

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

34/1



THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING Under Multipoint Entry & Credit System

DETAILED SYLLABUS

- | | |
|---------------------|----------------------------|
| 1. | 4. Basic Technology course |
| 2. Hard core course | 5. Applied Technology |
| 3. Soft core course | 6. Diversified course |

SPONSORED BY
DIRECTORATE OF TECHNICAL EDUCATION, BHOPAL (M.P.)

DEVELOPED BY
M. P. BOARD OF TECHNICAL EDUCATION, BHOPAL

Prepared by
CENTRAL SCHOOL OF MT,
BSF ACADEMY, JALALPUR
GWALIOR (M.P.)

GOVT. KALANIKETAN
POLYTECHNIC
JARALPUR (M.P.)

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION

BHOPAL (MP)

MULTI POINT ENTRY

&

CREDIT SYSTEM

DIPLOMA

IN

AUTOMOBILE ENGINEERING

*Approved by
B.O.S on
3-2-77/99*

SPONSORED BY

DIRECTOR OF TECHNICAL EDUCATION

BHOPAL (MP)

PREPARED & COMPILED

BY

CENTRAL SCHOOL OF MOTOR TRANSPORT

BORDER SECURITY FORCE

TEKANPUR : GWALIOR (MP)

&

DEPT. OF AUTOMOBILE ENGG.

GOVT. KALANIKETAN (POLYTECHNIC)

JAUNPUR (M.P.)

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PRE FACE

The course contents of various course of MULTI POINTS ENTRY AND CREDIT SYSTEM are compiled in the form of this booklet based on revised curriculum of Diploma programme in Automobile Engineering. This booklet contains all the 31 course syllabus to be taught to Automobile Engineering Diploma students.

No changes are made in the contents of common course which are common with mechanical Engineering programme and contents of physics and chemistry course which are common CTM. only Automobile Courses.

The courses in which the syllabus have been revised are :-

1. A - 405 Strength of materials and mechanics of Machines.
2. A - 503 Auto Design, Drafting Estimating and costing.
3. A - 505 Auto Business and Industrial Management
4. A - 506 Automobile Maintenance service and Repair
5. A - 508 Project
6. A - 605 Special Vehicle and equipments

A part from this, few practicals are added in " DIVERSIFIED COURSES".

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This book is the outcome of the combined efforts of (1) Shri W.S. Pawar lecturer Auto Engineering Govt. Kalaneketan Polytechnic, Jabalpur (M.P.)

(2) Shri R.M. Khan, BE (Auto), DEC, MISTE, Lecturer Auto Engineering CSMT, BSF Tekanpur

(3) Shri Sanjay Mohite, BE (Mech), Lecturer in Mech. Engg. CSMT, BSF Tekanpur.

(4) Shri Premod Tyagi, BAE, MA (Economics) EX. works Manager TATA Authorised Dealer Lucknow, CSMT, BSF Tekanpur

Hope that this booklet serve the purpose.

(J.S. JANGI)
PRINCIPAL
GOVT. K.N. POLYTECHNIC
JABALPUR

Amphac
01.12.98
~~(S. S. JANGI)~~
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REVISED CURRICULUM OF DIPLOMA
PROGRAMME IN AUTOMOBILE ENGINEERING
LIST OF COURSES

Course Code	Course Title
I FOUNDATION COURSES	
A/M-101	Comm. Skill-I
A/M-102	Comm. Skill-II
A-103 P	Physics
CTM-103	
A-104	Chemistry
CTM-104	
A/M-107	Mathematics-I
A/M-108	Mathematics-II
ii HARD CORE COURSES	
A/H-201	Applied Mechanics
A/H-202	Engg. Drawing
A/H-203	Workshop Practice
iii SOFT CORE COURSES (ANY THREE)	
A/M-301	Computer Application
A/M-302	Environmental Engg.
A/M-303	Elements of Civil Engg.
A/M-304	Marketing Management
A/M-305	Non Conventional Source of Energy
A/M-306	Entrepreneurship
A/M-307	Maths-III
iv BASIC TECHNOLOGY COURSES	
A/H-401	Mechanical Drafting
A/H-402	Manufacturing Process
A/H-403	Materials Technology
A-404	Auto Engines-I
A-405	Strength of Materials and
A-406	Mechanics of Machines
A/H-407	Auto Electrical & Electronics
A-408	Fluid Mechanics & Hydraulics
A-409	Machine
A-410	Auto Chassis-I
v APPLIED TECHNOLOGY COURSES	
A-501	Auto Engines-II
A-502	Auto Chassis-II
A-503	Auto Design, Drafting,
A-504	Estimating & Costing
A-505	Auto Workshop
A-506	Practice
A-507	Auto Business and Industrial Management
A-507/H-404	Automobile Production, Servicing & Rep. Insp.
A-508	Metrology and Instrumentation
A-509	Project
A-510	Seminar/Forum/Inplant Training/Group discussions etc.

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DIVERSIFIED COURSE (ANY TWO)

- A-601 Refrigeration and Vehicle Air Conditioning
 - A-602 ✓ Vehicle Emission Controls ✓
 - A-603/(M-504) Industrial Engineering ✓
 - A/M-604 ✓ CAD/CAM ✓
 - A-605 Special Vehicle and Equipments
-

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL
 M.P.E.C. SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN AUTOMOBILE ENGG.
 1. FOUNDATION COURSE : ALL COURSES ARE COMPULSORY (CREDITS- 24)

S. No.	Code No.	Course	Pre-requisite	Hours/week Th. Pr.	Credits	Sessional Term Lab. Work work I II	Prog. Asst.	Board paper	Exam Dur.	Theory Marks	Practical/Viva Marks	Total	
1.	A/M-101	Commn. Skill-I	-	3 -	3	20 -	10 10	1	3Hrs	100	-	140	
2.	A/M-102	Commn. Skill-II	-	3 -	3	20 -	10 10	1	3Hrs	100	-	140	
3.	A-103 CTM - 103	Physics	-	4 2	5	20 20	10 10	1	3Hrs	100	1 3Hrs 50	210	
4.	A-104 CTM - 104	Chemistry	-	4 2	5	20 20	10 10	1	3Hrs	100	1 3Hrs 50	210	
5.	A/M - 107	Mathematics-I	-	4 -	4	20 -	10 10	1	3Hrs	100	-	140	
6.	A/M - 108	Mathematics-II	-	4 -	4	20 -	10 10	1	3Hrs	100	-	140	
TOTAL CREDITS					24	120	40	60	60	60	2	100	980

NOTE:- FOUNDATION COURSES ARE COMPULSORY FOR ALL 10+ STUDENTS.

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FIRST YEAR DIPLOMA IN CIVIL ENGINEERING/MECHANICAL (7)
ENGINEERING/ELECTRICAL ENGINEERING AND OTHER ALLIED
DIPLOMA COURSES AS DETAILLED ON FRONT PAGE.

SUBJECT : COMMUNICATION SKILLS -I
(TO BE IMPLEMENTED FROM ACADEMIC SESSION-1995-96)
(A "D" ON-WORDS)

(1) Salient features of the new curriculum.

Teaching of English is based on text book approach. 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 changed, altogether new exercises have been framed, Particular emphasis has been laid in preparation of topics like the 'Auxiliaries' and 'Conditionals.'

CONCLUSION

(8)

(3) English occupies an important place in our curriculum. Besides functioning as one of the important literary languages in India, it acts as a window to technical and scientific 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. Emphasis is being laid on the development of communication skills among the students.

SKILLS TO BE DEVELOPED(A) WRITING :

(9)

- (a) Understand & use the vocabulary items of general use besides words from the register of physical and social sciences.
- (b) Given a passage use substitutes for identified words and expressions in an appropriate manner.
- (c) Ensure that the intended communication through a written passage occurs in practice.
- (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 causal 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.

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(D) SPEAKING :

(10)

- (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 en-quiries 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; and
 - or/ or. perfect; question words; phrasal verbs

(4) SCHEME OF STUDIES AND EXAMINATION.

S.No.	Topics.	Lecturer	Hrs.
<u>Section A</u>			
1.	<u>The Text.</u>		
	Part-I - Passages for comprehension.		27
	Part-II- Short stories.		15
	Part-III-applied Grammar.		22
<u>Section B</u>			
2.	(a) Paragraph writing on topics of general interest.		10
	(b) Unseen Passage.		10
Total			84

Note : For spoken English integrated approach may be adopted.

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SECTION - II

(11)

COURSE CONTENTS. PART - I

PASSAGES FOR ORAL EXAMINATION.

1. Language of science.
2. My Thousandth Goal.
3. Rip van winkle Comes to Four.
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 Lopez Y. Puentes.
- (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.

(12)

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.	<u>The text.</u>	
A.	<u>Passages.</u>	
	(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.	<u>Short Stories.</u>	
	(a) Answers in 5-6 lines.	06
	(b) Composition type.	09
C.	<u>Applied Grammar.</u>	25

Total : 100 Marks.

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For achieving the for said objectives the text book ⁽¹³⁾ titled "Communication skills for Technical Students vol-I" if being prepared for the 1st year of M.E., Maharashtra, Gujarat and Goa may be prescribed. This shall be published by M/s Semaiy 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:-

Home work	-	10 Marks.
Testing of	-	10 Marks.
Spoken Skills.		

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DIVERSIFIED COURSE (ANY TWO)

- A-601 Refrigeration and Vehicle Air Conditioning
- A-602 Vehicle Emission Controls ✓
- A-603/(H-504) Industrial Engineering ✓
- A/H-604 CAD/CAM ✓
- A-605 Special Vehicle and Equipments



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M.D.Y. PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPL.

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PROGRAMME : DIPLOM. IN/ AUTOMOBILE 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
		<u>42</u>

Credits -3

MADHY. PRADESH BOARD OF TECHNICAL EDUCATION,
BHO PAL. (16)

PROGRAMME : DIPLOMA IN/ AUTOMOBILE 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 scope 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 single - sentence answers to questions. (iii) One-word, substitutes, appropriate word derivations.
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.
	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.

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PROGRAMME : DIPLOMA IN / AUTOMOBILE ENGINEERING.

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 (ii) Mechanics:	Difference between literary and technical style; Features of technical style. Abbreviations numerals, punctuations and spelling rules.
(3) Types of Technical Writing.	Feasibility Report, Progress Report, Trouble Report in the form of memorandum.
(4) Technical Descriptions	(a) Objects - Cooler; refrigerator; Pressure cooker, fire-extinguisher; 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

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPLA.

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PROGRAMME : DIPLOMA IN/ AUTOMOBILE 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.

LIST OF BOOKS

- (1) Passages in General Studies,
Vikas Publications, Bhopal.
- (2) A Course in Technical English, Book II,
Sri Aya Publications Pvt. Ltd. Bombay.

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MHHA FRANCHISE BOARD OF TECHNICAL EDUCATION,
BHOJAL.

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING.

COURSE : PHYSICS.

COURSE CODE NO: CIM 103

PREREQUISITE : NIL

R A T I O N A L E.

Physics forms the foundation of all technician courses. The knowledge and comprehension of basic concepts like motion, force energy molecular phenomena, heat light electric phenomena helps in understanding the engineering subjects. And hence these concepts are incorporated in the syllabus.

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

- (i) Attainment level of student at entry level.
- (ii) Reference to engineering subjects.
- (iii) And to maintain continuity of sequence for logical development of subject.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING.

COURSE : PHYSICS

COURSE CODE NO. : CIM 103

PRE-REQUISITE : NIL

SCHEME OF STUDIES.

<u>S.No.</u>	<u>NAME OF TOPIC.</u>	<u>Th. Hrs.</u>	<u>Pr. Hrs.</u>	<u>Total.</u>
(1)	Physics and its importance in technician education.	1	-	1
(2)	S.I. Units.	3	-	3
(3)	Linear and angular measurements.	4	6	10
(4)	Force and Motion.	4	-	4
(5)	Circular Motion.	4	-	4
(6)	Molecular phenomena in solids liquids and gases.	5	-	5
(7)	Surface tension.	4	-	4
(8)	Heat and work.	2	4	6
(9)	Hygrometry.	3	4	7
(10)	D.C. Circuits.	8	4	12
(11)	Heating effect of electric current.	3	-	3
(12)	Comparative study of cells batteries and their maintenance.	3	4	7
(13)	Refraction of light.	4	4	8
(14)	Effects of images.	3	-	3
(15)	Optical instruments.	5	6	11
Total		56	28	84

Credit - 5

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOJAL.

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PROGRAMME : DIPLOMA IN AUTOMOBILE ENGRG

COURSE : PHYSICS.

COURSE CODE NO: CTM 103

PREREQUISITE : NIL

CONTENTS.

- | <u>S.No.</u> | <u>TOPIC.</u> | <u>SUB-TOPICS.</u> |
|--------------|--|---|
| 1. | <u>PHYSICS AND ITS IMPORTANCE IN TECHNICIAN EDUCATION.</u> | Why teach Physics, Importance of fundamental Sciences, Physics in particular in the field of engineering education. |
| 2. | <u>S.I. UNITS.</u> | - S.I. Units.
- Base and Supplementary units.
- Derived units.
- Symbols, abbreviations and precautions. |
| 3. | <u>LINEAR AND ANGULAR MEASUREMENTS.</u> | - Principle of linear and angular verniers.
- Calculation of 10^n ^{least count} and use of vernier callipers, vernier attached with Travelling microscope, Fortin's barometer spectrometer etc.
- Zero error of linear and angular verniers.
- Principle, use and IC of screw instruments.
- Zero error and Backless error of screw instruments. |
| 4. | <u>FORCE AND MOTION</u> | - Classification of motion.
- Concept of particle in Mechanics.
- Characteristics of different types of motion.
- Distinction between rotary and circular motion.
- Newton's laws of motion.
- Velocity- Time and Distance- Time graphs. |
| 5. | <u>CIRCULAR MOTION</u> | - Circular motion and related physical quantities.
- Relation between linear and angular velocity.
- Centripetal and centrifugal forces.
- Banking of roads and bending of cyclist. |

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6. 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.
- Corroboration of these postulates with experiments, Brownian motion, diffusion of solids, liquids & gases.
- Kinetic and potential energy of molecules.
- Order of magnitude of interaction forces in matter (molecular forces)
- Concept of internal energy.
- Change in internal energy.
- Relation of internal energy with heat and temperature.

7. SURFACE TENSION

- Molecular forces.
- Cohesive and adhesive forces.
- Free still surface of a liquid tries to contract and behaves like a stretched membrane, Def. 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 and Engineering.
- Effect of temp. on S.T. of liquids.
- Experimental determination of ST of liquids by capillary rise (No derivation of formula required)

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8. HEAT AND WORK

- Nature of heat energy.
- Relation of degree of hotness with KE of motion of molecules.
- Relation of heat in a body with internal energy.
- Concept of heat capacity & specific heat capacity of a body.
- Variation specific heat capacity of bodies in different temperature. Zones.
- First law of thermodynamics, Mechanical equivalent of heat.
- Concept of latent heat capacity.

9. HYGROMETRY

- Importance of the knowledge of humidity in Industry and metrological observations.
- Concept of Absolute & Relative humidity (RH) and dew point.
- Determination of RH, dew point hygrometer (Regnault's), Wet and dry bulb Hygrometer, Hair's hygrometer.

10. D.C. CIRCUITS

- Electric current, free electron theory of metallic conduction.
- Ohm's law current voltage relation, resistance.
- Dependence of resistance on various factors.
- Grouping of resistances.
- Determination of resistances.
- Wheatstone bridge, meter bridge.
- Internal resist of a cell.
- Potentiometer and its use to compare EMF's of two cells, and to determine internal resist of a cell.

11. HEATING EFFECT OF ELECTRIC CURRENT.

- Joule's laws.
- Work and power in electric circuits.
- Calculation of electric energy.

12. COMPARATIVE STUDY OF CELL BATTERIES AND THEIR MAINTENANCE.
- Comparative study of electrodes, electrolytes, depolariser, emfs 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 of secondary cells, precautions.
13. REFRACTION OF LIGHT
- Refraction of light, laws of refraction.
 - Speed of light in different media.
 - Refraction through prism.
 - Refraction through lenses.
 - Combination of lenses and power of lens.
14. DEFECTS OF IMAGES
- Defects of images
 - Chromatic and Spherical aberrations.
15. OPTICAL INSTRUMENTS.
- Simple microscope.
 - Compound microscope.
 - Astronomical telescope.
 - Galillean telescope

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : CONSTRUCTION TECHNOLOGY AND MANAGEMENT,
COURSE : PHYSICS,
COURSE CODE NO. : CTM 103
PRE-REQUISITE : Nil

LIST OF EXPERIMENTS.

Students are required to perform any six experiments out of the following:

- (1) To determine the fraction of unit of length with the aid of linear and angular verniers.
- (2) To determine area of cross section of a wire with the aid of screw gauge.
- (3) To determine specific heat of a solid by the method of mixture.
- (4) To verify Ohm's law.
- (5) To determine resist of wire material with the aid of material bridge.
- (6) To determine R.H. of atmospheric air with the aid of wet and dry bulb hygrometer.
- (7) To determine focal length of a convex lens by conjugate foci method.
- (8) To determine the refractive index of transparent slab material.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOJAL.

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING.

COURSE : PHYSICS.

COURSE CODE NO: CTM 103

PREREQUISITE : NIL

LIST OF REFERENCE BOOKS.

- (1) Principles of Physics Prepared by T.T.T.I., Bhopal.
- (2) Principle of Physics By Drijlal & Subrahmaniyam.
- (3) Principles of Physics. By H. White.
- (4) Basic Applied Physics. By R.K. Gour.
- (5) A Text Book of Applied Physics- By Mehta,
- (6) A Text Book of Physics By- R.F. Goyal.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BKNAL.

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING.

COURSE : CHEMISTRY.

COURSE CODE NO : CTM 104

PREREQUISITE : Nil

R A T I O N A L E.

The teaching of Chemistry should be aimed in developing right type of attitudes in the student. It should develop in student the habit of scientific enquiry, ability to investigate the cause and effect relationships, ability to predict the results under given conditions of chemical activity and give convincing reasons for his prediction, and the ability to make generalisation.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING.

COURSE : CHEMISTRY.

COURSE CODE NO: CIM 104

PREREQUISITE : NIL

SCHEME OF STUDIES.

<u>S.NO.</u>	<u>TOPICS.</u>	No. of Hrs.		<u>Total.</u>
		<u>Th. Hrs.</u>	<u>Fract. Hrs.</u>	
1.	Atomic structure and Radio Activity.	6	-	6
2.	Chemical Equilibrium.	2	-	2
3.	Periodic classification of Elements.	4	-	4
4.	Electro Chemistry	3	4	7
5.	Surface chemistry.	2	4	6
6.	Metals and Alloys.	8	6	14
7.	Carbon compounds.	4	-	4
8.	Ionisation pH Value Corrosion and Protection	8	6	14
9.	Glass.	3	-	3
10.	Water.	8	6	14
11.	High Polymers and insulators.	4	2	6
12.	Pollution.	4	-	4
		56	28	84

Credits - 5

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOBAL.

- 29.

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING.

COURSE : CHEMISTRY.

COURSE CODE NO. CIM 104

PREREQUISITE : NIL

CONTENTS.

1. ATOMIC STRUCTURE AND RADIO ACTIVITY.
 - Discovery of Electron, Proton & Neutron
 - Rutherford & Bohr's model of atom; shells.
 - Bohr-Bury scheme of filling of electrons in various orbits.
 - Idea of s, p, d, f. orbitals.
 - Electrovalency & Co-valency
 - α , β & γ rays.
 - Theory of radio activity.
 - Group displacement law.
 - Half life period (Numericals)
 - Fusion & Fission.

2. CHEMICAL EQUILIBRIUM.
 - Rate of reaction, factors effecting rate of reaction, Reversible reaction.
 - Law of mass action & its application to reversible reactions.
 - Le-Chatelier's Principle.
 - Effect of temperature, pressure & concentration in Chemical equilibrium of NH_3 , HI , FeS .

