methods of alloying. - Composition and uses of alloy like Brass, Bronze, Duralumin, Solder German silver, Gunmetal etc.
CARBON COMPOUNDS	- Tetra valency of carbon. - Saturated and unsaturated hydrocarbons, Nomenclation. - Homologous series, Isomerism (chain and functional) - Laboratory preparation and properties and uses of ethylene, acetylene and ethan. - Manufacture of ethyl alcohal.
IONISATION pH VALUE CORROSION AND PROTECTION	- Archemious theory of ionisation. - Factors effecting ionisation. - Hydrolysis of acid, Base and salts. - pH Meaning (numericals) - Buffer solution and Buffer actions. - Choice of indication (acidimetry and alkalimetry pH curves)

	- Explanation of corrosion, factors effecting corrosion, types of corrosion. - Corrosion control (protection against corrosion) - Metal coating and organic coating for corrosion control.
Glass, ceramics cement, Refractory and Abrasives.	- Basic raw materials for glass Composition of glass Manufacturing of glass Varieties of glass Annealing of glass Cement- Constituting compounds in cement. Portland cement - manufacture, setting and hardening of cement. Refractory- Meaning, characteristics, use of common refractory materials. Abrasives- Definition, natural and artificial abrasives, silicious and non-silicious abrasives, uses
Water	- Sources of water - Types of water. - Hardness of water - Types and causes of hardness of water - Removal of hardness of water - Boiler feed water - Harmful effect of hard water in boiler. - Municipal water supply - Numericals on soda lime process. - Determination of hardness of water by O.Hesiers, EDTA & soap solution methods.
High polymers and Insulators	- Polymerisation and condensation - Classification of plastics. - Compounding and moulding constituents of plastics. - Preparation properties and uses of PVC, polytehene, polystyrene, Bakelite. - Synthetic fibres-Nylon, Rayon, Orlon Decton and polysters. - Definition characteristics, classification and properties of insulators. - Glass wool and thermocole.

Contd...

1. Pollution & Control	- Introduction - Chemical Toxicology. - Air pollution - Water pollution - Control of air and water pollutio
2. Fuels, Fire extinguishers and explosives	- Classification of fuels, Gross and Net calorific value, determination of C.V. of solid fuel by Bomb calorimater, Octane and Cetane numbers. Proximate Analysis of fuel, its utility. Crude petroleum products of fractional distillation. Fire extinguishers- description and use. Explosives- Meaning, type and use of explosives.
3. Lubricants, paints & varnishes	Lubricants- meaning, type, theory of lubrication, properties of a good lubricant. Flash and Fire point, pour point and cloud point, emulsification number, viscosity, paints and varnishes- meaning, ingradients characteristies of good paint and varnishes, their engineering applications.

MADHYA PRADESH BOARD TECHNICAL EDUCATION, BHOPAL.

Subject - Applied Chemistry (Mode common to various disciptions as per apprndix-1)

List of Practicals

1. To identify two cation and two anion in a given sample of salt. (excluding interfering radical)
2. To measure the PH of different solutions by :
   1) colorimeter method (2) PH meter
3. To determine the percentage of Iron in a ferrous salt by redeximetory.
4. To prepare a colloidal solution and interpretate its properties.
5. To determine the percentage of copper in a sample of Brass by iodimetry.
6. To determine the temporary and permanent hardness of a sample of water by - 1) O'Heners method (2) EDTA method (3) Soap solution method
7. To prepare Bakelite.
8. To set up an experiment for simple electroplating of a regular and irregular surface material.
9. Proximate analysis of a sample of coal.
10. To findout the flash point/ fire point of dry/non-drying oil
11. Determination of viscocity by Red wood viscomiter.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL

Subject - "Applied Chemistry" (Mode commom to various disciplines as per appendix-1)

LIST OF SUGGESTED BOOKS

.	Applied Chemistry	By Shrivastava & Singhal PBS publication, Bhopal.
.	Physical Chemistry	By Bahl & Tuli
.	Advanced inorganic Chemistry	By Mitra
.	Engineering Chemistry	By P.C.Jain & Monica Jain (Dhanpat Rai & Sons publication)
.	Objective in Chemistry	By Shrivastava & Shrivastava. (Chandra Publication, Bhopal)
.	Experiments in Applied Chemistry	By M.Prasad Chandra publication, Bhopal.
.	Chemistry of Engineering materials	By Leighou.
.	Organic Chemistry	By Sarkar & Raksait
.	Chemistry of Engineering materials	By C.L.Agarwal

(Appendix-1)

Madhya Bradesh Board of Technical Education, Bhopal.