3. PERIODIC CLASSIFICATION OF ELEMENTS.
 - Doberniers Trial, New Land's law
 - Mendeleev's law and his periodic table, advantages and limitations.
 - Modern periodic law.
 - Spdf Orbital classification of elements.
 - Elementary idea of Lanthanide and Actinide series

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- 30
4. Electro Chemistry
- Explanation of electrolysis.
 - Faraday's laws of electrolysis.
 - Numerical problems on Faraday's laws.
 - Electroplating of copper and Nickel.
5. SURFACE CHEMISTRY
- True solution, Colloidal solution and suspension.
 - Classification of Colloids.
 - Properties of colloids.
 - Explanation of emulsion, and Gels.
6. METALS AND ALLOYS
- General principles of metallurgy.
 - Mineral; ores, Chief ores.
 - Ore dressing, Roasting, Smelting, Bessemerisation, Fluxes, Purification.
 - Extraction of metal copper, Aluminium and iron.
 - Explanation of alloying purposes.
 - Composition and uses of alloys, like Brass, Bronze, Duralumin, Steel, Solder etc.
7. CARBON COMPOUNDS.
- Tetra valency of carbon.
 - Saturated and unsaturated hydrocarbons, Nomenclature
 - Homologous series, Isomerism (chain and functional)
 - Laboratory preparation and properties and uses of ethylene, Acetylene, and Ethane.
 - Manufacture of Ethyl alcohol.
8. IONISATION pH VALUE CORROSION AND PROTECTION.
- Arrhenius theory of ionisation.
 - Factors effecting ionisation.
 - Hydrolysis of acid, Base and salts.
 - pH meaning (numericals)
 - Buffer solutions and Buffer actions.
 - Choice of indicator (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.
9. GLASS
- Basic raw materials for glass.
 - Composition of glass.
 - Manufacture of glass.
 - Varieties of glass.
 - Annealing of glass.
- (2)

10. WATER

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- 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. Nessler, EDTA & soap solution methods.

11. High polymers and Insulators.

- Polymerisation and condensation
- Classification of plastic.
- Compounding and moulding constituents of plastics.
- Preparation properties and uses of PVE, Polyethylene, Polystyrene, Bakelite.
- Synthetic fibres - Nylon, Rayon, Orlon, Dacron and Polysters.
- Definition characteristics, classification and properties of insulators.
- Glass wool and thermocole.

12. POLLUTION

- Introduction
- Chemical Toxicology.
- Air pollution.
- Water pollution.
- Control of air and water pollution

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PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING.
COURSE : CHEMISTRY.
COURSE CODE NO. : CM- 104
PREREQUISITE : NIL.

LIST OF 8 PRACTICALS.

- (1) To identify one cation and one 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 redoximetry.
- (4) To prepare a colloidal solution and interpretate its properties.
- (5) To determine the percentage of copper in a sample of Brass by gravimetry.
- (6) To determine the temporary and permanent hardness of a sample of water by
 - (i) O'Heners method.
 - (ii) EDTA method
 - (iii) Soap solution method.
- (7) To prepare Bakelite.
- (8) To set up an experiment for simple electroplating of a regular and irregular surface material.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION
BHO PAL.

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING..
COURSE : CHEMISTRY.
COURSE CODE NO. → GTM-104
PREREQUISITE ; NIL.

LIST OF SUGGESTED BOOKS.

- (1) Applied Chemistry By Shrivastava and Singhal
PBS Publication, Bhopal.
- (2) Physical Chemistry By- Bahl and Tuli.
- (3) Advanced inorganic chemistry By- Mitra.
- (4) Engineering Chemistry By P. C. Jain & Monica Jain
(Khannat Rai & Sons Publication)
- (5) Objective in Chemistry By Shrivastava & Shrivastava.
(Chandra Publication, Bhopal)
- (6) Experiments in Applied Chemistry - By- M. Prasad Chandra Publication
Bhopal.

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- 34.

M.D.M. PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPL.

(47)

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING
COURSE : MATHEMATICS - I.
COURSE CODE NO. : 107

PREREQUISITE : ---

R A T I O N A L E.

Mathematics forms backbone for all technologies 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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INDIAN PRICES BOARD OF TECHNICAL EDUCATION, (48)
B OF E.

PROGRAMME : DESIGN IN AUTOMOBILE ENGR.
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.			Total
		Th.	Pr.	Tut.	
<u>ALGEBRA.</u>					
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
<u>TRIGONOMETRY</u>					
1.	Trigonometrical ratios.	5	-	-	5
2.	Properties of Triangles.	5	-	-	5
3.	Trigonometrical Equations.	3	-	-	3
4.	De Moivre's Theorem.	4	-	-	4
<u>DIFFERENTIAL CALCULUS.</u>					
1.	Definitions.	2	-	-	2
2.	Differentiation.	6	-	-	6
3.	Successive Differentiation.	2	-	-	2
				56	56

Credits 4

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPL.

(19)

PROGRAMME : DIPLOMA IN / AUTOMOBILE - ENGG.

COURSE : MATHEMATICS - I.

COURSE CODE NO. 107 PREREQUISITE :

MATHEMATICS - I.

SUGGESTED

- (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, Arithmetic 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, Permutations 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 Theorem. - 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 fraction of different algebraic expressions, viz. cases of linear, different and repeated linear factors, Quadratic factors.
- (9) Determinants. - Concept and principles of Determinants, properties of determinants of order three 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.

TRIGONOMETRY

(50)

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

$$\sin \phi = \sin x$$

$$\cos \phi = \cos x$$

$$\tan \phi = \tan x$$
4. De Moivre's Theorem - Meaning of $i = \sqrt{-1}$, Definition of complex number in cartesian and polar forms and their conversion, Statement of De Moivre's Theorem for any index. Application of De Moivre's theorem for algebraic equations such as $x^2 - 1 = 0$, $x^3 - 1 = 0$, $x^5 - 1 = 0$ etc.

DIFFERENTIAL CALCULUS

1. Definitions. - Definition of function, constant, variable, limit and evaluation of limits. Definition of differentiation and differentiation by first principles.
2. Differentiation - Differentiation of sum, product and quotient of two functions. Differentiation of a function of a function, Implicit function, Logarithmic function, Trigonometrical functions, Parametric equations and exponential functions.
3. Successive differentiation. - Successive derivatives of a function w.r. to x and simple problems related to successive differentiation.

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M.D.M.Y. RAJESH BOARD OF TECHNICAL EDUCATION,
BHOPL.
(51)

PROGRAMME : DIPLOMA IN ENGINEERING AUTOMOBILE ENGINEER

COURSE : MATHEMATICS -I.

COURSE CODE NO. : 107 PREREQUISITE :

MATHEMATICS -I

LIST OF REFERENCED BOOKS.

- (1) Applied Mathematics Publisher Popular Book Depot, Bhopal.
- (2) Mathematics for Polytechnic Vol. I P.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.

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M.D.M. PRADESI BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(52)

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGG.

COURSE : MATHEMATICS -II.

COURSE CODE No. 108 : PREREQUISIT :

R E Q U I S I T E

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.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPLUR.

(5)

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGG.

COURSE : MATHEMATICS -II.

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

SCHEME OF STUDIES.

S.No.	Topic	Duration of hours			Tot
		Th.	Pr.	Tut.	
<u>COORDINATE GEOMETRY</u>					
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
<u>VECTOR ALGEBRA</u>					
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
<u>INTEGRAL CALCULUS .</u>					
1.	Integration.	2	-	-	2
2.	Methods of Integration.	5	-	-	5
<u>MATRIX.</u>					
1.	Matrix.	1	-	-	1
2.	Special Matrices.	2	-	-	2
3.	Operation and different laws.	5	-	-	5
		<hr/>			
		56			56

Credits 4

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
GHOSE.

(547)

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGG.

COURSE : MATHEMATICS -II.

COURSE CODE NO. : 109 : PREREQUISITE : --

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 relation to the standard form. Equation of a 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.

(55)
- 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 conjugate hyperbola.

VECTOR ALGEBRA.

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1. Introduction of vectors - Concept of vector and scalar quantities.
 2. Addition of vectors and components of vectors. - Principles of addition and subtraction of vectors, component 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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MADH. PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPL.

(56)

PROGRAMME : CIVIL
DIPLOMA IN MECHANICAL/ELECTRICAL ENGG./
AUTO MOBILE 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 Gerakh pd.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL
 M.P.E.C. SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN AUTOMOBILE ENGG.
 (CREDITS - 12)

II. HARD CORE

S. No.	Code No.	Course	Pre-Requisite	Hours/week Th. Pr.	Credits	Sessional Term Lab. work work 1/2 II	Prog. Asst.	Board paper	Exam Dur.	Theory Marks	Practical/Viva Pr. Dur. Marks	Total
1.	A/M -201	App. Mechanics	-	3 2	4	20 20	10 10	1	3Hrs	100	1 3Hrs 50	210
2.	A/M -202	Engg. Drawing	-	2 4	4	20 -	10 10	1	4Hrs	100	- -	140
3.	A/M -203	Workshop Practice	-	- 8	4	- 20	- -	-	-	-	1 3Hrs 50	70
TOTAL CREDITS					12	40 40	20 20	2		200	2 100	420

NOTE:- HARD CORE COURSES ARE COMPULSORY FOR 10+ AND 12+ STUDENTS.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(63)

PROGRAMME : DIPLOMA IN / AUTOBIOBILE ENGRG.
COURSE : APPLIED MECHANICS.
COURSE CODE NO. : 201
PREREQUISITE : NIL.

R A T I O N A L E

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

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

Only those topics which form common requirement of the different courses and those too, to a depth required by all have been included in 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.V.E. PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL. ~~(KIA)~~

PROGRAMME : DIPLOMA IN **AUTO MOBILE-ENGR**
COURSE : APPLIED MECHANICS.
COURSE CODE NO. : 201
PRE-REQUISITE : NIL

SCHEME OF STUDIES.

<u>S.No.</u>	<u>TOPIC.</u>	<u>TH. HRS.</u>	<u>PR. HRS.</u>	<u>TOTL.</u>
(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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M.D.M. RAJESH BOARD OF TECHNICAL EDUCATION,
BANGALURU.

(55)

PROGRAMME : DIPLOMA IN : AUTOMOBILE . 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. coplanar, Non coplanar, concurrent forces etc. combining two or more coplanar concurrent forces, in to one single force, graphically 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-concurrent forces.

- Laws of (1) Parallelogram 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, Punicular-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 equilibrant relation and difference between resultant force and equilibrant force, three condition of equilibrium of the rigid body $\sum H=0$, $\sum V=0$ & $\sum M=0$.

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

(5) CENTRE OF GRAVITY AND MOMENT OF INERTIA.

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

Concept of moment of inertia and radius of gyration, relation between them moment of inertia of a lamina and different 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 Engineering works, characteristics and conditions to develop a frictional 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 horizontal plane and inclined plane.

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(7) SIMPLE LIFTING MACHINE :

(67)

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

(8) LAWS OF MOTION :

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

(9) MOTION OF PARTICLES (LINEAR)

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

(10) MOTION OF ROTATION :

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

(11) WORK, POWER AND ENERGY.

Definition of work, power, energy, impulse, principle of conservation of momentum, units of the above, work done, work done by a varying force, graphical representation of work done by a constant force and variable force, Definition of HP, relation between watt and HP, BHP, EHP, efficiency, types of energy, law of conservation of energy simple problems.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAAL. (68)

PROGRAMME : DIPLOMA IN / **AUTOMOBILE** ENGRG.
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. comparison of the results by vector diagrams and by Lami's theorem.
- (10) To find out :
 - (a) velocity ratio.
 - (b) Mechanical Advantage and
 - (c) Efficiency of Differential wheel and axle and interpret the law of machine Drawgraph.
- (11) To find out the velocity ratio, Mechanical advantages and efficiency of single purchase crab and interpret 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 interpret the result graphically.
- (13) To find out the V.R., M. Adv and efficiency of screw Lead Demonstrate its working, interpret the results graphically.
- (14) To find out the V.R. M. Adv. and efficiency of Different pulley block. Interpret 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,
KICPAL.

(67)

PROGRAMME : DIPLOMA IN / AUTO MOBILE ENGG.
COURSE : APPLIED MECHANICS.
COURSE CODE NO. : 201

REFERENCE BOOKS.

- (1) Applied Mechanics By T.N. 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.

(20)

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGG.
COURSE : ENGINEERING DRAWING.
COURSE CODE NO. : 202.

R A T I O N A L E

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 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.

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGG.
 COURSE : ENGINEERING DRAWING.
 COURSE CODE NO. : 202.

SCHEME OF STUDIES.

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.	84 hrs.
			(10 Plates)	
			Credits 4	

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M.D.H.V. PRADESH BOARD OF TECHNICAL EDUCATION, (72)
MOP.L.

PROGRAMME : DIPLOMA IN ENGINEERING IN AUTOMOBILE 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. Enng. Drawing, Identification and representation of various symbols used in electrical Enng. Drawing Identification and representation of various symbols of building elements, materials and sanitary fittings.
- TOPIC- 4 LINE 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 case 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 exercises for constructing various types of scale.
(Practice to be done on sketch book)

TOPIC -6 ENGINEERING CURVES. (23)

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 TECHNIQUES.

Principles, system and arrangement of dimensioning, practice problems on of current method of dimensioning.

TOPIC- 8 ORTHOGRAPHIC PROJECTION OF POINTS LINES AND PLANES.

Definitions of various terms associated with orthographic projections, planes of projections, quadrant 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 SURFACES.

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.

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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 section 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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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
M.P.E.T.E.

PROGRAMME : DIPLOMA IN **AUTOMOBILE 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

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M.D.W. FEDERAL BOARD OF TECHNICAL EDUCATION, (H)
MUMBAI.

PROGRAMME : DIPLOMA IN AUTOMOBILE ENG.
COURSE : ENGINEERING DRAWING.
COURSE CODE NO. : 202
PREREQUISITE : Nil.

LIST OF REFERENCE BOOKS.

- (1) I.S. 696. (Latest revision).
- (2) Engineering Drawing
By H.D. Street.
- (3) Engineering Drawing & Machine Drawing.
By Dharma Kumar.
- (4) Engineering Drawing
By H.B. Gupta.
- (5) Geometric Drawing.
By P.S. Gill (Publisher- Latson & Sons.)
- (6) Machine Drawing
By P.S. Gill (Publisher- Latson & Sons.)

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MALAYA PRATISHI BOARD OF TECHNICAL EDUCATION, ~~(77)~~
 RICE.L.

PROGRAMME : DIPLOMA IN AUTO MOBILE ENGG.
 COURSE : WORKSHOP PRACTICE
 COURSE CODE NO. : 203 PREREQUISITE : NIL.

RATIONALLE.

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.

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M.D.V. PROTEST BOARD OF TECHNICAL EDUCATION,
MORRIS.

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING.
COURSE : WORKSHOP PRACTICE
COURSE CODE NO. : 203

SCHEME OF STUDIES.

	Theory	Pract.	Total
1. Engineering material.	3	-	3
1.1 Metal			
(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

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOJPA.

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGG.
COURSE : WORKSHOP PRACTICE
COURSE CODE NO. : 203
PREREQUISITES : 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 mechanics 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, limitations, tools and equipment employed.

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- 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.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, (22)
BHOPL.

PROGRAMME : DIPLOMA IN /
COURSE : WORKS OF PRACTICE
COURSE CODE NO. : 203
PREREQUISITE : NIL.

AUTOMOBILE ENGG.

LIST OF REFERENCE BOOKS.

- (1) Workshop Technology (vol.I)
Hajra & Chaudhary
- (2) Workshop Technology - (vol.I & II)
Chowhan
- (3) Manufacturing process (vol.I)
Dalel.
- (4) Materials and Manufacturing.
Lindberg Processes.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL
MPEC SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN AUTOMOBILE ENGG.

III. SOFT CORE (ANY THREE) (CREDITS = 9)

S. No.	Code No.	Course	Pre-requisite	Hours/Week Th.	Pr.	Credits	Sessional Term Lab. Work work I	Asst. paper I	Prog. Asst. II	Exam Dur.	Theory Marks	Practical/Viva Marks	Total
1.	A/M-301	Computer Application	-	2	2	3	20 20	10 10	10 10	3Hrs	100	1 3Hrs 50	210
2.	A/M - 302	Environmental Engg.	-	3	-	3	: 40 -	10 10	10 10	3Hrs	100	1 3Hrs 50 (Viva voice)	210
3.	A/M - 303	Elements of Civil Engg.-	-	2	2	3	20 20	10 10	10 10	3Hrs	100	1 3Hrs 50	210
4.	A/M - 304	Marketing Management	-	3	-	3	40 -	10 10	10 10	3Hrs	100	1 3Hrs 50 (Viva - voice)	210
5.	A/M - 305	Non. Con. Source of Energy	-	2	2	3	20 20	10 10	10 10	3Hrs	100	1 3Hrs 50	210
6.	A/M - 306	Entrepreneurship	-	3	-	3	40 -	10 10	10 10	3Hrs	100	1 3Hrs 50 (Viva voice)	210
7.	A/M - 307	Maths- III	107 108	3	-	3	40 -	10 10	10 10	3Hrs	100	1 3Hrs 50 (VIVA-VOICE)	210
TOTAL CREDITS							9	120	30 30	300	150	630	

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M. P. BOARD OF TECHNICAL EDUCATION, BHOPAL

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT, MECHANICAL & ELECTRICAL ENGINEERING.

COURSE : COMPUTER APPLICATION.

COURSE CODE NO: 301

PRE-REQUISITE : NIL

RATIONALE -

Computers have become indispensable tool for business and industry. Their applications are numerous and vary from maintaining of on line calendar of personal engagements to design and production of complex physical systems. Technicians find them in use in almost all types of possible places of work. Knowledge of computers, therefore, has become indispensable. A third level course, in the studies of Technical Diploma Programme, is therefore well justified.

This course aims at providing students with basic knowledge of computers-focus is what they are and some understanding of problem solving using computers. Major inputs on programming in BASIC have been included with a focus on hands on experience in programme development and execution. BASIC has been chosen because of its sheer simplicity that significantly contributes to fast learning by students as his/her very first programming language. Moreover, BASIC being a general purpose language a wide variety of application ranging from data processing engineering and engineering computations to measurement of physical parameters e.g. temperature & pressure are possible using it on a small machine like IBM-PC compatible microcomputer.

To give an idea of popular application software packages topics on WordStar, LOTUS and dBASE III+ have been included. The objective is to give the students a knowledge on how to use these packages and areas of their applications.

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M.F. BOARD OF TECHNICAL EDUCATION, BHOPAL

COURSE : DIPLOMA IN CONSTRUCTION TECHNOLOGY
AND MANAGEMENT/MECHANICAL/ELECTRICAL ENGINEERING.
COURSE : COMPUTER APPLICATION
COURSE CODE NO : 301
PRE REQUISITE : NIL

SCHME OF STORE.

S.No.	TOPIC	THEORY HRS.	PR./TUT. HRS.	TOTAL HRS.
1.	Introduction to computers.	5	2	7
2.	Computer software	5	4	9
3.	Basic concepts of programming.	5	2	7
4.	Programming in Basic	12	16	28
5.	Introduction to application Packages.	5	8	13
TOTAL		32	32	64

Credit - 3

Note :- This course is common to DCM/DME/DEE Programs.

3 SOFT CORE

SCHME OF EXAMINATION

Code	Course	Req- uisite.	Theory/Cr- weeks dit	Sess- ional	Prog- ressive Assess- ment	Board Exam. paper Dur- ation	Th. Mks.	Pr/Ve	Pr. Dur					
									Th.	Pr.				
	Computer -		2	2	3	20	20	10	10	1	3Hrs.	100	1	3Hrs

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT MECHANICAL AND ELECTRICAL ENGINEERING.

COURSE : COMPUTER APPLICATION

COURSE CODE NO. : 301

PRE-REQUISITE : NIL

CONTENTS.

1. Introduction to computer.

Computer hardware generation, computer block diagram, basic terms (bit, byte, and word etc) Input & Output devices, memories, classification of computers as micro, mini & mainframe.

2. Computer Software.

Basic classification of software viz. application & system software, their types and functions, purpose and function of an operating system, and elementary idea of disc operating system. Development of programming languages and their basic difference, need of application packages & their general characteristics.

3. Basic Concepts of Programming.

Problem solving, algorithms, Flow charting, Program development process, testing and documentation.

4. Programming in Basic.

Introduction basic character set, difference between statements and commands, constants and variables, expressions, assignment statement, Library functions, output statements, control statements, array, functions, subroutine, files, fixing of programming bug simple programming for engineering problems and file processing.

5. Introduction to application packages.

Elementary ideas of word Processing, spread sheet and database management packages, their functions and elementary commands & field of application.

- 1.2.3 Distinguish between data, address and control lines
- 1.2.4 Explain that an executing program requires input, memory, ALU, control and output resources.
- 1.3 Understand the terms related to computers.
- 1.3.1 Describe bit, byte, word registers & their common types, clock, and pulse. The fact that bit processor mounted on a bus structure high lighted.
- 1.3.2 Distinguish between 16 bit and 32 bit computers.
- 1.4 Understand working of various input output devices.
- 1.4.1 List various I/O devices.
- 1.4.2 Explain functions of
 (i) Punched card
 (ii) Terminal (Dumb, intelligent, monocalphanumeric, graphics (CGA & EGA))
- 1.4.3 Explain the methods of inputting data.
 (a) Key to diskette
 (b) Key to tape
 (c) Key to disc.
- 1.4.4 Explain the functions & working of plotter, impact printer, and non impact printer.
- 1.4.5 Identify input and output devices from a given set of devices.
- 1.4.6 Compare the various printers on the basis of speed and types of printing.
- 1.5 Understand the types of memories.
- 1.5.1 Explain the functions of main memory.

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- 1.5.2 State that memory units store all information in memory cells called bits.
- 1.5.3 Explain that each memory location has unique address.
- 1.5.4 State that memory size is constrained by number of lines in address bus in general.
- 1.5.5 State the units of measurement of main memory.
- 1.5.6 Differentiate between magnetic core memory and semiconductor memory.
- 1.5.7 Describe characteristics of semiconductor memory.
- 1.5.8 Explain the terms RAM, ROM, PROM, EPROM and cache memories and their functions.
- 1.5.9 Differentiate between RAM and ROM, static and dynamic memories.
- 1.5.10 State the term firm ware .
- 1.5.11 Describe the need for secondary memory.
- 1.5.12 Differentiate between serial access secondary memory and random access secondary memory.
- 1.5.13 Describe magnetic tape and the way of recording data on it using tracks, blocks and gaps.
- 1.5.14 Describe magnetic disc and the way of recording data on it using tracks and sectors.
- 1.5.15 Compare advantages and disadvantages of magnetic tape with magnetic disc as a secondary memory.
- 1.5.16 Define access time and seek time.

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- 1.5.17 State the typical values of access time and seek time.
- 1.5.18 Differentiate between removable discs, fixed disc and winchester disc drives.
- 1.5.19 Describe use of floppy as a secondary memory.
- 1.5.20 State typical capacities of floppies of given sizes.
- 1.6 Understand the classification of computer based on computing speed and memory.
- 1.6.1 Describe the different types of measures of computer.
- 1.6.2 Differentiate among micro computer, super micro computer, mini, midi, main-frame and supercomputer on the basis of processing speed and memory capacity, number of channels.
- 1.6.3 State typical hardware configuration of PC, PC/XT, PC/AT.
- 1.6.4 List various applications of computers.

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TOPIC 2 - COMPUTER SOFTWARE.

S.No.	Control/sample objectives.	Specific Treatment, if any.
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Know the basic types of computer software.

- Identify the software as
 - a. System software
 - b. Application software

2.1.2 List the types of system software as.

- a. Operating system
- b. Loader and Linker
- c. Language translators (interpreters, Compilers)
- d. Utilities
- e. System libraries.

2.1.3 Describe functions of different type of system software .

Functions of Loader, Linker, Utilities and system Libraries are to be described.

2.1.4 List the types of application of software as

- A. Application packages
- b. User application programs.

Fact that application packages are designed to address a specific class of application in general,

while user application programs are written by application programmers for specific applications should be stated and elaborated.

2.2 Understand the basic functions of an operating system.

- the operating system manages the hardware manager.
- High light the following why a programme under execution requires different computing resources
- OS manages all resources for the program
 - How the length of program will significantly increase in absence of OS on the machine.
- Explain the need and functions of the four basic modules of an operating system viz.
- Elementary idea of (Disc Operating System) should be given e.g. MS consists of three basic components/modules viz. BIOS, OS-Kernel and command shell.
- a) memory management
 - b) Device management
 - c) Processor management
 - d) Information management
- 2.2.3 Use some basic MS-DOS commands viz. TYPE, CD, DIR, DEL, MD, RD, COPY, FORMAT. Lab Practice must be provided.
- 2.3 Understand the development of programming languages.
- 2.3.1 Explain the development of programming languages viz.
- Describe the need base development of computer languages from machine level to 4GLs, and thus shift from machine dependent features to features close to problem solving approach.
- a) Machine Language
 - b) Assembly
 - c) Interpreter & Compiler based
 - d) 4 GLs.
- 2.3.2 State the classification of programming languages as
- a) low level
 - b) high level
- 2.3.3 Differentiate between low level and high level programming languages.
- Give 3 examples of high level language statements and its corresponding assembly code
 - Demonstration of product mixed listing on computer should be given.
- 2.3.4 Distinguish an interpreter from a compiler on the basis of features.

Characteristics of
application packages & their use

1 of application

Discuss on following lines.

Describe salient general characteristics of application packages.

Packages address a specific class of application. They eliminate to a very large extent the need to know conventional programming languages. They are menu driven and user friendly in general. Some packages provide their own programming environment, thus give increased flexibility of use. Unlike programming languages, however, the packages can not be used in an area other than their specific class of applications.

2.4.3 List popular application packages and their area of use. e.g.

- | | |
|-----------------------------------|---------------------|
| a) Word processing package | - WordStar |
| b) Spread sheet package | - LOTUS 1-2-3 |
| c) Database management package | - dBASE-III + |
| d) CAD package | - Auto CAD |
| e) Desk Top Publishing Package. | - VENTURA |
| f) Statistical Analysis package | - SPSS |
| g) Presentation Graphics package. | - Hardware Graphics |

TOPIC 3 Basic concept of Programming.

- Understands the problem solving approach
- 3.1.1 Distinguish the components of the problem in terms of
- | | | |
|-----|-----------------------|---|
| (1) | Output to be printed | Take a simple example and show all parts. |
| (2) | Computations involved | |
| (3) | Input required | |
- 3.1.2 List the inputs, processes and outputs for the given problem
- 3.1.3 Define algorithm.
- 3.1.4 Explain procedure for algorithm development
- Example on real problems may be
- 3.1.5 Explain and features of algorithm.
- 3.1.6 Develop algorithm for simple problems.
- Take simple problem like finding largest number amongst three numbers and solution of quadratic equation.
- 3.2 Apply concept of flow chart.
- 3.2.1 State purpose of a flowchart
- Draw flow chart and explain the use of each symbol with examples.
- 3.2.2 State flow chart symbols (IBM-convention)
- 3.2.3 Explain the functions of flow chart symbols.
- 3.2.4 Explain various flowchart constructs for sequence, decision (IF-THEN-ELSE), process (Compute), and loops, (Do-while, for-next).
- 3.2.5 Discuss features of a structured programme flow chart.

Flow chart for a given

Interpret the problem for given flow chart.

Demonstrate structured programming by drawing a flow chart for a given problem.

Understand program development process/phases.

- 3.3.1 Explain the programme coding Take an example, identify its basic elements and operations, and code them using statements of basic language.
- 3.3.2 Explain programme compilation and execution
- 3.3.3 Explain compilation errors and run time errors.
- 3.3.4 List the sequence of programme development process State all the steps of program development process
- 3.3.5 Explain program debugging and testing. Take simple examples and explain.
- 3.3.6 Explain the terms deskchecking logical errors and program validation.
- 3.3.7 Explain program documentation
- 3.3.8 List the advantages of Program documentation. Show meaningful variables and comments in a program and describe the purpose for which they have been used.
- 3.3.9 State uses of meaningful variables and comments in a program.

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Unit 4- Programming in Basic

S.No.	General Objective/Special Objective	Specific if any.
4.1	<u>Understand the fundamental of the BASIC language.</u>	
4.1.1	State the meaning of BASIC	
4.1.2	Explain important features of the BASIC	
4.1.3	Explain the purpose of the program statements.	
4.1.4	Distinguish the terms (i) key words (ii) program statement (iii) Command	
4.1.5	Explain the Basic program structure and general rules of writing program in BASIC.	
4.1.6	Give some examples of the multiple statement lines and multiple-line statements in BASIC.	
4.1.7	Explain the Editing, listing, running & testing of simple BASIC program.	
4.1.8	Explain the system command for the following tasks. i. execute the current program ii. print the current program. iii. terminate execution of a program. iv. save a program in a file v. change a program's file name vi. Load and execute a program saved earlier	For appropriate commands and their functions the system must be coded.
4.1.9	Explain the utility of statement number.	Table may be prepared containing all important BASIC statements and their purposes.
4.1.10	Explain all the important BASIC statements.	

- ... Identify the BASIC statements in different categories;
- ... Understand the concept of constant and variable.
- ... Describe the character set of BASIC. A printed list of character set of BASIC language should be shown in the class.
- ... Identify the numeric constant and string constant.
- 4.2.3 Describe variables.
- 4.2.4 Explain the rules for naming the variable.
- 4.2.5 Explain Basic statement by which a variable can be assigned a value e.g. LET, INPUT, READ statement. State improper assignment of values to the variable which may lead to error message or wrong answer.
- 4.2.6 Explain important feature of READ. DATA statement
- 4.2.7 Explain the use of RESTORE statement.
- 4.2.8 Identify mistakes in program written using LET, INPUT, READ, DATA statements.
- 4.3 Apply concepts of BASIC programming in solving mathematical problems. Give some additional examples of hierarchy of operations.
- 4.3.1 Explain operators of different types.
- 4.3.2 Explain the Hierarchy of operators.
- 4.3.3 Identify arithmetical and logical/relational expressions.
- 4.3.4 Demonstrate the use of arithmetic operators.
- 4.3.5 Explain the rules of converting arithmetic expressions into correct BASIC expressions.

- 4.3.6 Demonstrate the use of some logical operators by preparing some program in BASIC.
- 4.3.7 Convert a mathematical formula and expressions into BASIC statement
- 4.3.8 Explain various library functions in BASIC Programming.
- 4.3.9 Develop some BASIC programs using library functions.
- 4.4 Demonstrate the correct usage of different Printing control.
- 4.4.1 Know the different printing control in BASIC programming e.g. comma, semicolon.
- 4.4.2 Describe the division of output line in terms of five printing lines/fields.
- 4.4.3 Distinguish the printing action of comma and semicolon.
- 4.4.4 Use the TAB function for printing of output.
- 4.4.5 Explain/PRINT USING control,
- 4.4.6 Distinguish between the printing of integer number, Real number, character string.
- 4.4.7 Predict output form of a given BASIC statement.
- 4.4.8 Predict the action of computer when it encounters exceptions in a program.
- 4.5 Understand the different controls statement.
- 4.5.1 Explain the jumping, branching and looping
- 4.5.2 Explain infinite loop
- 4.5.3 Recognise the ways of getting out of loop situation.

Program may be written for which the flow chart has already been drawn earlier.

- 4.5.4 Distinguish between "GO TO" and "ON GO TO" statement.
- 4.5.5 Explain the logic of the program to recognise the importance of making a flow chart.
making a flow chart. Discuss "Go TO" statement and structured programming.
- 4.5.6 Explain "I.....THEN" statement
- 4.5.7 Explain counting using loops
- 4.5.8 Explain "FOR ' -NEXT" statement
- 4.5.9 Explain the nesting of loops.
- 4.5.10 Convert a basic program that uses "IF" statement to implement loops to a program with "FOR-NEXT" statement
- 4.6 Apply the concept of jumping, Branching and looping in some situation.
- 4.6.1 Prepare programs to evaluate some mathematical function up to given accuracy.
- 4.6.2 Prepare programs to solve practical problems using BASIC control statements e.g. Electricity bill etc.
- 4.6.3 Predict output of some programs written in BASIC.
- 4.6.4 Prepare programs to solve some statistical problems using control statement.
- 4.7 Apply the concept of arrays in BASIC programming.
- 4.7.1 Recognise the situation in which arrays are used.
- 4.7.2 Distinguish the terms element, index and subscript.
- 4.7.3 Explain the advantage of array variables.
- 4.7.4 Explain DIM statement.
- 4.7.5 Explain single and double subscripted variable.

- 4.7.6 Explain the use of single and double subscripted variable.
- 4.7.7. Prepare a programme for reading data values in a single and two dimensional arrays and print them. Write a program to Transpose a matrix etc.
- 4.8 Demonstrate the correct usage of one and two dimensional array.
- 4.8.1 Prepare programs for sorting of numbers & alphabets. Some example may be given to prepare Alphabetical list of students, & Roll Number wise Merit list of examination.
- 4.8.2 Compute the final value of an element in an array variable in a given program using manual trace.
- 4.8.3 Prepare some basic program to solve some mathematical, statistical problems. e.g. addition and subtraction, multiplication of matrix.
- 4.9 Apply the concept of SUBROUTINE
- 4.9.1 Distinguish between library function and user defined functions.
- 4.9.2 Explain the importance of subroutine.
- 4.9.3 Explain GOSUB-n and RETURN statements.
- 4.9.4 Summarize important rules for the preparation of a program with subroutine.
- 4.9.5 Distinguish multiple parameter functions and multiple-line functions.
- 4.9.6 Prepare a modular program using functions and subroutine.
- 4.10 Understand the programming bugs.
- 4.10.1 Describe syntax, logical, data error
- 4.10.2 Distinguish between syntax, logical and execution errors.
- 4.10.3 Explain the debugging techniques

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Understand the handling of BASIC data files.

- 1 Describe the term "data file", sequential file, random file".
 - 2 Explain the creation and writing into a data file in BASIC.
 - 3 Explain the use of file in a BASIC program.
 - 4 Explain reading from a file
 - 5 Explain writing on a file.
- Demonstrate the concept of data file in BASIC.
- 2.1 Prepare a program to read data from a input file, process it, then write it into another file.
 - 2.2 Prepare program for merging of two sorted sequential data files into one single file.
- 13 Apply concepts of BASIC programming in practical situations.
- 13.1 Prepare the marksheet of students having 4 theoretical and 3 practical subject, showing the division and result Pass/fail on the basis of some conditions such as
- i. minimum pass marks in each theory subject is 33%
 - ii. minimum pass marks in each practical subject is 40%
 - iii. minimum aggregate pass marks are 40%
 - iv. First division awarded on 65% or more marks.
 - v. 2nd division awarded on 50% or more marks.
 - vi. 3rd division awarded on 40% or more marks.
- 4.13.2 Solve an engineering problem e.g. unbalanced wheat stone bridge by joining the galvanometer current.

TOPIC 5-INTRODUCTION TO APPLICATION PACKAGES

- 5.1 Know features and use of a word Processor.
- 5.1.1 List various features of word Star package.
- 5.1.2 Describe purpose of the two modes of creating a document
- document mode
 - non-document mode
- 5.1.3 List basic menu-screens of word Star and purpose of commands provided in each of them.
- 5.1.4 Describe purpose of dot commands.
- 5.1.5 List dot commands to
- define page limit
 - omit page number
 - state page number.
- 5.1.6 List application/areas in which word Processor Package can be used.
- 5.2 Understand the use of spread sheet software package.
- 5.2.1 State that the LOTUS 1.2.3 package supports
- electronic spread/work sheet
 - database and
 - graphics.
- 5.2.2. Explain the type of information that can be entered on a spread sheet viz.
- text
 - numbers.
 - mathematical expressions, and
 - special functions.

Demonstration should be given to show creation and editing of a document, using simple menu based selection of commands. Use of dot commands should also be demonstrated to describe number of lines per-page, and change of page number.

Demonstration should be given to show entry and manipulation of text number and mathematical expressions. Students should be encouraged to go through the on time spread sheet tutor program.

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5.2.3 Identify command sequences from the spreadsheet menu to perform simple operations e.g. copy, move, delete data.

5.2.4 Reproduce a command sequence to draw graphs in X-Y, bar and pie chart form for a given set of data.

Practice of drawing the graphs should be preceded by a demonstration.

5.2.5 List applications area in which spreadsheet package can be used.

5.3 Understand the features and use of database management software package.

5.3.1 Describe that the dBASE III+ is an integrated file management package which can be used

Students should be encouraged to go through on line dBASE-III+ TUTOR. Creation of a database should be demonstrated using ASSIST menus and commands separately. Data should also be entered in the data base.

- a. assist menus
- b. dot prompt commands
- c. program.

Purpose of each command should be stated in the class and a demonstration of use of these commands should follow the class room discussion.

5.3.2 Explain the use of following commands.
CREATE, DIR, USE, DISPLAY-STRUCTURE, LIST, APPEND, DELETE, RECALL, PACK, CLOSE.

Demonstrate the use of a dBASE program.

5.3.3 Explain the purpose of a dBASE program.

5.3.4 List steps involved in developing dBASE PROGRAM.

5.3.5 Distinguish between dot prompt commands and dBASE III+ program features.

5.3.6 List application areas of dBASE-III+ database management package.

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL

PROGRAMME : DIPLOMA IN CONSTRUCTION TECHNOLOGY AND
MANAGEMENT MECHANICAL/ELECTRICAL ENGINEERING
COURSE : COMPUTER APPLICATION
COURSE CODE : 301
PRE-REQUISITE : NIL

LIST OF EXPERIMENTS.

1. Visit to computer centre, demonstrate various I/O units and show a computer session in progress.
2. Familiarise with basic MS DOS commands.
3. Demonstration of different softwares, e.g. interpreters compilers, loaders, system libraries.
4. Demonstration of BASIC program development & editing.
5. Practicals on BASIC programming.
6. Demonstration of word processor package.
7. Familiarising with Lotus 1-2-3.
8. Familiarising with dBase III+.

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PROGRAMME - DIPLOMA IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT
 - MECHANICAL ENGINEERING
 - ELECTRICAL ENGINEERING
 SUMMARY OF THE DISTRIBUTION TABLE OF GENERAL/SPECIFIC OBJECTIVES.

TOPIC NO.	GENERAL OBJECTIVE			SPECIFIC OBJECTIVE		
	KNOWLEDGE	COMPREHENSION	APPLICATION	KNOWLEDGE	COMPREHENSION	APPLICATION
1.	1	5	-	20	19	-
2.	2	2	-	8	5	-
3.	-	2	1	7	13	3
4.	-	5	8	8	52	19
5.	1	2	-	11	6	-
TOTAL	4	16	9	54	96	22
PERCENTAGE	14%	55%	31%	31%	56%	13%

ASSESSMENT SPECIFICATIONS

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

Topic No.	Percentage Assessment for the topic	Percentage assessment three levels		
		Knowledge	comprehension	application
1.	10%	5%	5%	-
2.	10%	5%	5%	-
3.	15%	5%	5%	5%
4.	50%	5%	5%	20%
5.	15%	5%	5%	-
TOTAL	100%	25%	25%	25%

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MADHYA PRADESH TECHNICAL EDUCATION,

PROGRAMME M. TECH. IN CONSTRUCTION TECHNOLOGY AND
COURSE COURSE IN MECHANICAL & ELECTRICAL ENGINEERING,
APPLICATIONS

COURSE

SEM-III

RECOMMENDED BOOKS.

- Programme: 1. Götterfred, Scheme Series.
Programme: 2. E. Balaguruswamy, Tata McGraw
Hill Pub. Co., Delhi.
Basic Handbook: 3. J. Lien, Compusoft Publishing,
California.
Companion: 4. PEP Publications, New Delhi.
Introduction: 5. IIT III* by Alan Simpsons.
1-2-3 The Reference by Mary Campbell,
Osborne Morse.
Introduction: 6. Arthur Naiman.
Word Processing: 7. Essential concepts by Marilyn Popyk,
McGraw Hill.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,

BHOPAL.

(95)

CIVIL.

PROGRAMME : DIPLOMA IN TECHNICAL / ELECTRICAL ENGG./

COURSE : ENVIRONMENTAL ENGINEERING. AUTOMOBILE ENGG.

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 development 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 ^{purifi}cation processes and those employed in engineered processes.

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

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

SCHEME OF STUDIES

SNo.	TOPIC.	TH. HRS.	PR. HRS.	TOT. L. 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 BCTM/DME/DEE Programs.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION
BHO PAL.

(37)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGINEERING/
AUTOMOBILE ENGRG.
COURSE : ENVIRONMENTAL ENGINEERING.
(Common to Civil, Mechanical & Elect.
programmes.)

COURSE CODE NO. : 302

PRE-REQUISITE : NIL.

TOPIC-1: INTRODUCTION:

The Environment, 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 & perspectives.

AIR POLLUTION - Historical overview, global Implication of Air pollution, units of measurement, sources of pollutants.

CLASSIFICATION OF POLLUTANTS- Particulates, hydrocarbons, carbon monoxide, Oxides of sulphur, Oxides of Nitrogen, photochemical oxidants, indoor air pollution Measurements of above pollutants.

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 meteorological conditions- Changes on the Mesoscale & Microscale, changes on Macroscale.

TOPIC-4: ENGINEERED SYSTEMS FOR AIR POLLUTION CONTROL :

Atmospheric cleansing processes, approaches to contaminant control.

Central devices for particulate contaminants- Gravitational settling chambers, centrifugal collectors, wet collectors, fabric filters (Baghouse filters) Electrostatic precipitators (ESP) control devices for gaseous contaminants- Adsorption, absorption, condensation, combustion, Automotive emission control.