Commonality of " Applied Chemistry" Paper (Code no.0015) paper syllabus in the following disciplines.

I First Year revised (1994 Scheme)
(Paper code no.0009 given in the Examination Dec.1996.)

(1) Civil Engg.
(2) Mechanical Engg.
(3) Electrical Engg.
(4) Metallurgy
(5) Electronics and Tele Communication
(6) Chemical Engg.
(7) Automobile Engg.
(8) Refrigeration and Air Condidioning
(9) Refinary and Petrochemicals.
(10) Computer Science
(11) Instrumentation

II First Semester (Rev.94) (Break up to first year 1994 sch
(Paper Code no.0009 given in the Examination Dec.96)

1) Civil Engg.
2) Mechanical Engg.
3) Electrical Engg.
4) Metallurgy.
(5) Electronics & Tele Communication
6) Chemical Engg.
7) Automobile Engg.
8) Refrigeration and Air Conditioning.
9) Refinary and Air Conditioning.
10) Computer Science.
11) Instrumentation.

III First Semester(un revised)
(Paper code no.1132 given in the Examination-Dec.96)

1, Cement Technology

IV First Year (Un-revised)
(Paper Code no.1132 given in the Examination Dec.96)

1. Cement Technology

V First Semester (revised)
(Paper code no.1764 given in the Examination-Dec.96)

1. Mining and Mine Surveying

VI Multi Point Entry and Credit system(Foundation Course)
Paper Code no.CTM-104 given in the Examination Dec.96)

1. Construction Technology and Management.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.

Syllebus/Content outlines for the Subject

"Applied Chemistry-1"

(Paper code no – 0016)

(Made common to Various disciplines as per apperdix-III

S.NO.	TOPIC	CONTENT DETAILS	SCOPE
1	Atomic Structure and Nuclear chemistry.	Discovery of partincles of atom and their placement in it.	Discovery of electron by Thompson experiment Structure of nuclus. Atomic nucleus proton neutron, Atomic number atomics mass, Rutherford's and Bhhr's model of an atom. Bohr Burry scheme of filling the scheme of filling the electrons in various orbits. Ided of S, P, D, F, sub-shells, Elementry idea of electron cloud concept of hybridisation. (Up tosp.)
		Relationship of structure of atom and valency.	Valency–Electronics theory of valency, Electro valency, Covalancy, Co-ordinates valency, of hydrogen bonding. Explaination with exxmples.
		Radioactivity	General introduction of radioactivity, characteristics of α, β, γ, rays. Theory of radio activity half life period, numerical problems on half life period, artificial radioactivity, Atomic fission & atomic fusion. Application of radioactivity.

3	4	5
lligative operties and emical Enesgtics	Osmosis, Osmotic perssure.	Explaination of osmosis and osmotic pressure, determination, Roults'law numerical, problems on Roults Law's Relationship of Roults law with elevation of boiling point and depress-oin of freezing point. Determination of molecular masses. (of non-Volatic)
	Types of energy and energy charges in chemical reactions	Internal energy and enthalpy. conversion of energy. Disectio of spontaneous chemical charge, Entropy, Entropy of fusion, Free energy, physical significence of free energy prediction about reaction probability change in temperature.
eriodic lassification f elements.	Development of periodic table.	Dobernner's triads, New lands' law Luther Mayer Curve, Mendeleef's Law and his periodic table, advantage and limitations. Periodicity and electron activity. Modern periodic l classification of elements the basis of s,p,d,f, orbi tals, elementary idea of Lanthanides & actinides.
xidation and eduction.	Concept of oxidation and reducation	Explaintion of oxidation and reduction. Oxidation number & its calculation Redox reactions. Caleulatio of chemical equivalents on its basis.
lectrochem-istry	Electrolysis electroplating	Explaintion of electrolysis Faradays' law of electrol-ysis, Numerical Problems o Faradays' Law. Electroplati Copper & Nickel.

hermoche nistry	Endo&Exothermic reaction	Explainations, Simple numericals. Heat of formation Heat of neutrilisation Heat of combustion Heat of reaction Heat of law.
face emistry	Colloids, Emulsion Gels	True solution, colloidal solution and suspension. Classification of colloids. Properties of colloids. Explaination of emulsion and gels.
mical ocess and hnology	Unit process & unit operations	Explainations of unit process in the manufacture of sodium carbonate and ammonia (their flow-sheet diagramme)
tals and leys	Metallurgical operation and metallurgy	General principles of metallurgy, minerals/ ores, ore dressing, roasting calcination, smelting, Bessemerisation purification Extraction of metal Cu, Pb, Zn, Fe, Al. Explaination of alloying purposes composition and uses of steel, solder, Brass, Bronze Duralumin alloys.
ter	Domestic and industrial water	Souroes of water, types of water Hardness of water its causes, Types and removal Boiler feed water Harmful-effects of hard water. Municipal water supply. Numericals on lime-sods-requirements for removal of hardness. Determination of harness E.D.T.A. and Heher is method.

2.	3.	4.
Chemical Equilibrium	Rate of Reaction Reversible reaction Le-chatlier Principle	Rate of reaction. factors ettecting rate of reaction, law of mass action and its application to reversible reaction Le-chatliers priciple, ettect of temperature. pressure, and concentration in MH3 and HI.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.

APPLIED CHEMISTRY-1 (PRACTICALS)

(Made common to various disciplines as per apperdix-III)

EXPERIMENTS:

		Hrs.
1.	Indentification of two cations and two anions in a given sample.	16
2.	To determine percentage of copper in a sample of Brass iodometrically.	8
3.	To determine the percentage of iron in given salt redoxismetrically.	8
4.	Volumetric estimation by electrolitic method.	4
5.	Quantitative estimation of two metals in an allyoy(Solder/Brass).	4
6.	Colorimetric estimation of metals in a given sample of an alloy.	4
7.	Proximate analysis(moisture contents and volatile matter) of a sample of coal.	4
8.	To prepare colloidel solution, emulsion and Gel and to study their general properties.	4
9.	To set up a Daniel cell and interprate the electrochemical theory of corrosion.	2
10.	To find out the hardness of water (Temp/ Permanent) by Heners/EDTA Methods.	

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— 6 —

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

SUB: APPLIED CHEMISTRY-I

(Made common to various disciplines as per apperdix-III)

REFERENCES

(1) Physical Chemistry By Puri & Tuli

(2) Advance Inorganic Chemistry
By Mitra.

(3) Applied Chemistry
By Shrivastava & Singhal
(PBS Pub. Bhopal)

(4) Objective Chemistry.
By Shrivastava & Shrivastava
(Chandra Pub. Bhopal)

Appendix- III

Madhya Pradesh Board of Technical Education, Bhopal.

Commonality of " Applied Chemistry"-I Paper Code No.0016) in the following disciplines

(1) First Year New Course(Scheme applicable before 1994)
(Paper Code no.0004 given in the Examination-Dec.96)

1. Civil Engg.
2. Mechanical Engg.
3. Electrical Engg.
4. Metallurgy.
5. Electronics and Tele Communication.
6. Electronics'Y' Scheme.
7. Production.
8. Automobile Engg.
9. Chemical Engg.
10. Opto-Electronics.
11. Refrigeration and Air Conditioning.
12. Petro Chemical & Refinary.
13. Computer Science.

II Part Time Diploma Course First Semester(New Course)
(Paper Code No.0004 given in the Examination Dec.96)

1. Civil Engg.
2. Mechanical Engg.
3. Electrical Engg.

III First Year (Un-revised)
(Paper code no.0004 given in the Examination Ded.96)

1. Textile Technology

IV Multipoint entry and Credit System(Foundation Course)
(Paper code no.CME-105 given in the Examination Dec.96)

1. Civil Engg.
2. Mechanical Engg.
3. Electrical Engg.

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Appendix-VI

Madhya Pradesh Board of Technical Education,
BHOPAL

Syllabus/Content outlines for the subject

"Applied Chemistry-II "
(Paper Code No.0017)
(Made common to various disciplines as per appendix-V)