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(98)

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

Processing techniques- Mechanical size alteration, Mechanical component separation, Magnetic and Electro-mechanical separation, Drying and Dewatering.

Materials recovery systems - Materials specifications, processing 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- allowable 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 abatement 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.

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TOPIC-8: ENVIRONMENT & POLLUTION CONTROL LAWS.

(97)

Air (prevention and control of pollution) Act, 1981
& Air (Prevention and control of pollution) Rules,
1982 - Short title, extent and commencement, defini-
-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.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
M.P.B.T.E. (100)

CIVIL
PROGRAMME : DIPLOMA IN MECHANICAL/ELECTRICAL ENGINEERING./
AUTOMOBILE ENGG.
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 I. Vemerow.
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 Kenneth work and Warner.
(U.N.O. Publication)
6. Industrial Waste by Hunt.
7. Thermal Environment by Burgess H. Jennings.
8. Environment & Pollution Control Laws
by Vijjay Malik (BSC publishing (PVT.) Ltd:
Lucknow.
9. Environment protection - Problems, policy Administration, Law Edited by Faris Divan Deep & Deep Publications.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAAL.

(10)

PROGRAMME : DIPLOMA IN CIVIL MECHANICAL/ELECTRICAL ENGINEERING./
AUTOMOBILE 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,
BHOPLAL.

(112)

CIVIL
 PROGRAMME : DIPLOMA IN MECHANICAL/ELECTRICAL ENGINEERING/AUTOMOBILE ENGG.
 COURSE : ELEMENTS OF CIVIL ENGINEERING.
 COURSE CODE NO. : 303
 PRE-REQUISITE : NIL.

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

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

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPLI.

(103)

PROGRAMME : DIPLOMA IN ^{CIVIL} TECHNICAL/ELECTRICAL ENGINEERING.
COURSE : ELEMENTS OF CIVIL ENGINEERING. AUTOMOBILE ENGNG
COURSE CODE NO. : 303
PRE-REQUISITE : NIL.

C O N T E N T S

TOPIC 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 vice-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: (10/1)

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 mortar, concrete etc.

Concrete- a mixture of coarse aggregate, Fin sand (Fine aggregate), cement water cement Ratio: used for laying foundation for erection of machines, Erection 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 strength.

Placing of concrete in the form work.

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

TOPIC 7 : SELECTION OF SITE FOR INDUSTRIAL SITES :

1. Location of Industrial Area-Rural, 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.

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TOPIC 8 : INTERPRETATION OF CIVIL ENGINEERING DRAWING : (105)

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 topic 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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100

NADYA PR. DESH BOARD OF TECHNICAL EDUCATION,
SHOPIA.

(106)

PROGRAMME : DIPLOMA IN ^{CIVIL} MECHANICAL/ELECTRICAL ENGINEERING
AUTOMOBILE ENGRG.
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 Reduced level of different points.
(Spot levelling)
4. Testing of cement concrete for compressive strength
and workability.
5. Initial and final setting time test of cement.
6. Reading of Civil Engineering Drawing.
Related to Industrial sheds (Standard Drawings)
Report the bye-laws used.
7. Layout practice of Industrial sheds on the basis
of reading of drawing.

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101

MIDHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BAGPIL.

(107)

PROGRAMME. : CIVIL
: DIPLOMA IN MECHANICAL/ELECTRICAL ENGINEERING/
: AUTO MOBILE ENGR.
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 Laxhu Udyog Nigam.
6. Civil Engineering Drawing By Leo-Mallic.

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NATIONAL PROTEST BOARD OF TECHNICAL EDUCATION,
MUMBAI.

(108)

PROGRAMME : DIPLOMA IN CIVIL / MECHANICAL / ELECTRICAL ENGINEERING /
 COURSE : MARKETING MANAGEMENT. AUTOMOBILE ENGG.
 COURSE CODE NO : 304
 PRE-REQUISITE : NIL.

RATIONALE.

In the days of competitive business, a course in marketing management is of great importance to the entrepreneurs, 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 emphasizes 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.

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M.D.V.V. PRIDESE BOARD OF TECHNICAL EDUCATION,
BICP.L.
CIVIL.

(109)

PROGRAMME : DIPLOMA IN MECHANICAL/ELECTRICAL ENGINEERING,
COURSE : MARKETING MANAGEMENT. AUTO MOBILE ENGG.
COURSE CODE NO : 304
RE-REQUISITE : NIL.

SCHEME OF STUDIES.

S.No.	TOPIC.	THEORY	PRACT/TUTORIAL	TOTL.
1.	Marketing and its applica- -tion.	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
TOTL:		48	-	48

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPEL.

(110)

PROGRAMME : DIPLOMA IN ^{CIVIL} MECHANICAL/ELECTRICAL ENGINEERING,
AUTOMOBILE ENGG.
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 ENVIRONMENT :

Marketing system : Business marketing Institutions, producers and manufacturers, Intermediaries, competitors, Facilitating Institutions and Public.

MARKETING ENVIRONMENT :

Demographic Environment, Economic Environment Political environment Physical environment, 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, opportunity and Issues 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: (III)

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 behaviour :- Cultural, social, personal and Psychological factors, Buying Decision process Types of Buying behaviour, Indian 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 testing, 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.

Pricing policies and practices:-

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 advertising, Pre-requisites of advertising Deciding on the advertising budget:- Sales response and Decay model, Adaptive control model and competitive 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 on 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.

6. MARKET MEASUREMENT, DISTRIBUTION AND CONTROL STRATEGY :

Demand forecasting :- Objectives, Estimate of current and future demand, Distribution strategies, objectives, significance, types. Marketing channels : Definition and types of channels, Factors affecting the choice of channels.

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MAHARAJA RAJESWAR BOARD OF TECHNICAL EDUCATION,
MUMBAI.

(113)

PROGRAMME : CIVIL
: DIPLOMA IN MECHANICAL/ELECTRICAL ENGINEERING./
COURSE : MARKETING MANAGEMENT. AUTO MOBILE ENGIN-
COURSE CODE NO : 304
PRE-REQUISITE : NIL.

LIST OF REFERENCE BOOKS.

1. Marketing Management - Philip Kotler.
- Analysis, Planning and Control
Pub. Prentice Hall of India, N. Delhi.
2. Principles and practice of Marketing in India. - C. B. Namoria.
- R. L. Joshi.
Pub. Kitab Mahal, Allahabad.
3. Contemporary marketing - Louis E. Boone
- David I. Kurtz.
Pub. Dryden Press, Hinesdale,
Illinois.
4. Essential of Management - Koontz.
Pub. McGraw Hill.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

(114)

CIVIL

PROGRAMME : DIPLOMA IN MECHANICAL/ELECTRICAL ENGINEERING/
AUTOMOBILE ENGG.

COURSE : NON-CONVENTIONAL SOURCES OF ENERGY.

COURSE CODE NO : 305

PRE-REQUISITE : III.

R A T I O N A L S.

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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M.D.M. PR. DESH BOARD OF TECHNICAL EDUCATION,
BHOPLI. (115)

PROGRAMME : DIPLOMA IN ELECTRICAL/ELECTRICAL ENGINEERING/
AUTOMOBILE ENGINEERING
COURSE : NON-CONVENTIONAL SOURCES OF ENERGY.
COURSE CODE NO : 305
PRE-REQUISITE : Nil.

SCHEME OF STUDIES.

S.No.	TOPIC.	LECT. HS.	PR. CR./Wk.	TOTL HRS.
1.	Introduction.	02	-	02
2.	Wind energy.	04	04	08
3.	Direct energy conversion system.	08	10	18
4.	Solar energy.	07	06	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.	Incinerators plant.	01	-	01
TOTAL :		32	32	64

CREDITS - 3

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, Hydro 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 energy, Advantages and Disadvantages of wind energy, Mean wind speed, power coefficient, Mechanical power, speed ratio, local speed ratio, tip speed ratio, Torque, Torque coefficient. Basic components of simple wind mill, construction and working of wind mill. Merits and demerits of vertical and horizontal wind mills. Map of India.

TOPIC 3. DIRECT ENERGY CONVERSION SYSTEM : Definition, principle of different direct conversion schemes- fuel cell, 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 MHD- advantages of MHD. Reversible and irreversible thermoelectric effect. Definition of the Seebeck effect, the Peltier effect, the Thomson effect, Joule effect and conduction effect. Working of thermoelectric converter figure of merit. Principle of thermionic converter. Analogy between

Thermoelectric and thermionic converters. Thermionic (117)
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 flux, 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 : (Gobar Gas Plants)

Concept of Biogas, 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, slurry 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 tides, tidal range, components of Tidal power plant operation method of utilisation of tidal energy selection of site for tidal power plant, Advantages 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 disadvantages of geothermal energy, Applications of Geothermal energy. Factor for ~~selection~~ 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. Incineration plant - Energy from organic waste. Description and working of plant.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
JHOPIL.

(113)

PROGRAMME : DIPLOMA IN CIVIL ENGINEERING/AUTOMOBILE ENGINEERING
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 Gobar Gas Plant (Janat/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. Gobar Gas Plants/Mic-Gas Plant
 3. Ocean Thermal energy conversion machines.
 4. Incinerator 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 relevant to the plant in the class.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAAL. (115)

PROGRAMME : DIPLOMA IN ^{CIVIL} MECHANICAL/ELECTRICAL ENGINEERING/
COURSE : NON-CONVENTIONAL SOURCE OF ENERGY. AUTO MOBILE ENGR
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 P.L.S.
Elsevier Applied Science Publishers.
5. Non Conventional Energy sources
by G.D. Rao
Khanna Publishers.

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NATIONAL BOARD OF TECHNICAL EDUCATION,
BHOPLA.

(12)

PROGRAMME : DIPLOMA IN TECHNICAL/ELECTRICAL ENGINEERING
CIVIL
COURSE : ENTREPRENEURSHIP. AUTO MOBILE ENGRG.
COURSE CODE NO : 306
PRE-REQUISITE : Nil.

RATIONALE.

Since long entrepreneurship has been recognized as an essential ingredient of economic development. Concept of entrepreneurship 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 denote a dealer who buys and sells goods at uncertain prices. Then an entrepreneur was considered a dynamic agent or the catalyst who transformed increasingly physical, natural and human resources, into corresponding production possibilities. In recent years, managerial aspects of entrepreneurship are being emphasized. It employs innovativeness, a urge to take risk in the face of uncertainty 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 DCE, DEE and DEE to bring to surface certain common characteristics such as perception of economic opportunity, technical and organisational skills, managerial competence, and motivation to achieve result.

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

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MUMBAI PRIDESE BOARD OF TECHNICAL EDUCATION,
M.P.E.L.

(121)

PROGRAMME : DIPLOMA IN ^{CIVIL} MECHANICAL/ELECTRICAL ENGINEERING/
 COURSE : ENTREPRENEURSHIP. AUTOMOBILE ENGG.
 COURSE CODE NO. : 306
 PRE-REQUISITE : NIL.

SCHEME OF STUDIES :

S.No.	Topic.	Theory	Pract/Lab.	Total
1.	Entrepreneurship-its 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

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.
CIVIL.

PROGRAMME : DIPLOMA IN TECHNICAL/ELECTRICAL ENGINEERING
AUTO MOBILE ENGINEERING
COURSE : ENTREPRENEURSHIP. Th. Hrs. 48, Total Credits - 3
COURSE CODE NO : 306
PRE-REQUISITE : NIL.

TOPIC-1. ENTREPRENEUR : HIS QUALITIES AND FUNCTIONS -

Concept of entrepreneurship, Types of entrepreneurs, Qualities of an entrepreneur, Example of entrepreneurship.

TOPIC-2. SMALL SCALE INDUSTRY : ITS GROWTH AND SIGNIFICANCE
Definition of SSI and its history, 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 Government like Trysam IRDP, ERER

TOPIC-4. PLANNING AN INDUSTRIAL UNIT : Project environment, Project selection Factors of selection, Tools for selections, Limitation of selection, Market surveys Analysis, Project formulation and scheduling, project 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 :

(123)

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 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 Enterpreneurs.
- (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 project report for the industry they are willing to start.

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INDIAN TRADES BOARD OF TECHNICAL EDUCATION,
SIOP, D.

(124)

PROGRAMME : DIPLOMA IN ^{CIVIL} MECHANICAL/ELECTRICAL ENGINEERING
COURSE : ENTREPRENEURSHIP. AUTO MOBILE ENGRG
COURSE CODE NO : 306
PRE-REQUISITE : NIL.

LIST OF REFERENCES

- (1) Project Engineering and Management
- A.K. Sinha.
Ramesh Sinha.
- (2) Developing New Entrepreneurs
- Entrepreneurship Development Institute of India.
- (3) Developing Entrepreneurship - A hand Book
- Vaidal Prasad
- T.V. Rao.

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

DETAILED CURRICULUM.

COURSE : MATHEMATICS - III.
COURSE CODE NO : 307
PRE-REQUISITE : 107 MATHS.I AND
108 MATHS.II.
CATEGORY : SOFT CORE.

DIPLOMA PROGRAMME IN
CIVIL/MECHANICAL 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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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPL.

(128)

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PROGRAMME. : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG./
 COURSE : MATHEMATICS-III. AUTO MOBILE ENGG.
 COURSE CODE NO : 307
 PRE-REQUISITE : 107 MATHS. I AND
 108 MATHS. II.

I N D E X

 S.No. TITLE PAGE NO.

1. Rationale.
2. Scheme of Studies and Examination.
3. Course Contents.
4. Detailed Curriculum.
5. List of Reference Books.
6. Percentage Assessment Specifications.

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

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG./
COURSE : MATHEMATICS-III. AUTO MOBILE ENGG.
COURSE CODE NO : 307
PRE-REQUISITE : 107 MATHS. I AND 108 MATHS. II.

RATIONALE.

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 competency. 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.

U.P. STATE BOARD OF TECHNICAL EDUCATION, (13c)
GHAZIABAD.

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL & ELECTRICAL ENGG./
AUTO MOBILE ENGG.
COURSE : MATHEMATICS-III.
COURSE CODE NO : 307
PRE-REQUISITE : 107 MATHS. I AND
108 MATHS. II.

SCHEME OF STUDIES.

TOPIC NO.	CONTENT.	HOURS		TOTAL
		THEORY	PRACTICAL	
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	Cre- Theory	dits	Sessional Term work	Lab work	Progre- ssive assess- ment.	Theory Paper		Practical		ES		
						Board Exam. Paper	Th. Exm. Durn. in Hrs.	Pr. Exm. Durn. Hrs.	Mks. s. s.			
3	-	3	20	-	10	10	1	3	100	-	-	-

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPLA.

(131)

PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL/ELECTRICAL ENGG./
AUTOMOBILE 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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PROGRAMME : DIPLOMA IN CIVIL/TECHNICAL/ELECTRICAL ENGG. /
COURSE : MATHEMATICS- III. AUTOMOBILE ENGG.
COURSE CODE NO : 307
PRE-REQUISITE : 107 MATHS.-I AND 108 MATHS. II.

DETAILED CURRICULUM.

S.No. General/Module specific objectives. Specific treatment, if any.

1.1 APPLY THE CONCEPT OF SUCCESSIVE DIFFERENTIATION FOR SOLVING ENGG. MATHEMATICAL PROBLEMS.

1.1.1 State second and higher order derivatives.

1.1.2 State the various notations used for the higher derivatives.

1.1.3 Compute the n^{th} derivative of given functions.

Explain the meaning of n^{th} derivatives of functions i.e. e^{ax} , $\log_e (a+x)$ $\sin(ax + b)$...etc. be explained clearly.

1.1.4 State Leibnitz Theorem.

1.1.5 Explain Leibnitz Theorem for successive differentiation of product of two functions.

solve simple problems on Leibnitz 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 cantilever beam of length 1 and uniform weight 'w' Kg/m
$$y = \frac{w}{24EI} (4lx^3 - 6l^2x^2 - x^4)$$

Calculate the bending moment $(EI, \frac{dy^2}{dx^2})$ and the shearing force $(EI, \frac{d^3y}{dx^3})$ at a distance

'x' meter from the fixed end of the beam.

The distance covered by a particle, falls from rest under gravity in resisting medium at any instant 't' is

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 8.10. General/Sample specific objectives. Specific treatment,
 if any.

given by

$$x = \frac{1}{k} (gt - G e^{-kt}) + C_2$$

where k, G, C_2 and g are constants. compute $\frac{dx}{dt}$ and

$$\frac{d^2x}{dt^2} \text{ and show that } \frac{d^2x}{dt^2} + kx = g$$

$$\frac{dx}{dt} - g = 0$$

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 Approximation.

1.2.4 State the Approximation formula.

$$\lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x} = \frac{dy}{dx}$$

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) Δx
- (B) $\frac{\Delta x}{x}$
- (C) $\frac{\Delta x}{x} \times 100$

1.2.7 Compute the error in one variable when the error in the depending variable is given.

1.3 UNDERSTAND TANGENT AND NORMAL.

1.3.1 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 mentioned 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.
$$R = \frac{\left\{ 1 + \left(\frac{dy}{dx} \right)^2 \right\}^{3/2}}{\frac{d^2y}{dx^2}}$$
 - 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.

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S.No. General/Sample Specific Objectives. Specific treatment, if any.

- 1.6.6 Solve given problem of single variable on maximum and minimum. Illustrate some examples like the horsepower transmitted by a belt moving at velocity is proportional to $f b - \frac{W}{g} v^3$, (where f is maximum allowable stress, W is weight of belt) The velocity for the maximum horsepower can be given as

$$v = \sqrt[3]{\frac{fg}{3W}}$$

- 1.7 SOLVE PROBLEM ON PARTIAL DIFFERENTIATION.

- 1.7.1 State the meaning and notations of partial differentiation viz $f_x, f_y, f_{xx}, f_{yy}, f_{xy}, f_{yx}$.

- 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. $x \frac{du}{dx} + y \frac{du}{dy} + z \frac{du}{dz} = nu$

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 standard formulae of integrations

2.1.2 State the formulae for Integration by parts.

2.1.3 Explain the process of Integration by method of substitution.

Illustrate the examples

$$\text{and } \int \frac{f'(x)}{f(x)} dx$$

$$\int [f(x)]^n f'(x) dx$$

2.1.4 Explain the process of Integration by parts.

2.1.5 Compute the integration of rational functions .

Illustrate the examples

e.g. $\int \frac{1}{ax^2 + bx + c} dx$

$$\int \frac{1}{x^2 + a^2} dx$$

and $\int \frac{px + q}{ax^2 + bx + c} dx$

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) $2 \int_0^a f(x) dx = 0$, 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 formulae

Illustrate $\sqrt{P+1} = P\sqrt{P} = L^P$
 and $\sqrt{V_2} = \sqrt{H}, \sqrt{1} = 1$

2.2.8 Compute the integrals by using gamma functions.

Solve $\int_0^{\pi/2} x \sin^3 x \cos^2 x dx$

$\int_0^{\pi/2} \sin^m x \cos^n x dx = \frac{\sqrt{\frac{n+1}{2}} \sqrt{\frac{m+1}{2}}}{2\sqrt{\frac{m+n+2}{2}}}$ $\int_0^1 x^{1/2} \sqrt{1-x} dx$

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 formulae for area of curves.

Illustrate $A = \int_a^b f(x) dx$

and $A = \int_c^d f(y) dy$

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 S.No. General/Sample specific objectives. Specific treatment, if any.

- 2.3.2 Compute the area of standard curves, VOZ, circle and Ellipse.
- 2.3.3 State the formulae 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 about the axis perpendicular to its middle point.
- 2.3.7 Compute the moment of inertia of a rectangular lamina 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

$$A = \int_a^b f(x) dx$$

$$= \frac{h}{3} [y_1 + y_n + 4S_o + 2S_e]$$
 and $h = \frac{b-a}{2n}$
 where (2n+1) is the number of ordinates.
- 2.3.10 Compute the numerical integration viz

$$\int_1^2 \log x dx, \int_0^1 \frac{1}{x} dx$$

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 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

$$W = \int_a^b f \cdot dx$$

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 derivatives. Illustrate all varieties of differential equations such as

- (1) $\frac{dy}{dx} = x + y$
- (2) $\frac{d^2y}{dx^2} + 3 \frac{dy}{dx} + 2y = 0$
- (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) $\left\{ 1 + \left(\frac{dy}{dx} \right)^2 \right\}^{3/2} = x \frac{d^2y}{dx^2}$

3.1.2 Define differential equations.

3.1.3 Define order of differential equation.

Illustrate by suitable examples.

3.1.4 Define degree of differential equation.

Illustrate by suitable examples.