TOPIC	CONTENT DETAILS	SCOPE
2.	3.	4.
Ionisation corrosion and Protection	Theory of Ionisation pH value corrosion.	Archenious theory of ionisation Factors effecting ionisation Reaction in solutions strength of acid and base Hydrolysis of salt. PH-meaning ,numericals Buffer action indicator and its choice in Acidimetry and Alkalimetry(pH curves) -Explation of corrosion) -Types of corrosion (Atmospheric,wet). -Mechanism of corrosion. -factors effecting corrosi -Corrosion control (Protection against co[illegible] -Metal coating & organic coating for corrosion control.
Fuels	Classification, analysis and calorific-value.	Introduction and classfication of solid ,liquid and gaseous fuel. analysis of coal ultimate and proximate analysis determination and significiance of proximate analysis Petroleum and its various distilation products.Octane and cetane number.Calorific value,gross and....

		net C.V.,Determination of C.V. of a solid fuel by bomb calorimeter Combustion. Numericals on air required combusition of a fuel.
Refractories Cement and glass	Refractories	Meaning,types and Properties of various refractories Applications of refractories.
	Cement	Composition of Portland Cement, its manufacture,Types of Cements. Mechanism of setting and hardening of cement.
	Glass	Raw materials ,composition and manufecture of glass.Varities of glass,Annealing of glass.
Corbon Compounds	Nomenclature classification	Hydro carbons,un-saturation in carbon compounds,Homologous series ,Isomerisirision* IUPC System of nomenclature emperical & molecular formula of organic compounds and numericals based on it. *(Only chain position & functional)
	Study of Corbon Compounds	Lab preparation of Methane, Ethane,Acetylene Ethyl,ether Acetaldehyde,manufecture of Ethanol & Acetic Acid. Properties and uses of above compounds.
High Polymers and Insulators	Plastic and Rubber	<u>High Polymers</u> -Polymerisiation & Condensation,Rubber,Plastic, -Classification of Plastics. - Compounding & Moulding constituents of plastics.

		-Preparation Properties and uses of PVC,Polythene,Polystrene Polymides,Polysteres,Bakelite. -Synthetic fibres-Nylon,Decron Rayon,Orlon,Polysters.
		Insulators (Rubber) -Defination Thermal insulators & Insulators & their applicati - Characterstics,Classification and properties of insulators. -Glass wool and thermocole.
Soap and	Principles of Soap and detergents.	Soaps: -Defination,Characterstic, Classification of different types of soaps. Soap action. -Soapnification,Soapnification & Iodine value,. -Properties & uses of soaps,soap as washing agent. -Industrial application of soap.
		Detergents: -Defination,Characterstics of detergent, difference between soap and detergent. -Classification preparation an uses of detergents. -Detergent action. -Industrial application of detergents. -Surface active detergents wasing & cleaning powder. -Liquid soaps.
Explosives		Meaning of explosives, Types of explosives,applications of explosives.

....4....

Paints, Varnish and Lubricants	Paints and Warnish	Meaning, ingradients, and manufecture of paints and Varnish.
	Lubricants	Meaning, types, theory of lubrication and applications of Flash and fire point, closed & Pourpoint Emulification number, viscosity.
Polution	Air and Water polution in environment	-Introduction. - Chemical Toxicology. - Air Polution- - Water Polution - Instrumental Technique in environment, Chemical analysis. -Natural resourses, energy and environment.
Galvanizing and Electroplating	Classification Types	Defination, Classification types and factors influencing galvanizing -Defination, Principle and factors influencing electro-plating of copper and nickall in regular and irregular articles.
Biomass and Waste recycling	Fues gas from Biomass Gobar Gas	Concept of Bio-mass Chemistry of fuel gas from Bio-mass. Production of Gobar Gas from Gobar Gas Plant. Concept of producing non-conventional energy from waste of plants (organic matters).

Madhya Pradesh Board of Technical Education

BHOPAL

Subject- Applied Chemistry-II (Paper code no.0017)

(Made Common to Various disciplines as per appendix-V)

LIST OF EXPERIMENTS

EXPERIMENTS

1. Measurement of PH of different solutions/samples
2. to find out the Iodine value, soapnification value, Neutralisation value of the organic compounds like oils, fats and paints.
3. To prepare Bakelite plastic and Rayon.
4. To prepare Asprine.
5. To identify fibres in the textile used in cloth.
6. To find out the flash point/fire point of dry/non drying oils.
7. Preparation of a Bio-gas.
8. Proximate analysis (moisture content and votalite matter) of a sample of Coal.