3.1.5 Describe origin of differential equations considering geometrical problems, physical problems, primitives.

3.2 APPLY THE CONCEPT OF ORDINARY DIFFERENTIAL EQUATIONS FOR SOLVING VARIOUS PROBLEMS.

Distinguish between ordinary and partial differential equations.

3.2.1 State the forms of ordinary differential equation viz

- (a) Variables are separable
- (b) Homogeneous differential equation

$$\frac{dy}{dx} = \frac{f_1(x,y)}{f_2(x,y)}$$

where f_1 and f_2 are homogeneous functions of same degree.

- (c) Exact differential equations
- $Mdx + Ndy = 0$
 where M and N are functions of x and y

Give condition 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.

Introduce 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 operator and D^{-1} as an integral operator.

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S.No. Generally/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.

Emphasize that arbitrary constants occur only in complementary function. solution is sum of complementary function and particular Integral.

$$(a) F(x) = e^{ax}$$

$$(b) F(x) = \sin ax, \cos ax$$

$$(c) F(x) = x^m \quad (m = 0, 1, 2)$$

$$(d) F(x) = v \cdot e^{ax} \quad \text{where } v = \sin bx, \cos bx, n^m$$

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

$$M = EI \frac{d^2y}{dx^2}$$

at a distance x from the fixed end is $w(1-x)$. Find the maximum deflection of the beam.

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S.No.	General/Sample specific objectives.	Specific treatment, if any.
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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 Problems covering all equations using appropriate 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

$$(a) \frac{d^3 y}{dx^3} + a \frac{d^2 y}{dx^2} + b \frac{dy}{dx} + cy = 0$$

$$(b) \frac{d^4 y}{dx^4} + a \frac{d^3 y}{dx^3} + b \frac{d^2 y}{dx^2} + c \frac{dy}{dx} + dy = 0$$

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. AUTO MOBILE ENGG.
COURSE CODE NO : 307
PRE-REQUISITE : 107 MATHS.-I AND 108 MATHS. II.

LIST OF REFERENCE BOOKS.

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

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

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PROGRAMME : DIPLOMA IN CIVIL/MECHANICAL AND ELECTRICAL/
ENGINEERING. AUTO MOBILE ENGG.
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	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

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL
MECS SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN AUTOMOBILE ENGINEERING.

IV BASIC TECHNOLOGY : ALL COURSES ARE COMPULSORY (CREDITS - 40)

S. No.	Code No.	Course	Pre-Requisite	Hours/Week		Credits	Sessional Prof.		Exam paper Dur.	Theory Marks	Practical Marks	Viva Total			
				Th.	Pr.		Term Lab work	Asst. work							
1.	A/M - 401	Mechanical Drafting	202	3	6	6	20	40	10	10	1	3Hrs 100	1	Viva 50	230
2.	A/M - 402	Manufacturing Process	203	4	2	5	20	30	10	10	1	3Hrs 100	1	3Hrs 50	220
3.	A/M - 403	Material Technology	-	4	2	5	20	30	10	10	1	3Hrs 100	1	3Hrs 50	220
4.	A-404	Auto Engines -I	-	4	2	5	20	30	10	10	1	3Hrs 100	1	3Hrs 50	220
5.	A-405 A-405	Strength of Material & Mechanics of Machines	201	4	2	5	20	30	10	10	1	3Hrs 100	1	3Hrs 50	220
6.	A-406	Auto Electrical & Electronics	-	3	2	4	20	30	10	10	1	3Hrs 100	1	3Hrs 50	220
7.	A/M - 407	Fluid Mechanics & Hydraulics Machine	201	4	2	5	20	30	10	10	1	3Hrs 100	1	3Hrs 50	220
8.	A-408	Auto Chassis-I	-	4	2	5	20	30	10	10	1	3Hrs 100	1	3Hrs 50	220

TOTAL CREDITS 40 160 250 80 80 8 8 800 8 400 1770

TOTAL OF SOFT CORE & BASIC TECHNOLOGY 630 + 1770 = 2400
50% of 2400 1200

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)
COURSE : MECHANICAL DRAFTING
COURSE CODE NO : M-401
PRE-REQUISITE : 202

R A T I O N A L E .

This course in Mechanical Drafting has been prepared with a view to developing elementary drafting skill in the students. Looking to the professional needs of the technicians, more emphasis is laid on the use of I.S. Code of practice and reading and interpretation of drawings. The topics on Multiview Representation, Dimensioning and Tolerancing, Free hand sketching and Sections of M/c Parts are included to build foundation for production Drawing. The topic of Pipe Drafting will help the students to understand the importance and functions of piping system, in industry. Tracing and Blue Printing will develop in them the skill of preserving important drawings.

'Computer Graphics' is a modern concept in Mechanical Drafting and knowledge of Elementary level in Display Technology, D.D.S. and Dimensional Transfer scaling is considered essential for the technicians level.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPLI.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MECS)
COURSE : MECHANICAL DRAFTING.
COURSE CODE NO : M-401

SCHEME OF STUDIES.

S.No.	Topic	Theory periods.	Practical periods.
1.	Projections and Multiview Representation.	3	6 (2 plates)
2.	Sectional views	3	6 (2 plates)
3.	Auxiliary Views.	3	6 (2 plates)
4.	Dimensioning, Tolerancing, Machining and welding symbols.	6	6 (2 plates)
5.	Production Drawing.	10	42 (6 plates)
6.	Pipe Drafting.	4	6 (1 plate)
7.	Gear Drawings.	4	6 (1 plate)
8.	Reproduction and Preservation of drawings.	3	6 (1 tracing & its reproductions plates)
9.	Graphs and charts.	6	6 (2 plates)
10.	Computer Graphics	6	6 (1 plate)

TOTAL 48 96 (20 plates)

G.Total

Credits - 6

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 MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
 BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MTECS)
 COURSE : MECHANICAL DRAFTING.
 COURSE CODE NO : M-401

C O N T E N T S

Theory : 48 Hours.
 Tem/Practical : 96 Hours.
 Total : 144 Hours.

TOPIC NO. 1 : PRODUCTION AND MULTIVIEW REPRESENTATION:
 Projection, orthographic projection, First
 and Third angle projection, superfluous view,
 Choice of views, Auxillary views- full and
 partial, conversion of pictorial views in to
 orthographic views, conventional representation
 as per IS 696.

TOPIC NO. 2 : SECTIONAL VIEWS :
 Full section, half section, partial or broken
 section, revolved section, removed section,
 offset section. Sectioning conventions, section
 lines. Hatching procedure for different
 materials as per IS code 686-1972. sectional
 views of assembled parts choosing from IC
 engine parts, steam engine parts, valves,
 couplings, clutches, brackets, bearings etc.
 (Use 1st and 3rd angle projections both.)

TOPIC NO. 3 : AUXILIARY VIEWS :
 The use of auxiliary views, Types, construction
 of symmetrical and unsymmetrical auxiliary
 views.

(10)

TOPIC NO. 4: DIMENSIONING, TOLERANCING, MACHINING AND WELDING SYMBOLS:

Types of dimension (size and location)
Dimensioning terms and notations. (Use of I.S. Code 696 & 2709) general rules for dimensioning and practical hints on dimensioning, systems of dimensioning. Dimensioning of cylinder, holes, arcs of circle, narrow space, angles, counter sunk hole, screw threads, taper etc. Application of tolerances. (use I.S. code 696). Machining marks, finish marks, countersinking, counter-boring, spotfacing, figures and notes for same. Representation of characteristics machining (circularity, angularity etc.) (Ref. IS 696). Representation of welded joints, welding symbols, Tolerance of forms and positions. Procedure of drawing fits, limits, size, tolerance, clearance etc.

TOPIC NO. 5 : PRODUCTION DRAWING :

Detailed drawing, Assembly drawing, scale, finish, tolerances, processors, notes etc. Title block, Tool list, Gauge list, style list, parts list zoning, revision, panel

(Confid.....)

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preparation of production drawing for pattern shop, forging shop, machine shop, preparation of assembly drawing from detailed drawing. Exploded views, sectional pictorial views, assembly drawing of plummer block, flange coupling, stepped pulleys, foot step bearing, universal coupling, stuffing box, eccentric of steam engine, connecting rod, piston of I.C. Engines, stop valves, feed check valves, Dead weight safety valve for boiler. Preparation of detailed drawing from assembly drawings and assembled pictorial views, Interpretation of production drawings.

TOPIC No. 6

PIPE DRAFTING :

Various symbols used in pipe line work as per IS code of practice, C.I. Flanged joint, socket and spigot joint, gland and stuffing box, Expansion joint, pipe fittings, typical pipe bands, pipe supports and accessories. Piping diagram for a small pump house.

TOPIC NO. 7

GEAR DRAWING :

Gear terminology such as pitch, pitch circle diameter, module, addendum, dedendum, root circle diameter, hole depth, Blank diameter etc. Construction of cycloidal, involute teeth-profiles, pinion and rack meshing, spur gear meshing.

TOPIC NO. 8 RE-PRODUCTION AND PRESERVATION OF DRAWINGS:

Tracing, Blue printing, Brown print, white print, ammonia printing, xerography, photographic reproduction. Micro films. Indexing, folding and collification methods. (Use IS code of practice 696 - 1972)

(1 tracing plate and its reproduction)

TOPIC NO. 9 GRAPH AND CHARTS :

Introduction, classification of charts, graphs and diagrams, Quantitative and qualitative charts and graphs. Drawing and curve, Titles, legends, notes etc. procedure for making a Graphical Representation in Ink. Logarithmic Graphs, Semilogarithmic Graphs, Bar charts, Area (percentage) charts, Pie chart, Polar charts, trilinear chart, pictorial chart, Alignment charts (Nomographs) - Forms and construction, construction of functional scale, parallel scale charts for equations of the form $(f(t) + g(u) = f(v))$, $(f(t) \times f(u) = f(v))$ Three-scale Alignment chart, Graphical construction of a Z-chart, Four variable Relationship- Parallel scale Alignment chart.

TOPIC NO. 10 COMPUTER GRAPHICS :

Introduction to computer graphics, geometric modeling - Three types of commands, Methods of Representing objects in Geometric modeling.

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Automatic Drafting - Creating hard copy engineering drawing direct from CAD base, Graphic features of CAD helpful in automatic drafting.

Graphic terminal and other hardware for computer graphics their function and use.

- (a) Three types of grapher terminals.
- (b) Operator input devices - cursor control, input functions, digitiser, key-board, terminals.
- (c) Plotters and other output devices. Familiarity with a simple set of commands for generating simple orthographic views.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MECS)

COURSE : MECHANICAL DRAFTING.

COURSE CODE NO : M- 401

SUGGESTED TERMS-WORK

<u>S.NO.</u>	<u>TOPIC</u>	<u>NO. OF SHEETS.</u>
1.	Projections and Multiviews	2
2.	Representation.	
2.	Sectional Views.	2
3.	Auxiliary views.	2
4.	Dimensioning Tolerancing, Machining and Welding Symbols.	2
5.	Production Drawing.	6
6.	Isometric drafting.	1
7.	Isometric drawing.	1
8.	Reproduction and preservation of drawings.	1 Tracing & its reproductions
9.	Graphs and charts.	2
10.	Computer Graphics.	1

TOTAL 20 plates.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MFECS)
COURSE : MECHANICAL DRAFTING.
COURSE CODE NO : M-401

SUGGESTED BOOKS.

1. Fundamentals of Engineering Drawing By-warren J Luzadder
(Prentice-Hall)
2. Mechanical Drawing By-Giesecke, Michell
Spencer, Hill
(Collier Macmillan Internal
Edition)
3. Engineering Graphics. By-Giesecke/Mitchell/
Spencer/Hill/
Loving
(Macmillan)

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MTECS)
COURSE : MANUFACTURING PROCESS
COURSE CODE NO : M-402
PRE-REQUISITE : 203

R A T I O N A L E

Manufacturing Processes are advancing very fast with the expansionⁿ of technology. This course will provide basic insight in the students regarding methods of manufacturing processes. The course gives the opportunity for exhaustive study of metal casting, mechanical working of metals and metal joining. The abilities developed by studying this course will be directly helpful to all the technicians, in what ever field they are employed.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MFECS)
COURSE : MANUFACTURING PROCESS
COURSE CODE NO : M-402

SCHEME OF STUDIES.

S.No.	Topic.	Theory	Practical	Total
1.	Introduction to manufacturing Processes.	3	2	5
2.	Metal casting.	18	16	34
3.	Mechanical working.	28	6	34
4.	Metal joining.	15	8	23
TOTAL:-		64	32	96

Credits - 5

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MFECS)
COURSE : MANUFACTURING PROCESS
COURSE CODE NO : M 402

1. INTRODUCTION TO MANUFACTURING PROCESSES :

Definition, Distinction between manufacturing processes as used in engineering industries and other process oriented industries; classification of basic manufacturing processes, i.e. mechanical working, casting, metal joining processes, metal cutting processes, Examples of each of the above listed manufacturing processes, Factors which influence selection of production process for particular applications.

2. METAL CASTING :

2.1 INTRODUCTION, listing of different casting processes, advantages and limitations of casting as a production process.

2.2 Pattern making :- Definition of pattern, types of patterns and their details, Materials, Allowances, Tools required, colour code for patterns.

2.3 Moulding - Definition, Moulding, methods types of moulds, moulding materials, Moulding sand and its composition, Sand properties, Testing parameters of sand, and their effects, sand preparation, sand conditioning, characteristics and defects of moulds.

-Cores and core making, core boxes,

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2.4 FURNACES - Cupola, Crucible, Pit and Electric arc furnaces their salient features, advantages and limitations, preparing furnaces for melting, safety aspects.

2.5 CASTING PROCESS of runners, risers and gate.

Cleaning of casting,

special casting methods, - Need for special casting methods, Die casting, centrifugal casting, Investment (lost wax) casting, continuous casting, casting defects - causes and analysis area of application casting process.

3. MECHANICAL WORKING : Introduction- hot and cold working.

HOT WORKING : Principle of mechanical working, importance, Hot and cold working, structural changes during process, Pre-heating of stock, Defects in ingots and rectification, Advantages and disadvantages of hot working, Equipment required for hot working of metal, Different hot working methods.

COLD WORKING : Basic Principles of cold working, Effect of cold working on grain structure, strength, hardness. Type of cold working processes- Forging, Press working, Rivetting, Cold Rolling, Drawing, spinning. Residual stress in cold working. Comparison of hot and cold working processes. Advantages and disadvantages of cold working processes.

Preheating Principles, Equilibrium diagram its use for determining preheating and temperature range.

Effect of overheating of metal. Factors which decide stocks used in hot working of a given product functions of soaking pit.

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METAL ROLLING : Principal of metal rolling, Basic components of a simple rolling process equipment. Types of deformations during rolling, Differentiation between a bloom and a billet as applied to rolling, Roller material, selection and desirable properties, Principle of thread rolling description with sketches. Manufacture of seamless tubes by rolling, Types of rolling Mill.

METAL DRAWING : Basic principle of drawing of metals, Differentiate between the drawing and deep drawing of metals, Principle of wire drawing, Basic equipments required for wire-drawing, Process of wire drawing Die details.

METAL SPINNING : Process of metal spinning, Principle of deep drawing and example.

EXTRUSION - Definition; classify the methods of extrusion, their limitations, advantages and disadvantages. Tube extrusion, impact extrusion, Application of extrusion processes.

FORGING :- Die forging, Differentiate between the cold die and hot die forging, advantages of forming by forging, Common defects and reason of forged parts. Limitations of forging progressive forging, Press forging, upset forging, Die material, Applications of forging processes in engineering.

PRESS WORK : Definition of Press working of metals, Principle of press working, Description of a simple press working unit; Press working operations-Punching, shearing, Drawing, Bending, slitting, Curling, Notching, Trimming, Differentiate press and press brake, Double action press-description and its field of application, Die and punch, Types of Dies, Specifications of a press, safety precautions to be observed for working on a press.

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TOPIC : 4 : METAL JOINING

Introduction, classification of metal joining processes- soldering, Brazing and welding, welding, weldability of metals, Metallurgy of welding and welding

Classification- Plastic, Fusion and Forge

Resistance welding - Spot, seam, Butt, Projection, Percussion techniques

Gas welding and gas cutting - Principle of operation and technique, gas cutting.

Arc welding - Carbon arc, metal arc, inert gas arc- TIG, MIG submerged arc, atomic hydrogen, electro-slag, plasma arc welding processes. Electrode types and selection, Flux and their uses.

Special welding techniques-thermit, ultra sonic, electron beam, explosive and friction welding technique. Welding of different metals. Defects in welds, testing and inspection.

Accident prevention in gas fusion welding and in arc welding.

Equipments, tool, used in metal arc welding-specification and functions.

Soldering- Types, tools, working principle, consummables, application.

Brazing-Equipments, tools, working principles, Consummables, application. Adhesive joining- various materials used as chloroform adhesive such as: Glue, Quickfix, Arelidite,

Epico etc. Epoxy resin working principle, advantages, disadvantages and limitations. (15 = 23)

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)

COURSE : MANUFACTURING PROCESS

COURSE CODE NO : M 402

LIST OF EXPERIMENTS.

S.No.	Practical details.	shop	Time allotted	REMARKS.
1.	Carpentry practice on Sawing, planing, chiselling and simple Joinery work.	Carpentry/ pattern shop.	6 hrs.	
2.	Making a split/solid pattern from wood.	pattern shop.	3 hrs.	
3.	Making a core - box.	-do-	3 Hrs.	
4.	Tempering of sand, Practice of green and dry sand making.	Moulding shop/ & foundry.	3 Hrs.	
5.	Practice of core making and baking.	-do-	3 Hrs.	
6.	Practice of open mould in a two box, using split pattern and solid pattern. Locating the core.	-do-	3 Hrs.	
7.	Demonstration of casting of metal in pit furnace.	-do-	3 Hrs.	
8.	Simple forging practice (Making a square bar out of a given round bar, making of a chisel) and bolt.	Blacksmithy shop	9 Hrs.	

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1.	2.	3.	4.	5.
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- 9. Practice of upsetting of a round on power hammer. Blacksmithy shop. 3 Hrs.
- 10. Practice of sheet cutting with the help of straight and bent snips. Making small rectangular prism and cylinder. Tin smithy shop. 6 Hrs.
- 11. Practice of making of washer of any size on a flypress. -do- 3 Hrs.
- 12. practice of piercing, notching and circle cutting with the help of a Metal master machine. -do- 3 Hrs.
- 13. Practice of sawing filing and fitting of small rectangular pieces preparation of edges for welding. Fitting. 9 Hrs.
- 14. Linear measurement of jobs with the help of calliper micrometer and simple measuring tools. -do- 3 Hrs.
- 15. Demonstration and practice of bead laying (welding) on a flat piece. welding. 2 Hrs.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)
COURSE : MANUFACTURING PROCESS.
COURSE CODE NO : M - 402

LIST OF BOOKS FOR REFERENCE.

1. Process and materials of manufacture
- Lindberg.
2. Workshop Technology - Hazara & Choudhary.
3. Materials and Manufacturing Process - Dalela.
4. Manufacturing Processes - Yankee.
5. Manufacturing Processes - S.E. Rusinof.
6. Welding Engineering. - B.E. Rossi.
7. Foundry Engineering. - P.L. Jain.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)

COURSE : MATERIAL TECHNOLOGY.

COURSE CODE NO : M-403

R A T I O N A L E .

The knowledge of materials, their properties and behaviour is essential for people associated with Engineering activities. Materials Technology plays an important role in design and production of a product from the point of view of reliability and performance of the product.

The curriculum of the subject emphasizes upon understanding the properties and behaviour of materials in correlation with their structure and external environmental effects. The range of materials available for engineering is quite vast, hence only the basic groups of materials such as ferrous, non-ferrous non-metallic materials alongwith their general characteristics and application have been stressed.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPLI.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)

COURSE : MATERIALS TECHNOLOGY

COURSE CODE NO : M - 403

SCHEME OF STUDIES.

S.No.	Topic	Theory Hrs.	Practical Hrs.	Total Hrs.
1.	Engineering requirement of materials.	01	-	01
2.	Mechanical properties of materials and their testing.	04	10	14
3.	Structure of solid materials.	04	-	04
4.	Structural Imperfections.	02	-	02
5.	Permanent reformation.	04	-	04
6.	Practical metallography.	02	08	10
7.	Phase Diagram and phase Transformation.	05	-	05
8.	Iron-Carbon system.	03	-	03
9.	Heat treatment of steels.	06	12	18
10.	Ferrous Metals and Alloys.	08	02	10
11.	Non-Ferrous metals and Alloys.	05	-	05
12.	Non-metallic materials.	08	-	08
13.	Plastics.	03	-	03
14.	Powder Metallurgy.	04	-	04
15.	Metal Preservation.	02	-	02
16.	Selection of materials.	01	-	01
17.	Modern trends in Materials Technology.	02	-	02
TOTAL		64	32	96

Credits - 5

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)

COURSE : MATERIALS TECHNOLOGY.

COURSE CODE NO : M - 403

C O N T E N T S

1. ENGINEERING REQUIREMENTS OF MATERIALS :
Introduction to engineering materials, classification of engineering materials and their properties.
2. MECHANICAL PROPERTIES OF MATERIALS AND THEIR TESTING :
Mechanical properties of materials, Destructive and non-destructive testing.
3. STRUCTURE OF SOLID MATERIALS :
Classification, Amorphous and crystalline states, unit cells and crystal structure (B.C.C., F.C.C. and H.C.P.) Allotropy.
SOLIDIFICATION OF METALS :
Process, Nucleation of metal crystal, Ingot solidification, dendritic growth and its effect on properties, Methods of preventing dendritic growth. Growth of single crystals - column crystal, Equiaxed grains segregation of impurities Grain and Grain Boundaries.
4. STRUCTURAL IMPERFECTIONS :
Types of imperfections, Impurity atoms, Point defects, Line defects, screw and mixed dislocations, surface defects.
5. PERMANENT DEFORMATION :
Types, Mechanism of plastic flow, slip phenomenon in single crystals Dislocation theory, Twinning, Annealing, Recovery Recrystallization and grain growth.

6. PRACTICAL METALLOGRAPHY: Preparation of specimen, selecting the specimen, Mounting the specimen, Grinding and polishing, Etching, and etching reagents, The metallurgical microscope, Use and care of microscope. Micro-examination, sulphure printing. (2 + 8 = 10)

7. PHASE DIAGRAMS AND PHASE TRANSFORMATION :

Basic definition of phases, solid solutions- types, formation examples, characteristics, factors affecting the formation of solid solutions.

Equilibrium or phase diagrams :- Plotting of equilibrium diagrams, Interpretation, Phase rule and lever rule and its application. Isomorphous binary equilibrium diagrams.

Thermal equilibrium diagrams :- Uses, their construction and interpretation Eutectic type solid-solubility type and partial (limited) solubility type.

8. IRON-CARBON SYSTEM : The complete Iron-carbon diagram and its interpretation. The solidification and cooling of various carbon steels, structures produced, correlation of mechanical properties with carbon content.

9. HEAT TREATMENT OF STEELS :

Objective of heat treatment, Description of processes Annealing, hardening, Normalising and tempering.

Hardening processes :- Surface Hardening, Flame hardening, case hardening, methods, their scope, limitations and advantages, Quenching mediums and its effect on hardness. Hardening defects due to improper quenching, Hardenability, Jominy test and interpretation of its results. T.T.T. curves-interpretation and ^{use} Martempering and Aus-tempering process, use and their representation on TTT- curves.

10. FERROUS METALS AND ALLOYS:

Classification, Types of cast Irons- their micro-structure, formation, properties and uses, Alloy cast-irons-various alloying elements used, their effects on properties and uses. Classification composition and uses of plain carbon steels, effect of impurities, Alloy steels - various elements used for alloying, their effects on properties and uses of alloy steels. Alloy steel classification
 Tool steels :- Typical compositions, requirements of tool steels, High speed steel, High carbon steel.
 Standardization of steels.
 Designation of steels as per B.I.S. codes.

11. NON-FERROUS METALS AND ALLOYS :

Copper- its properties and uses
 Copper base alloys-brasses and bronzes, their classification composition, properties and uses. Designation of copper alloys as per B.I.S. Aluminum- its properties and uses, Aluminium alloys- their composition, classification properties and uses.
 Designation of Al-alloys as per B.I.S. Zinc, Nickel and lead- their alloys, properties and uses (only commonly used important alloys) bearing alloys-their composition and field of application.

12. NON-METALLIC MATERIALS :

Ceramic-types, characteristics and applications,
 Refractories- desirable properties, classification, special feature of acid, basic and neutral, refractories.
 Causes of failure
 Natural and synthetic abrasive materials-composition properties and uses, Glass, Fibre glass, glass wool-composition, properties and uses.

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RUBBERS- Properties and uses, vulcanisation, Adhesive-terms used, types, desirable qualities-principle of adhesion-setting of adhesive-surface preparation, selection of adhesive commercial names of commonly used adhesives. Thermal insulation and electrical insulation materials- Desirable qualities- Effect of moisture and temperature, types of insulation materials and their applications. Lubricants-Functions, properties, types and uses. Commercial names of lubricants their specific applications and characteristics.

13. PLASTICS : Characteristics, classification commonly used thermo setting and thermoplastics- their properties and uses.

Ingredients for processing plastics.

Plastic processing methods- different methods.

14. POWDER METALLURGY :

→ Introduction and application

Description of process, manufacture and blending of metal powders. Compacting, presintering and sintering, Advantages and computations design considerations.

15. METAL PRESERVATION :

Corrosion- meaning, various mechanism effect of corrosion, methods of minimising corrosion.

16. SELECTION OF MATERIALS :

- selection requirements, Fabrication of characteristics.

17. MODERN TRENDS IN MATERIALS ENGINEERING :

- New materials like FRP, Composites, synthetic Rubbers, synthetic wood.

- Super conductivity.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)
COURSE : MATERIALS TECHNOLOGY
COURSE CODE NO : M- 403

LIST OF EXPERIMENTS.

1. Study and use of metallurgical microscope.
2. Preparation of micro specimen.
3. To study microstructural characteristics of Grey Cast Iron, white cast iron and malleable cast iron.
4. To study microstructure of carbon steel.
5. To study of effect of normalising, annealing on the hardness and micro-structure of high carbon steel.
6. To study the effect of carbon and temperature on hardening of steel.
7. To study the effect of temperature on the properties during tempering of steel.
8. To study the effect of quenching media on hardness of steel.
9. To study the carbonising and decarburising of steels.
10. Joining hardenability test and its industrial use.
11. To study the microstructure of some important brasses and bron zes.
12. To observe the microstructural characteristics and other properties of various cast irons and prepare a report there of for industrial use.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)

COURSE : MATERIALS TECHNOLOGY

COURSE CODE NO : M-403

LIST OF REFERENCES

1. A text book of material science and Metallurgy by G.P.Khanna
2. Material science and processes - S.K. Hazra Choudhry
3. Material Science - Leuttin- Lakhtin
Pub. MIR Publisher, Moscow.
4. Materials for Engineers -M.H.A. Kerasty
5. Introduction to material science and
Engineering - K.M. Ralls
- T.H.Courtney
- John Wulff.
Pub. Wiley Eastern N. Delhi.
6. Physical Metallurgy principles- Reed Hill
Pub. Affiliated East- West Press Pvt. Ltd.
New Delhi.
7. Engineering Metallurgy
- R. Higgins.

(ELES.)

8. Material science - B.S.Narang
Pub. CBS Pub. & Distributors - Delhi.

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MULTIPOINT ENTRY AND CREDIT SYSTEM
DIPLOMA IN AUTOMOBILE ENGG.
A 404 AUTO ENGINES - I (PETROL ENGINES)

RATIONALE

The power plant or engine is the most important part of Automobile vehicle. This syllabus in Automobile Engines is prepared with the aim to develop average skill in understanding the subject. This subject is the core beginning of his career. The topics of basic fundamental importance such as concept of thermodynamics, laws of thermodynamics, thermodynamic processes & cycles, Air compressor are added to the present syllabus. Their inclusion will prove useful to understand basic principles of thermodynamics. It will develop the understanding of the student in application of the principles to Automobile system.

This course will facilitate the student to apply the principles for their further studies and the knowledge will be useful to them in practical field too.

OBJECTIVES

- 1) To get familiar with the basic fundamentals of thermodynamics.
- 2) To get familiar with various engine components and systems used in SI Engines.
- 3) To acquire adequate knowledge to analyse results of power calculations.
- 4) To get familiarise with commercial specifications of various vehicles.

A-404 AUTO ENGINES - I

SCHEME OF STUDIES AND SPECIFICATION TABLE :

TOPIC NAME OF TOPIC No.	TH. TUT/NOTES		K	C	A	TOTAL
	HRS.	LAB HRS				
1 Basic concepts of Thermodynamics	6	6	12	2	4	10
2 Laws of thermodynamics	6	6	12	2	4	10
3 Thermodynamics processes & cycles	6	6	12	2	4	10
4 constructional Features of Auto engines	8	6	14	4	6	12
5 Fuel systems in SI Engines	8	8	16	4	6	20
6 Lubricating systems	6	6	16	4	4	10
7 Cooling systems	6	6	16	4	6	12
8 Air Compressors	4	8	14	2	2	6
Total	56	56	112	32	42	106

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CONTENT OUTLINE

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Topic 1: Basic Concepts of thermodynamics :
Introduction, systems and surrounding, working substance, thermodynamic equilibrium, pressure, energy and forms of energy, Heat, Work, reversible and irreversible processes.

Topic 2: Laws of Thermodynamics :
First law of thermodynamics, Application of first law to closed system and steady flow system, limitations of first law, heat engine and heat pump, statement of second law of thermodynamics, Carnot cycle concept of entropy.

Topic 3: Thermodynamic Processes and Cycles:
Representation of following thermodynamic processes on PV & TS planes (i) Isothermal, (ii) Adiabatic (iii) Polytropic (iv) Isentropic calculation of work internal energy, for the above processes.

Representation of Otto, Diesel and dual combustion cycle on PV & TS planes, Air standard efficiency, reason for deviation of actual cycle from theoretical cycle, Working of four stroke and two stroke cycles, scavenging, valve timing and port timing diagram.

Topic 4: Constructional features of Automobile Engines :
Classification of I.C. Engines, the materials used, construction and functions in brief of the various major components, of engine, cylinder block, crank case, cylinder head, oil sump, crank shaft, main bearing, intake and exhaust manifold, piston, piston rings, connecting rod, cam shaft, fly wheel, valve operating mechanism.

Topic 5: Fuel systems in Spark Ignition Engines :
Molecular structure of fuel used in petrol engines. Properties of ideal gasoline, volatility of liquid fuels, knocking of SI engine fuels, Octane number, performance number, fuel additives Air fuel ratio, petrol injection, process of combustion, types of fuel feed systems, gravity feed system, forced feed system. Mechanical fuel pump. Theory of carburation. Working of simple carburettor, Defects in a simple carburettor, complete carburettor, study of working of Solex, S.U., Amal carburettors.

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Topic 6: Lubricating Systems :

Introduction , Functions of lubricating system , properties of lubricating oil , Additions , pressure lubrication system, Dry sump and wet sump system , oil filters , crankcase ventilation.

Topic 7: cooling System :

introduction , necessity of cooling , Types of cooling systems, water cooling systems, pressurised cooling system, study of working of thermostat valve , Radiator cooling fan , temperature gauge, antifreeze mixture.

Topic 8: Air Compressors :

Industrial uses of compressed air , Types of Compressors , reciprocating air compressor, constructional details , terminology as applied to reciprocating compressor. Compression ratio.

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LABORATORY WORK IN AUTO ENGINE - I

1. Study of hand tools :- Various types of spanners, pliers, screwdrivers, socket spanners, taps, dies, levers etc.
- Study of special tools :- Battery tester, Battery lifter, bearing puller, Drum puller, Stud extractor, screw extractor grip clip, piston ring groove cleaner, ring expander and compressor, ring file, torque wrench, nose plier, tappet spanner etc.
- Study of measuring instruments :- Cylinder dial gauge, compression gauge, micro meters, dialer gauge, thread gauge, level protector etc.
2. Study of two stroke petrol engine (model)
3. Study of four stroke petrol engine (model)
4. - Study of fuel feed system of petrol engine.
- Study of lubrication system of petrol engine.
- Study of cooling system of petrol engine.
5. To draw valve timing and port timing diagram.
6. - Dismantling and assembling of multicylinder engine
- To draw sketches of major components.
- To study working of major components of the engine.
7. To open the oil pump, sketch and identify the components and assemble.
8. To open the water pump, sketch and identify the components and assemble.
9. To open the fuel pump, sketch and identify the components and assemble.
10. To open the carburettor, sketch and identify the components and assemble.
11. To measure B.H.P., I.H.P., Indicated thermal efficiency, Brake thermal efficiency of an automobile engine.
12. Study of reciprocating air compressor.

REFERENCE BOOKS :-

1. Automobile Engineering (Hindi) Prof. S.M. Pandey
2. A Course in Thermodynamics : Heat Engines
3. I.C. Engines
4. Automotive Mechanics
5. Automobile Engineering

Dr. C.P. Dandiawar
Mathur & Sharma
William Crowle
Joseph Heiser

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

Programme : DIPLOMA IN AUTOMOBILE ENGINEERING
Course : Strength of Material and Mechanics of Machines
Course code: A - 405
Pre-Requisite: 201

RATIONALE

This curriculum has been prepared by integrating all important topics of strength of materials and mechanics of machines. These topics will form the basis of understanding the working of general machines elements and to design in engineering field and will help to understand the design of different machine components. Portion of mechanics of machine will be helpful in understanding and solving many problems related to working and operation of mechanism of many kind of machines, throughout the career of automobile engineering technician.

The knowledge of portion of strength of material is particularly essential for the technician working in field of design, maintenance of shop floor, inspection and quality control and production departments.

OBJECTIVES :-

- To understand the mechanisms employed in machines.
- To solve problems regarding kinematics of machines.
- To understand behaviour of metals under load.
- To gain skill in metal testing.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL

COURSE : STRENGTH OF MATERIALS AND MECHANICS
OF MACHINE.

COURSE CODE : A - 405

SCHEME OF STUDIES

S. Topic No.	Lec.Hrs	Pract/ Lab Hrs.	Total Hrs
1. Simple stresses & strains	08		
2. Shear force and bending moment of beams.	10		
3. Theory of simple bending	04		
4. Torsion of circular shaft.	06		
5. Thin Cylinders	04		
6. Simple Mechanisms.	03		
7. Transmission of power	08		
8. Crank effort diagram and flywheel	08		
9. Balancing	05		
10. Cams.	08		
TOTAL :	64	32	96

CREDITS - 05

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COURSE CONTENT OUT LINE

STRENGTH OF MATERIALS

TOPIC-1 :- Simple stresses and strains

Introduction, types of load and deformation types of stresses and strains, Hooke's Law, Elastic limit, Poisson's ratio, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus, Modular ratio, Temperature stresses, Hoop stress, state of stress at a point, shear, relation between the elastic constants, Volumetric strain, Rectangular block subjected to normal stresses.

Strain Energy or Resilience, proof resilience modulus of resilience, types of loading, strain energy stored due to Gradual, sudden and impact load.

TOPIC - 2 :- Shear force and bending moment of beams: 10

Types of beams, types of loading, shear force, bending moment, relation between shear force, and bending moment at a section. Sign convention, shear force and bending moment diagrams for cantilever, simply supported and over hanging beam under concentrated load and uniformly distributed load, point of contra flexure.

TOPIC - 3 :- Theory of simple bending 04

Assumption, Bending stress, and bending equation, Natural layer, Neutral axis, moment of resistance and section modulus, modulus of rupture, slope, curvature and deflection of beams, beams of uniform strength, solve simple problems of beams.

TOPIC - 4 :- Torsion of circular shaft 06

Torsion of shaft, torsion Equation (without proof) Solid and hollow circular shafts, problems on design of shafts subjected to pure torsion and combined bending and torsion.

TOPIC - 5 :- Thin cylinders 04

Definition.

Behaviour of thin cylinders subjected to internal pressure, Hoop stress and longitudinal stress, solve simple problems on thin cylinders

MECHANICS OF MACHINES

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TOPIC - 1 :- SIMPLE MECHANISMS.

03

Introduction to mechanics of machine, definitions of kinematics, Dynamics, statics and kinetics, Link, Kinematic pair, kinematic chain, Mechanism, Machine, Inversion, Difference between Mechanism and Machine.

TOPIC - 2 :- Transmission of Power

08

Introduction, Drives, types of drives, belt, rope, chain and gear drives, relative merit and demerits of different drives.

- A. Belt drives :- Types of Belts, Types of Flat belt drive, belt material, length of the belt calculation for open and cross belt drives. M.P. Transmitted, Effect of centrifugal force, Centrifugal tension, simple problems on velocity ratio.
- B. CHAIN DRIVE :- Classification of chain, and their applications.
- C. GEAR DRIVE :- Classification, types of gears and its application, spur gear terminology, Interference, function of Idler, Lewis equation (without proof) problems on finding number of teeth, exact centre distance and power transmitted by gear drives.

TOPIC - 3 :- CRANK EFFORT DIAGRAM AND FLYWHEEL

08

Dynamics of reciprocating Engine mechanism, Inertia force due to reciprocating mass, piston effort, crank effort, Turning moment of crank shaft.

Fluctuation of energy, co-efficient of Fluctuation of energy and speed Flywheel and its function and calculation of moment of inertia and weight of flywheel for I.C. Engine.

TOPIC - 4 :- Balancing.

05

Concept of balancing, difference between static and dynamic balancing, simple problems on dynamic balancing of single revolving mass by introducing two balance masses in different planes and dynamic balancing of several masses revolving in the same plane.

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TOPIC - 5 :- CAMS

08

Definition, classification, types of followers types of follower motion, drawing cam profiles for radian and offset follower with uniform velocity, simple harmonic motion and uniform and equal acceleration and retardation (one example in each).

REFERENCE BOOKS :-

1. Strength of materials by Ramamrutham
2. -do- by R.S. Khurmi
3. -do- by Prasad, J.B.
4. -do- by Dr. B.C. Punmia vol I & II
5. -do- by K.D. Saxena
6. Theory of Machine by R S Khurmi
7. -do- by Abdulla shariff
8. -do- by P.L. Ballany
9. -do- by Thomas bevan

LIST OF PRACTICAL WORK

32 hrs

- | S.No. | Topic |
|-------|---|
| 1. | Study of mechanical properties of materials, such as elasticity, plasticity, stiffness, ductility, Brittleness, Malleability, Hardness, Toughness. |
| 2. | Determination of hardness of MS Brass, CI by
(a) Brinel
(b) Rockwell.
(c) Vicker's method. |
| 3. | Determination of impact strength of M.S. C.I.
by
(a) Charpy and
(b) Izod testing methods. |
| 4. | Study of universal testing machine and its attachments. |
| 5. | Different tests using U.T.M.
(a) Tensile test.
(b) Compression test.
(c) Shear test.
(d) Bending test
(e) Hardness test (B H N only) |

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M. P. B.T. E.

Bhopal

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Course :- Auto Electricals & Electronics.

Course Code :- A-406

CREDITS: 04

SCHEME OF STUDIES

S. No.	TOPIC	LEC. HRS	Pract LAB HRS	Total HRS.
1.	Introduction	07		
2.	Storage Battery	07		
3.	Cranking Motor Fundamentals	05		
4.	Generators	03		
5.	Alternators	03		
6.	Regulators	03		
7.	Ignition System	06		
8.	(A) Indicating Devices (B) Horn & Headlights (C) Accessories (D) Wiring Diagrams	06		
9.	Electronics	08		
<u>TOTAL</u>		48	32	80

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MULTIPOINT ENTRY AND CREDIT SYSTEM

DIPLOMA IN AUTOMOBILE ENGG.

A 406 AUTO ELECTRICALS AND ELECTRONICS

BASIC TECHNOLOGY COURSE, CREDITS-4

1. INTRODUCTION:-

Need of Electrical systems for Automobiles, components of auto electrical system, basic principles of electricity such as conductors, insulators, current, voltage, resistance, ohm law, series and parallel circuits, voltage drop and its calculations, Electromagnetism, Introduction to measuring equipments and devices for electrical properties of material and electrical quantities in circuits.

2. THE STORAGE BATTERY:-

Purpose, working principle cell voltage construction, study of different parts, Nonoverflow devices, Battery operation, Battery connections, charging and recharging of batteries, Battery ratings, Battery characteristics. Study of commercially available batteries in the market. Effect of condition of battery regarding charging and discharging on electrolyte density. Measurement of electrolyte density, self discharging of battery.

3. CRANKING MOTOR FUNDAMENTALS :-

Electric motor principle, cranking requirements. A simple series motor, Cranking motor construction, Need for drive mechanisms, Bendix drive, over running clutch, cranking motor switches, magnetic switch, magnetic and vacuum control switch solenoid switch, cranking motor circuit.

4. GENERATOR :-

Generator principle, commutation, Regulating generator output, Armature reaction, third brush control, shunt generator, field connections, generator construction, output relay ammeter or charge indicator.