* * *

Madhya Pradesh Board of Technical Education
BHOPAL

bject: Applied Chemistry-II (Paper Code No.0017)
(Made Common to various disciplines as per appendix-V)

REFERENCES

Text Book of Engineering Chemistry
-By S.S.Dara(S.Chand Publication)

A Text Book of Engineering Chemistry
-By M.M.Uppal

Basic Applied Chemistry
-By P.C.Jain & Monica Jain
(Dhanpat Rai & Sons Pub.)

Engineering Chemistry
-By P.C.Jain & Monica Jain
(Dhanpat Rai & Sons Pub.)

Applied Chemistry
By-Shrivastava and Singhal
(P B S Publication,Bhopal)

Experiments in Applied Chemistry
-By M.Prasad
(Chandra Pub.Bhopal)

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Appendix-V

Madhya Pradesh Board of Technical Education

BHOPAL

Commonality of " Applied Chemistry-II" Paper Code No.0017 in the following disciplines :

(I) First Year New Course(Scheme applicable before 1994)

Paper code no. 0005 given in Examination Dec.96

(1) Civil Engg.
(2) Mechanical Engg.
(3) Electrical Engg.
(4) Metallurgy.
(5) Electronics and Tele Communication.
(6) Electronics 'Y' Scheme.
(7) Production Engg.
(8) Automobile Engg.
(9) Chemical Engg.
(10) Opto Electronics.
(11) Refrigeration and Air Conditioning.
(12) Petro Chemical and Refinery.
(13) Computer Science.

II Part Time Diploma Course Second Semester(New Course)

Paper Code No.0005 given Examination Dec.96.

(1) Civil Engg.
(2) Mechanical Engg.
(3) Electrical Engg.

III First Year (Un-revised)

Paper code no.005 given in Examination Dec.96

(1) Textile Technology

IV Multi Point Entry and Credit System(Foundation Course)

Paper Code No.CME-106 given in Examination Dec.96.

(1) Civil Engg.
(2) MechanicalEngg.
(3) Electrical Engg.

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Paper Code Number : F/96/RN/103

Roll No. of the Candidate.....

Signature of the Invigilator.....

This Paper contains 10 questions and Total Pages – 3

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FIRST YEAR/FIRST SEMESTER

DIPLOMA IN CIVIL, MECHANICAL, ELECTRICAL, METALLURGY, ELECTRONICS & TELE-COMMUNICATION, COMPUTER SCIENCE, REFRIGERATION AND AIR-CONDITIONING, AUTOMOBILE ENGINEERING, CHEMICAL ENGINEERING, REFINERY AND PETROCHEMICAL, INSTRUMENTATION

(REVISED NEW COURSE) (SCHEME 1994)

APPLIED CHEMISTRY

Time : Three Hours] [Maximum Marks : 100

NOTE :

(i) All questions are compulsory unless mentioned otherwise.
सभी प्रश्न अनिवार्य हैं जब तक कि कहीं इसके विपरीत न लिखा हो ।

(ii) In case of any doubt and dispute the English version question should be treated as final.
किसी भी प्रकार के संदेह अथवा विवाद की स्थिति में अंग्रेजी भाषा के प्रश्न को अंतिम माना जायेगा ।

1. (i) Electronic configuration $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^5, 4s^1$ belongs to the element

(A) Copper (B) Chromium

(C) Calcium (D) Magnesium 2

इलेक्ट्रानिक विन्यास $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^5, 4s^1$ जिस तत्व से सम्बन्धित है वह है