5. ALTERNATOR :-

Principle, Constructions and working of alternator, difference between D.C. and A.C. generator (Alternator), advantages of alternator over generator, A.C. to D.C. conversion, rectifier operation.

6. REGULATORS :-

Purpose, working principle and operation of current and voltage regulators, wiring diagram of regulator circuit, regulator for alternators.

7. THE IGNITION SYSTEM :-

Combustion in S.I. engines, need for electric ignition, Ignition spark advance, spark advance curve, function of ignition system, construction and operation of Ignition coil, condenser distributor and its components. Purpose and construction of spark plug centrifugal and intake manifold vacuum advance, combination of two. Magneto Ignitions system comparison of spark and magneto Ignition system.

8.(A) INDICATING DEVICES :-

Fuel gauges, Oil pressure gauge, Engine temperature gauge etc.

8.(B) HORN AND HEAD LIGHTS :-

Principle and operation of horn, construction and switches of electro magnetic horn, Head light operation construction of head light assembly, Head light circuits, Adjusting head light checking light output.

8.(C) ACCESSORIES :-

Electric wind shield wipers, Radios, Electro hydraulic window, front seats and convertible tops, Seat shift operation, Electrically operated seats and windows, Direction signals, Heaters, Automatic eye etc.

8.(D)

Study of wiring diagrams of various brands of vehicles available in market.

9. ELECTRONICS :-

Conductors, Insulators, Semiconductors, Impurities, doping, P type and N type materials, PN junction and its properties, PN and NP diodes, their applications, PNP and NPN transistors, Emitter, Collector, and Base, Diode and transistor characteristics, Use of diode as rectifier, Electronic Ignition system.

SUGGESTED LIST OF PRACTICALS :-

1. To study the battery principle, operation, its construction and circuit.
2. To charge a completely discharged battery with the help of available battery charger in workshop/Lab.
3. To check the level and Sp.Gravity of Electrolyte in a battery.
4. To study the cranking motor regarding, construction, operation circuit used, and drive mechanism used.
5. To study the Generator/Alternator regarding construction, operation, circuits used.
6. To study the regulator regarding construction, operation & circuit used.
7. To study coil Ignition system for a vehicle.
8. To study magneto Ignition system for a vehicle.
9. To study the wiring diagram of any brand of vehicle available at workshop.

Reference Books:-

1. Automotive Electrical Equipments by W.H.Crouse.
2. Automotive Electric Equipments by Young
3. Basic automobile Engineering by C.P.Hakra.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MTECS)
COURSE : FLUID MECHANICS & HYDRAULIC MACHINES.
COURSE CODE NO : M - 407

R A T I O N A L E.

This course is intended to introduce basic principles of fluid mechanics. It is further extended to cover the application of Fluid Mechanics by the inclusion of fluid machinery especially water turbine and water pumps. To day the principles of Fluid Mechanics find wide applications in many situations directly or indirectly.

The use of fluid machinery, turbines, pumps in general and in power stations is getting an accelerated fill up. Thus there is a great relevance for this course for mechanical technicians.

The mechanical technicians have to deal with large variety of fluids like water, air, steam, ammonia and even plastics. The major emphasis is given for the study of water. However the principles dealt with in this course will be applicable to all incompressible fluids.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)

COURSE : FLUID MECHANICS & HYDRAULICS MACHINES.

COURSE CODE NO : M - 407

PRE-REQUISITE : 201

SCHEME OF STUDIES.

S.No.	Topic	Duration in Hrs.		
		Theory	Practical/Tut.	Total
1.	Fundamentals of fluid flow.	04	--	04
2.	Pressure and its measurement.	06	04	10
3.	Basic equation ^{of} fluid flow	06	06	12
4.	Flow through orifice and mouth pieces.	06	04	10
5.	Flow through notches and weirs.	06	04	10
6.	Flow through pipes.	06	04	10
7.	Impact of jets.	06	02	08
8.	Water turbines.	08	04	12
9.	Water pumps.	08	04	12
10.	Model Analysis.	04	--	04
11.	Hydel Power stations.	04	--	04
TOTAL		64	32	96

CREDITS - 5

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)
COURSE : FLUID MECHANICS & HYDRAULIC MACHINES.
COURSE CODE NO : M - 407

C O N T E N T S.TOPIC 1. FUNDAMENTALS OF FLUID FLOW :

Definition of fluid- ideal and practical compressible and incompressible fluids, fluid properties density, specific weight, specific gravity, dynamic and kinematic viscosity, types of flow- laminar and turbulent, steady and unsteady, uniform and non-uniform. Continuity equation. Simple numerical problems on continuity equation.

TOPIC 2. PRESSURE AND ITS MEASUREMENT : Concept of pressure, intensity of pressure, pressure head, gauge pressure, vacuum pressure, absolute pressure. Manometers- piezometer, U-tube manometer, inclined manometer, differential manometer, inverted U-tube manometer Pressure gauges. Simple numerical problems on differential manometers.

TOPIC 3. BASIC EQUATION OF FLUID FLOW : Various forms of energies applicable to fluid flow, potential energy, kinetic energy pressure energy, total energy of fluid flow. Concept of datum pressure, velocity and total head of a fluid particle in motion. Bernoulli's theorem, general steady flow energy equation and derivation of Bernoulli's theorem, assumptions made in deriving Bernoulli's theorem, Practical application of Bernoulli's equation-venturimeter orifice-meter, pitot tube, flow nozzle- their construction, working and limitation. simple problems on venturimeter, orifice meter, pitot tube.

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- TOPIC 4. FLOW THROUGH ORIFICES AND MOUTH PIECES : Definition and types of orifices, Vena contracta, coefficient of contraction, velocity, discharge and resistance. Torricelli's theorem. Experimental determination of C_c , C_v , and C_d . Head loss due to sudden enlargement contraction and obstruction in pipe. Mouth pieces- types and their uses. Simple numerical problems discharge through orifices and pressure calculations for mouth pieces, Time of emptying vessel by orifice (cylindrical, ^{conical} Flow from one vessel to another large orifices.
- TOPIC 5. FLOW THROUGH NOTCHES AND WEIRS : Weirs and notches- definition, classification, Flow over rectangular weir with and without velocity of approach, calibration of rectangular weir, Different formulae for large rectangular weir: Time required to empty a reservoir with rectangular weir. V-notch. Advantages of triangular notch over rectangular notch. Trapezoidal notch. Broad-crest and submerged ^m weirs. Practical applications of weirs spillway and siphon spillway wege weir.
- TOPIC 6. FLOW THROUGH PIPES : Laminar and turbulent flow, Reynold number. Differentiation of laminar and turbulent flow on the basis of Reynold number, loss of head due to friction in pipes Darcy's formula and chezy's equation. Hydraulic gradient and total energy-line flow through long pipes, pipes in series and parallel, simple problems based on above formulae water hammer and its effect surge tank.
- TOPIC 7. IMPACT OF JETS: Impact of jet on flat and curved plates- stationary and moving, work done by pelton runner, velocity diagrams, simple numerical problems on axial, radial flow.
- TOPIC 8: WATER TURBINES : Meaning, classification - Impulse and reaction turbine. Comparison, Description and working of Pelton, Francis and Kaplan turbines. selection of turbines operating characteristics.

TOPIC 9. WATER PUMPS:

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Centrifugal and reciprocating- principle, construction, working, classification and layout. Comparison of centrifugal and reciprocating pumps. Specific speed selection of pumps. Use of air vessels in reciprocating pump, Indicator diagram, Horse power calculation in case of reciprocating pump. Horse power calculation in case of centrifugal pump. Operating characteristics.

TOPIC 10. MODEL ANALYSIS :

Geometric, Kinetic and dynamic similarity. Simple problems.

TOPIC 11. HYDEL POWER STATION :

Schematic diagram, function of various elements, advantage over other power stations.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MFECS)
COURSE : FLUID MECHANICS AND HYDRAULIC MACHINES.
COURSE CODE NO : M 407

LIST OF EXPERIMENTS.

1. To measure the pressure of water in pipe by--
(a) Piezometer (b) Different types ^{of} manometers.
2. To verify Bernoulli's equation.
3. To determine discharge through a given venturimeter.
4. To determine discharge through a given orifice meter.
5. To determine discharge through a pitot tube.
6. To determine C_c, C_v , and C_d for different types of orifices and mouth pieces.
7. To determine loss of head due to :-
(a) Sudden enlargement.
(b) Sudden contraction.
(c) Friction in pipes.
8. To determine discharge through different types of notches.
9. Study of Pelton wheel, Francis turbine, and Kaplan turbines.
10. To determine performance characteristics.
11. Study of reciprocating pump.
12. To determine h.p. of reciprocating pump.
13. Study of centrifugal pump.
14. To determine operating characteristics of centrifugal pump.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)
COURSE : FLUID MECHANICS & HYDRAULIC MACHINES.
COURSE CODE NO : M - 407

REFERENCE BOOKS.

1. A text book of hydraulics, fluid mechanics and Hydraulic machines by Khurmi (S.Chand & co.)
2. Fluid mechanics by M.Mancher.
3. Hydraulic & Hydraulic machines by Dr. Jagdish Lal.
4. Hydraulic & Hydraulic machines by Priyani.
5. Fluid mechanics with engineering applications by R.L. Draightbery & A.C. Jugersoll (McGraw Hills)
6. Journal of experiments in hydraulic laboratory by V.N. Rao & Hasan (New heights)
7. Fluid mechanics by Dr. M.L.Mathur (std. Publications)

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MULTIPHASE THEORY AND MODEL SYSTEM

DEPARTMENT OF AUTOMOBILE ENGG.

6609 AUTO CHASSIS-I

BASIC TECHNOLOGY COURSE, CREDITS-5

RATIONALE :

In teaching fundamental of automobile engineering chassis is essential topic. It is divided in two parts. In Part-I i.e. Auto Chassis-I we have included components of Power Transmission Train. the student will learn about clutch, Gearbox, Propeller shaft, Universal joints, Differential, Rear axle, Wheels and Tyres.

OBJECTIVES :

1. To understand the working of various types of major assemblies used in automobiles.
2. To understand the working of transmission components, such as clutch, gearbox, universal joint, propeller shaft, differential, rear axle, wheels and tyres.
3. To know the changes and new equipments in modern vehicles from control and safety point of view.

A 609 AUTO CHASSIS -I

:SCHEME OF STUDIES AND SPECIFICATION TABLE :

TOPIC NAME OF TOPIC No.	TH. HRS.	TUT. LAB. HRS.	TOTAL HRS.	K	L	A	TOTAL
1. Clutch & Gear box	20	10	30	10	8	7	25
2. Universal Joints & Propeller shaft	15	4	19	8	9	8	25
3. Differential & rear axle	14	0	14	10	7	9	26
4. Wheels & Tyres	15	0	15	10	5	7	22
Total	64	14	78	38	32	30	100

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A 408 AUTO DREVESIS -1

CONTENT OUTLINE

TOPIC 1 :

20 + 10 = 30

(A) CLUTCH

Introduction to chassis, its components & classification
Need, Purpose, function, location of clutch. different types of clutches, construction and working of friction plate type, centrifugal and electro-magnetic clutches. Their advantages and limitations. Fluid coupling, clutch layout and operating systems.

(B) GEAR BOX

Need of gearbox, Engine performance limitations, three types of external resistances, Vehicle load and tractive effort requirements, Gearbox ratios and their relationships. Different types of gearboxes, Construction and working of constant mesh, crash mesh and synchromesh gearboxes, principle and construction of synchromesh device, Gear change mechanism, Different types of gears. Introduction to automatic gearbox. Stepless transmission, Hydraulic transmission, Transfer case assembly, speedometer.

TOPIC 2 :

13 + 6 = 19

(A) UNIVERSAL JOINTS

Need of the joints, Fluctuations in angular speed, Construction and working of constant velocity joint and universal joint.

(B) PROPELLER SHAFT

Need of propeller shaft, Construction, whirling speed and its effect in design of propeller shaft, slip joints, their construction and need. Propeller shaft and riding comfort. Layout and alignment of propeller shaft.

TOPIC 3 :

16 + 8 = 24

(A) DIFFERENTIAL

Turning requirements of rear wheels, Differential, its need and purpose, Theory of sun and planet gears. Construction and working of differential, rear wheel behaviour in muddy roads, limitations of differential, differential lock. single main gear and dual main gear type.

(B) REAR AXLE

Need of rear axle, its three types: their construction and working, location of bearings.

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15 + 8 = 23

TOPIC 4 :

(A) WHEELS

Requirements of wheel, Different types, effect of Requirements of wheel, Different types, effect of diameter on vehicle performance, wheel drum and rim construction, location of brakes, Load distribution on front and rear wheels, wheel material distribution and wheel balancing, Wheel location and centring of wheels on axle.

(B) TYRES

Construction, material and specification of tyres, tubed and tubeless tyres, effect of air pressure on tyre wear, treads, their importance, patterns of tread. Cold and hot retreading, balancing of wheels and tyres. Dual tyre arrangement.

SUGGESTED LIST OF PRACTICALS

1. Study of clutch assembly regarding its construction, components and operation.
2. Study of constant Mesh, Synchromesh and sliding Mesh gearboxes regarding their construction, components and operation.
3. Study of Universal joints regarding construction, components and operation.
4. Study of propeller shaft and slip joint regarding construction and operation.
5. Study of differential regarding construction, components and operation.
6. Study of rear axle of a vehicle regarding construction, bearing location, wheel-fitting and operation.
7. Study of wheel rims and tyres their shape, size and specification.

REFERENCE BOOK :

1. Automotive Chassis and body by P.L.Kohali.
2. Basic Automobile Engg. by G.P.Nakra.
3. Motor Vehicle by Newton and Steed.
4. Automobile Chassis by P.M.Heldt.
5. Automobile Engineering (Hindi) by Prof.S.M.Pandey.
6. Automotive Mechanics by Heitner.
7. Automotive Mechanics by Srinivasan.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION

MPDS SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN AUTOMOBILE ENGINEERING

; ALL COURSES ARE COMPULSORY

V. APPLIED TECHNOLOGY

(CRED ITS - 43)

S. No.	Course code	Course	Pre Requisite	Hours/Week Th.	Pr.	Credits	Sessional Prog.		Board Exam	Theory	Practical/Viva	Total			
							Term Lab	Asst.							
work work I II															
1.	A - 501	Auto Engines-II	A-404	4	2	5	20	40	10	10	1	3Hrs 100 1 3Hrs 50 230			
2.	A- 502	Auto Chassis-II	A-405	4	2	5	20	40	10	10	1	3Hrs 100 1 3Hrs 50 230			
3.	A - 503	Auto Design, Drafting, Estimating, costing	A- 401	3	4	5	20	40	10	10	1	4Hrs 100 1 3Hrs 50 230			
4.	A - 504	Auto Workshop Practice	A - 404 A - 408	1	6	4	-	40	-	-	1	3Hrs 50 90			
5.	A - 505	Auto Business and Industrial Management	-	5	-	5	20	-	10	10	1	3Hrs 100 - - 140			
6.	A - 506	Automobile Maintenance Services & Repairs	A - 404 A - 408	2	6	5	20	40	10	10	1	3Hrs 100 1 3Hrs 50 230			
7.	A - 507	Metrology and Instrumentation	-	3	2	4	20	40	10	10	1	3Hrs 100 1 3Hrs 50 230			
8.	A - 508	Project	90CR	-	6	5	-	40	-	-	1	Viva 50 90			
9.	A - 509	Seminar/Tour/Inplant Trg./ Group Discussions etc.	-	-	-	5	-	40	-	-	1	Viva 50 90			
TOTAL CRED ITS							43CR.120	820	60	60	6	600	6+2	400	1560

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NOTE : (1) Allowed to take these courses unless clears all foundation courses.

MULTIPOINT ENTRY AND CREDIT SYSTEM

DIPLOMA IN AUTOMOBILE ENGG.

A 501 AUTO ENGINES - 11 (DIESEL ENGINES)

APPLIED TECHNOLOGY COURSE, CREDITS-5

RATIONALE :

This subject imparts basic knowledge about Diesel Engines and Accessories including cycles, constructional details, combustion process and engine performance. This will help students in learning construction, operations and performance assessment of Diesel Engines and its accessories.

OBJECTIVES :

1. To get familiar with various Engine components and systems used in C.I. Engines.
2. To acquire adequate knowledge to analyse results of power calculations.
3. To understand the combustion theory of engines to diagnose the engine faults.
4. To get acquainted with the knowledge of Supercharger, Turbocharger and Fuel pumps.
5. To get familiarize with commercial specifications of various vehicle engines.

A 501 AUTO ENGINES - 11 (DIESEL ENGINES)

:SCHEME OF STUDIES AND SPECIFICATION TABLE :

TOPIC No.	NAME OF TOPIC	TH. TUT/		TOTAL	K	C	A	TOTAL
		HRS.	LAB HRS					
1.	Cycles for Diesel Engines	12	0	12	10	-	-	10
2.	Two & four strokes Diesel Engines	10	6	16	6	6	6	18
3.	Combustion in Diesel Engines	9	6	15	6	6	6	18
4.	Fuel Injection system	13	8	21	6	6	6	18
5.	Governors Super-Chargers & Feed Pumps	12	5	17	6	6	6	18
	Engine Performance & Its Assessment.	8	7	15	6	6	6	18
Total		64	32	96	40	30	30	100

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A 501 AUTO ENGINES - II (DIESEL ENGINES)

COURSE OUTLINE

- TOPIC 1 : CYCLES FOR DIESEL ENGINE** 12 + 0 = 12

Diesel and Dual Combustion Cycles, their Air standard efficiency. Cutoff and Comp. ratio, their effect on cycle performance comparison of Otto, Diesel and dual combustion cycles. Actual cycles for Diesel Engines, Simple numerical problems based on use of formulae for calculation of Heat, Work and cycle efficiency etc.
- TOPIC 2 : TWO AND FOUR STROKE DIESEL ENGINES** 10 + 4 = 14

Basic arrangement, working principles, order of various processes, valve timing arrangements and comparison of two and four stroke Diesel Engines. Comparison of Diesel Engines and Petrol Engines.
- TOPIC 3 : COMBUSTION IN DIESEL ENGINES** 9 + 6 = 15

Introduction, basic combustion process in C.I. Engines, Diesel knock, factors responsible for Diesel knock, various types of combustion chambers, Fuels for C.I. Engines, Cetane No. and fuel additives.
- TOPIC 4 : FUEL INJECTION SYSTEM** 13 + 8 = 21

Introduction, Air blast and Mechanical injection, study of jerk pump regarding requirements, functions basic principle, constructional details and working of the pump. fuel quantity variation by pump plunger. Injector, its functions, construction and working of injector assembly. Types of nozzles. Construction of platten pintle and simple hole type nozzles.
- TOPIC 5 : GOVERNORS SUPERCHARGERS AND FEED PUMPS** 12 + 5 = 17

 - (A) Need of governor, functions of governor, basic principle, construction and working of Mechanical, Pneumatic and combine Mech-Pneumatic Governor.
 - (B) Need of feed pumps, function of feed pump, construction and working of diaphragm and plunger type feed pump.
 - (C) Need of Superchargers, Basic principle and construction and working of centrifugal, Turbo and blower type superchargers. Advantages and Disadvantages of supercharged engines. Advantages & Disadvantages of turbo charged engine.
- TOPIC 6 : ENGINE PERFORMANCE AND ITS ASSESSMENT** 8 + 7 = 15

I.H.P., B.H.P., Mechanical Efficiency, Indicated and Brake thermal efficiency. Morse Test, Specific fuel consumption, Heat balance, Volumetric efficiency, engine performance curves, their interpretation and use. Simple Numerical problem based on use of formula only.

SUGGESTED LIST OF PRACTICALS

1. Study of two stroke and four stroke diesel engines.
2. Study of fuel injection pump assembly regarding construction, operation and various components.
3. Study of Injector assembly.
4. Study of different types of Gaskets.
5. Study of any type of super charger used on diesel engine.
6. Collection of engine construction and performance data.

REFERENCE BOOK :

1. I.C. Engines by Sharma & Mathur.
2. Automobile Engines by Dr. Kripal Singh.
3. Automobile Engines by A.W. Judge.
4. Carburetor and fuel injection system by A.W. Judge.
5. High speed combustion engines by P.H. Heldt.
6. Thermodynamics applied to heat engine by E.H. Lewnt.
7. Automobile Engg. by Prof. S.M. Pandey.

MULTIPOINT ENTRY AND CREDIT SYSTEM

DIPLOMA IN AUTOMOBILE ENGG.