(अ) कॉपर (ब) क्रोमियम

(स) केल्शियम (द) मैगनेशियम

(ii) Most popular and ideal disinfectant of water is

(A) Bleaching powder (B) Ozone

(C) Chlorine (D) Lime 2

पानी के लिए सबसे आदर्श एवं लोकप्रिय रोगाणुनाशक है

(अ) विरजंक चूर्ण (ब) ओजोन

(स) क्लोरीन (द) चूना

(iii) Octane Number is

(A) the number of carbon atom in octane

(B) a standard of rating petrol fuel

(C) the number of octane molecules found in cracking process

(D) the length of carbon chain in fuel

आक्टेन संख्या है

(अ) आक्टेन में कार्बन परमाणुओं की संख्या

(ब) पेट्रोल ईंधन के स्तर-निर्धारण का मापदण्ड

(स) क्रेकिंग विधि द्वारा बने आक्टेन अणुओं की संख्या

(द) ईंधन में कार्बन श्रृंखला की लम्बाई

(iv) The pH value of N/10 HCl is

(A) 1 (B) 3

(C) 5 (D) 7

N/10 HCl का pH मूल्य है

(अ) 1 (ब) 3

(स) 5 (द) 7

(v) The purest form of Iron is

(A) Cast iron (B) Wrought iron

(C) Pig iron (D) Steel

लोहे का सबसे शुद्ध रूप है

(अ) ढलवां लोहा (ब) पिटवाँ लोहा

(स) पिग आयरन (द) इस्पात

2. (a) What are the causes of hardness of water ? How will you remove perm hardness of water by lime soda process ?
पानी में कठोरता के क्या कारण हैं ? पानी की स्थायी कठोरता को लाइम विधि से किस प्रकार दूर करेंगे ?

(b) Describe E.D.T.A. Method of estimation of total hardness of water.
पानी की पूरी कठोरता ज्ञात करने की ई.डी.टी.ए. विधि का वर्णन कीजिए ।

3. (a) Explain Half life period and Average life of a radioactive element.
रेडियोधर्मी तत्त्व के 'अर्ध आयु' एवं 'औसत-आयु' काल को समझाइये ।

(b) What is 'Group displacement law' in radioactivity ?
रेडियोएक्टीविटी का 'समूह विस्थापन नियम' क्या है ?

4. (a) What are the main constituents of a paint ? Give the applications of paint.
पेन्ट के मुख्य घटक कौन-कौन से हैं ? पेन्ट के उपयोग बतलाओ ।

(b) Explain the proximate analysis of Coal.
कोयले के प्रोक्सीमेट विश्लेषण की व्याख्या कीजिये ।

5. (a) What is Glass ? Name the different substances used in manufacturing glass.
कांच क्या है ? काँच निर्माण में जिन विभिन्न पदार्थों का उपयोग होता है, उन नाम लिखो ।

(b) What is Polymerization and Condensation ? Explain it with the example of plastic. 5
बहुलीकरण और संघनन क्या है ? प्लास्टिक का उदाहरण देते हुए समझाइये ।

6. What is Rutherford's Atomic Model ? Give defects of Rutherford Atomic model. Describe the modification made by Bohr. 10
रदरफोर्ड का परमाणु मॉडल क्या है ? रदरफोर्ड परमाणु मॉडल के दोष लिखो । बोहर ने इसमें क्या संशोधन किये, लिखिये ।

7. What is Catalysis ? Give types of catalysis. Describe adsorption theory of catalysis. List four industrial applications of catalysis. 10
उत्प्रेरण क्या है ? उत्प्रेरण के प्रकार बतलाइये । उत्प्रेरण का अधिशोपण सिद्धान्त विस्तार-पूर्वक बतलाइये । कोई भी चार उत्प्रेरण के औद्योगिक अनुप्रयोग लिखिये ।

8. Explain the term Corrosion. Give types of corrosion. Describe Electro-chemical theory of corrosion and methods of protection. 10
धातु क्षय क्या है, समझाइये । धातु क्षय के प्रकार दीजिये । धातु क्षय का विद्युत-रसायनिक सिद्धान्त और इसे रोकने के उपाय विस्तार से समाझाइये ।

9. What is Lubricant, Give types of Lubricant. Explain the theory of lubricant. Describe the properties of a good lubricant. 10
स्नेहक क्या है ? स्नेहक के प्रकार लिखिए । स्नेहक का सिद्धान्त समझाइए । एक अच्छे स्नेहक के गुणों को विस्तार से समझाइये ।

10. Write optical and electrical properties of colloidal solution ? Give their important industrial applications. 10
कोलाइडी विलयनों के प्रकाशीय एवं वैद्युत गुणधर्म लिखिये । उनके महत्त्वपूर्ण औद्योगिक अनुप्रयोग लिखिए ।