A 502 AUTO CHASSIS-II

APPLIED TECHNOLOGY COURSE, CREDITS-5

RATIONALE :

In teaching fundamentals of automobile Engineering Chassis is essential topic. It is divided in two parts. In Part-II i.e. Auto Chassis-II, we have included other chassis components and systems such as steering suspension, Brakes and Body.

OBJECTIVES :

1. To understand working of different types of Front axles, Steering system, Suspension system and braking system.
2. To understand the various elements of Body structure.

A 502 AUTO CHASSIS - II

SCHEME OF STUDIES AND SPECIFICATION TABLE :

TOPIC NAME OF TOPIC No.	TH. HRS.	TUT/ LAB HRS	TOTAL HRS.	K	C	A	TOTAL
1. Steering System	16	0	16	10	0	7	25
2. Suspension System	14	7	21	8	10	7	25
3. Brakes	16	8	24	7	8	10	25
4. Chassis and Body	18	9	27	10	0	7	25
Total	64	32	96	35	34	31	100

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A 502 BUCH (CH221) 11

CONTENT OUTLINE

TOPIC 1 : STEERING SYSTEM

16 + 8 = 24

Need of steering, its purpose, condition of true turning principle and operation of Davis and Ackermann steering mechanism, their advantages and limitations. Construction and operation of basic steering system including study of various components. Construction and working of steering gearboxes. Steering geometry popular caster, Camber, King pin inclination, toe in, toe out, wheel alignment centre point steering, steering lock, effect of tyre pressure on steering, side slip, introduction to power steering. Collapsible steering, layout of steering system and driver seat.

TOPIC 2 : SUSPENSION SYSTEM

14 + 7 = 21

Purpose, various elements of suspension system spring and unsprung masses and their effect on human comfort, principle and construction of Helical, Leaf and volute springs, spring deflection, Spring stiffness, Energy stored, Shackles Principle and construction of torsion bar spring. Principle of shock absorbers, construction and working of Telescopik shock absorber. Study and comparison of different types of front axle suspension systems. Stabilizers, Hotchkiss drive & Torque tube drive. Anti squat and antidive systems, Roll centre, coupling of suspension, passive and active suspension, suspension geometry.

TOPIC 3 : BRAKES

16 + 4 = 20

Purpose, Transmission and parking brakes, Construction and working of (a) Internal Expanding Shoe-brakes (b) Master Cylinder (c) Tandem Master Cylinder, (d) Exhaust brakes (e) Disc brakes (f) Air Pressure and Vac assisted servo brakes. Study of a car brake system with study of components. Brake lining materials, Brake fluid characteristics. Leading and trailing shoes, Self energised brakes, Brake performance and testing. Effect of front and rear load distribution on brake performance. dual brake circuit, anti skid braking system, brake system layout and brake operating systems.

TOPIC 4 : CHASSIS AND BODY

18 + 9 = 27

Various types of vehicles, chassis frame principle and constructional details. Unified and frameless construction, vehicle inspection check. Design considerations for car body. Car body construction and finishing (Material requirement and body parts identification and function of body pressings, body build, paint and sealing sound deadening, corrosion in car bodies, basic body repair principles). Chassis & body layout & various considerations.

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SUGGESTED LIST OF PRACTICALS

1. Study of steering system of vehicle regarding its components, construction and operation.
2. Study of various elements of steering geometry of a vehicle such as caster, camber, kingpin inclination, toe in, toe out, etc. steering lock etc.
3. Study of carriage spring assembly, its location, components, construction and operation.
4. Study of shock absorber including location, construction and operation.
5. Study of car braking system regarding its components, construction and operation.
6. Study of chassis frames of different vehicles with respect to layout, location and function of various major visible components.

REFERENCE BOOK :

1. Automotive Chassis and body by P.L.Kohali.
2. Basic Automobile Engg. by G.P.Nakra.
3. Motor Vehicle by Newton and Stord.
4. Automobile Chassis by P.H.Heldt.
5. Automobile Engg. (Hindi) by Prof.S.M.Pandey
6. Automotive Mechanics by Holtorf
7. Automotive Mechanics by Shanmugasan

Programme : Diploma in Automobile Engineering
Course : Auto Design Drafting, Estimating & Costing
Course Code : A 503
Pre-Requisite : A 401 & 405

RATIONALE :

Automobile design is an important subject, in order to give an exposure of design aspect of various automobile component. Diploma passouts. They shall perform design related activities under guidance of design engineers. In service station, while maintaining or repairing vehicle, may times they face design related problems. It will help them to understand such problems. This subject will give them an idea of how to approach in designing the various components.

For better communication and effective working in Automobile industries, Motor Garages, service station, transport departments and other related fields the knowledge of auto drafting is very essential.

The student should well conversed with drawing preparation process, drawing development process and drawing modification process.

The other main area of learning is to use the drawing effectively for industrial purpose that is drawing interpretation and exploration and to implement the practices offered by the Automobile Industry.

Further, it is very much necessary for Automobile student to have a basic knowledge of Estimating and costing of repair work. They should know the cost of repair of different Automobile units. Hence introduction of this part will help to student to know elementary knowledge of repair cost.

OBJECTIVES:

1. To get conversed with basic concept of design practices to be applied to automobile components.
2. To understand the various forces which action major engine and chassis component.

3. To calculate the important dimensions of various engine and chassis components.
4. To develop skill of studying the drawing and sketches of various automobile components and systems.
5. To be well conversant with basic knowledge of drawing specification and details.
6. To understand the development & modification of various component drawings.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

Programme	: Diploma in Automobile Engineering
Course	: Auto Design Drafting Estimating & Costing
Course code	: A - 503
Pre-requisite	: A - 401 & A-405

SCHEME OF STUDIES

S. No.	Topic	Lect.Hrs	Pract/Lab.Hrs.	Total Hrs.
<u>SECTION - A</u>				
1.	Introduction	02	0	02
2.	Design of Engine parts	12	0	12
3.	Design of Clutches	08	0	08
4.	Design of Gear box	08	0	08
5.	Design of Propeller Shaft axi Frames.	05	0	05
6.	Design of Suspension System	05	0	10
7.	Design of Brakes	10	0	11
8.	Performance of vehicle	11	0	11
<u>Section - B</u> <u>Auto Drafting</u>				
1.	Lay outs	06	0	06
2.	Free hand sketch practice	08	0	08
3.	Assembly drawing	28	0	28
<u>Section - C</u> <u>Estimating and costing</u>				
1.	Estimating	05	0	05
2.	Costing	05	0	05
3.	Cost estimating	15	0	15
Total :		128	0	128

CREDITS :- 05

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COURSE OUT LINE

- 1.0 INTRODUCTION 02 Hrs
- 1.1 Define auto design
 - 1.2 Explain the aspects of auto design.
 - 1.3 Give a classification of auto design.
 - 1.4 State the requirements of designing of elements.
 - 1.5 Explain the general procedure of design.
- 2.0 DESIGN OF ENGINE PARTS 12 Hrs
- 2.1 Design the piston for I.C. Engine.
 - 2.2 Design the piston rings.
 - 2.3 Understand the design of the piston pin.
 - 2.4 Design of crank shaft.
 - 2.5 Understand the design of crank pin.
 - 2.6 State the function of fly wheel
 - 2.7 Design the connecting rod assembly
 - 2.8 Solve simple problems.
- 3.0 DESIGN OF CLUTCHES 08 Hrs
- 3.1 State the different types of friction clutches.
 - 3.2 State the requirement of a clutch.
 - 3.3 Design the equation for the power transmitted through single plate clutch assembly for :-
(a) Uniform wear (b) Uniform pressure.
 - 3.4 Solve the problems for finding out the dimensions of clutch.
 - 3.5 Design the equation for power transmitted through multiplate clutch.
 - 3.6 Solve simple problems.
 - 3.7 State the equation of centrifugal clutch.
 - 3.8 Solve simple problems.
- 4.0 DESIGN OF GEAR BOX 08 Hrs
- 4.1 State the factor to be considered for designing a gear drive.
 - 4.2 Explain the Lewis equation.
 - 4.3 Understand about width of face.
 - 4.4 Understand how to find out gear ratio and number of teeth of different gears.

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- 4.5 Solve the problems on sliding mesh mesh gear box which involves finding teeth, distance between the main shaft and velocity ratio with simple sketch.

5.0 DESIGN OF PROPELLER SHAFT AND FRAMES

- 5.1 Explain the difference between hollow shaft and solid shaft.
- 5.2 Know the design of solid circular shaft.
- 5.3 Know the design of hollow shaft.
- 5.4 Solve simple problems on propeller shaft for critical speed and torque transmitted by the shaft (use only formula)
- 5.5 State the difference types of frames.
- 5.6 Understand the shear force and bending moment diagrams of frames.

6.0 DESIGN OF SUSPENSION SYSTEM

05 Hrs

- 6.1 State the different types of suspension system.
- 6.2 Mention the types of suspension springs.
- 6.3 Understand the design of laminated leaf springs.
- 6.4 Understand the design of coil spring
- 6.5 State simple problems.

7.0 DESIGN OF BRAKES

10 hrs

- 7.1 State the different types of brakes.
- 7.2 State the expression for Internal expanding shoe brake.
- 7.3 Understand the total braking torque.
- 7.4 Explain braking efficiency.
- 7.5 Explain stopping distance
- 7.6 State the operation in braking of vehicles.
(a) Brakes applied to front wheel.
(b) Brakes applied to rear wheel.
(c) Brakes applied to all the four wheel.
- 7.7 Understand the calculation mean lining pressure and heat generated during braking operation.
- 7.8 Understand the calculation of centrifugal force when braking the vehicle while moving along a curved path.
- 7.9 Solve simple problems.

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9.0 PERFORMANCE OF VEHICLE

- 9.1 Explain the power required for propul. state the equation.
- 9.2 Explain the different types of motion of veh.
- 9.3 State the equation of wind resistance, rolling resistance and gradient resistance.
- 9.4 Explain friction & friction effort.
- 9.5 Explain draw bar pull.
- 9.6 Explain acceleration of gradability.
- 9.7 State the expression to calculate the equivalent weight of the vehicle.
- 9.8 State the expression for distribution of weight in,
 - 9.8 (a) Three wheel vehicles.
 - 9.8 (b) Four wheel vehicles.
- 9.9 Solve simple problems (based on tractive resistance, such wind, road at gradient resistance).

REFERENCE BOOKS

1.	Auto Design	:	R.B. Gupta
2.	Automobile Mechanics	:	Dr. N K Giri
3.	Auto Design problems	:	K M Agarwal
4.	Machine design correction	:	Trikha
5.	Theory of Machines	:	Kurmi R S
6.	Machine design	:	R K Jain
7.	Design of M/c elements	:	Abdulla shariff.
8.	Machine design	:	Pandey & shali.

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SECTION - B
AUTO DRAFTING

- 1.0 LAY OUTS 06 hrs
 - 1.1 Defination of lay outs.
 - 1.2 Lay outs of service station (Including fuel pump)
 - 1.3 Lay outs of Garages (Including major repairs and body construction sections).
- 2.0 FREE HAND SKETCH PRACTICE 08 hrs
 - 2.1 Free hand sketches of Automobile components. Such as radiator, Air cleanes, Fuel Filter, Shock absorber, oil Filter, Muffler, V.C. Mechanical, Fuel pump, Spark plug, valve aclusting mechanism.
- 3.0 ASSEMBLY DRAWING OF 28 hrs
 - 3.1 Fuel Injector
 - 3.2 Piston & connecting rod.
 - 3.3 Single plate clutch.
 - 3.4 Multiplate clutch.
 - 3.5 Leaf springs.
 - 3.6 Shackle.
 - 3.7 Master Cylinder.
 - 3.8 Wheel cylinder.
 - 3.9 S.U. Charburator.
 - ~~4.0 Fuel Injector.~~

REFERENCE BOOKS

- 1. Auto Engineering Drawing : R.B. Gupta
- 2. Automative Machine drawing : Laxmi Narayan & Mathur

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SECTION - "C"

ESTIMATING AND COSTING

- 1.0 ESTIMATING 05 hrs
- 1.1 Introduction to estimation.
 - 1.2 Define estimating and mention elements of estimate
 - 1.3 Mention the aim of estimating.
 - 1.4 Mention the procedure of estimating.
 - 1.5 State the constituents of estimation.
- 2.0 COSTING 05 hrs
- 2.1 Define costing
 - 2.2 State the objectives and aim of costing
 - 2.3 State the difference between estimating and costing
 - 2.4 Explain the elements of a cost.
 - 2.5 Mention the components of cost.
 - 2.6 What are the different methods of cost and allocation.
 - 2.7 Solve simple problems on components of cost
 - 2.8 Define depreciation
 - 2.9 Explain the depreciation fund.
 - 2.10 Explain the causes of depreciation.
 - 2.11 Define obsolescence.
 - 2.12 State the methods of calculating depreciation.
- 3.0 COST ESTIMATING 15 hrs
- 3.1 Estimate the cost of over hauling of major assemblies of Automobile Vehicle (Engine, clutch, Gear box, Differential, Brake)
 - 3.2 Estimate the cost of body repair of a car.
 - 3.3 Estimate the cost of spray painting of a car.
 - 3.4 Estimate the cost of retreading of resoling of tyres.
 - 3.5 Estimate the cost of water servicing and high pressure lubrication.

REFERENCE BOOKS

- 1. Mechanical estimating and costing : T.R. Banga & S C Sharma
- 2. Mechanical estimating and costing : T.T.T.I. Madras
- 3. Mechanical estimating and costing : Hari Prasad, Mathur & Kishori Lal

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MULTIPOINT ENTRY AND CREDIT SYSTEM

DIPLOMA IN AUTOMOBILE ENGG.

A 504 AUTO WORKSHOP PRACTICE

APPLIED TECHNOLOGY COURSE, CREDITS-4

RATIONALE :

This subject is very important for technician who has to work mostly in an automotive industry, this subject gives knowledge of the students with regards to many kinds of equipments used in Auto Industry major thrust is to expose the students to acquire practical skills in handling, operating and studying the various measuring tools and gauges available in workshop. This enables technicians to perform well in many kinds of testing work in auto industry.

OBJECTIVES :

1. To understand the handling and application of various measuring and testing tools.
2. To conduct simple tests and measurements by various tools and gauges.
3. To get familiar with motor workshop activities.

A 504 AUTO WORKSHOP PRACTICE

SCHEME OF STUDIES:

TOPIC NAME (IF THE TOPIC)	TH. HRS	TUT/LAB HRS	TOTAL HRS
1. STUDY, HANDLING AND USE OF VARIOUS TESTING/MEASURING TOOLS.	2	19	21
2. CONDUCTING SIMPLE EXPERIMENTS BY VARIOUS TOOLS AND GAUGES	2	19	21
3. MOTOR WORKSHOP PRACTICE	8	20	28
4. STUDY, HANDLING AND USE OF VARIOUS REPAIR TOOLS	2	19	21
5. STUDY OF SERVICE STATION EQUIPMENTS AND OPERATION PRACTICE	2	19	21
TOTAL	16	76	112

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A 504 AUTO WORKSHOP PRACTICE

TOPIC 1 : STUDY, HANDLING AND USE OF VARIOUS MEASURING AND TESTING TOOLS 2 + 19 = 21

Such as Vernier Callipers, Screw gauges, Micrometers, Round and leaf feeler gauges, Dial gauges, V-blocks, Surface plate, Revolution counter, Speedometer, Continuity tester, Multimeter, Compression gauge, Valve tightener, Valve tester, Meger, tyre pressure gauge, Bore gauge, Spring rate tester, tachometer, Sheet gauge, Wire gauge, bevel protector, Battery tester etc.- Study of workshop tools and practice to use them.

TOPIC 2 : CONDUCTING SIMPLE TESTS AND MEASUREMENTS, BY VARIOUS TOOLS/GAUGES 2 + 19 = 21

Such as - Voltage and current measurement, clearance measurement, end play and end play measurement, Engine vacuum measurement, tyre pressure measurement, Compression measurement, continuity and short circuit tests, measurement for crankshaft and cam shaft bend, piston liner clearance, valve tappet clearance, connecting rod flatness checkup, battery level checkup, Specific gravity measurement, battery cell voltage measurement etc.

TOPIC 3 : 8 + 20 = 28

- (A) The students will perform various jobs in workshop under guidance of teachers (miscellaneous works to get familiar with motor workshop activities).
- (B) The Students will learn how to decide/plan for any test measurement, selection of measuring tools and gauges and their use in solving vehicle problems in workshop.

TOPIC 4 : STUDY OF REPAIR TOOLS AND THEIR USE 2 + 19 = 21

Such as double end spanner set, ring spanner set, box spanner set, various types of hammers, chisel set, drift set, punch set, pipe wrench, pliers, cutters, circlip pliers, S.P. spanner, wire brush, ring expander, socket wrench set, hacksaw and hacksaw blades, various types of files, Torque wrench etc.

TOPIC 5 : STUDY OF SERVICE STATION EQUIPMENTS AND THEIR OPERATION PRACTICE 2 + 19 = 21

Such as Air compressor, Spark plug tester, Tyre inflater, Hydraulic jack, Screw Jack, Dug, Engine oil dispenser, Gear oil dispenser, oil spray gun, car washer with gun drain pans and drains, Drilling machines, grinder, Tyre changer, tube vulcanizing m/c H.P. Air operated grease gun, wheel braces, Toe in gadge, tune up equipment, battery charger, lathe, Wooden horses, Gas and Arc welding plants, Lathe m/c, Degreasing plant, timing light, Tap and die set, Spray paint gun F.I.P. Testing m/c., Injector tester, Chain pulley block, Portable hoist, Vices, Stud puller valve grinder, Valve seat facer etc.

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SUGGESTED LIST OF PRACTICALS AND PRACTICES

1. Demonstrations and use of various tools, instruments and equipments used in Auto workshop.
2. Practice for wheel rotation and repairing of punctured tubes.
3. Practice for brake adjustment and air bleeding.
4. Practice to fill water and coolant in radiator.
5. Practice to wash the vehicle and its various components.
6. Practice to clean various components in kerosene.
7. Practice to jackup the vehicle.
8. Practice toward safety while working.
9. Practice for Auto workshop housekeeping.
10. Measurement of valve tappet clearance.
11. Measurement of piston liner clearance.
12. Measurement of piston ring clearance.
13. Measurement of spark plug gap.
14. Measurement of distributor contact point gap.
15. Measurement of brake liner wear and friction plate liner wear.
16. Driving practice on motor vehicle.
17. Wheel tyre air pressure measurement.
18. Battery electrolyte - checkup of level and specific gravity.
19. Cell voltage checkup.
20. Oil level checkup in engine, gearbox, differential etc.
21. Lubrication of wheel hub bearings.
22. Tightening of fan belt.
23. Practice for wire connection.
24. Visit to an automobile workshop to learn how the above mentioned and other similar activity are performed.

Programme : Diploma in Automobiles Engineering
 Course : Auto Business and Industrial Management
 Course code : A - 505
 Pre-Requisite : NIL

SCHEME OF STUDIES

S. No.	Topic	LEC.HRS	Prac/Lab. Hrs	Total Hrs.
<u>SECTION 'A' (AUTO BUSINESS)</u>				
1.	Meter Trade in India	05	0	05
2.	Vehicle Marketing and sales	18	0	18
3.	Fuel and oil sales	08	0	08
4.	Service station	10	0	10
5.	Garage	06	0	06
6.	Micellaneous	14	0	14
<u>SECTION 'B' (INDUSTRIAL MANAGEMENT)</u>				
1.	Principles of Management	10	0	10
2.	Production, planning and control	07	0	07
3.	Store and store function	08	0	08
4.	Staffing	10	0	10
TOTAL		96	0	96

CREDITS : 05

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

PROGRAMME	:	DIPLOMA IN AUTOMOBILE ENGINEERING
COURSE	:	AUTO BUSINESS AND INDUSTRIAL MANAGEMENT
COURSE CODE	:	A - 505
PRE-REQUISITE	:	NIL

COURSE CONTENT OUTLINE

TOPIC I	:	<u>MOTOR TRADE IN INDIA</u>	05 hrs
1.1		Brief history of Automobile trade in India before and after independence.	
1.2		Modern trend in the development of Automobile Industries in India.	
1.3		Manufacturers of different types of two-wheeler, 3-wheeler, LMV & HMV in India.	
TOPIC II	:	<u>VEHICLE MARKETING & SALES</u>	18 hrs
	A.	VEHICLE SALES:	
2.1		Distributor, Dealership, Sub dealers.	
2.2		Qualification of distributor & dealers, Duties.	
2.3		Procedure for dealership	
2.4		Agreement between manufacturer & Distributor.	
2.5		Agreement between distributor and dealers.	
	B.	PURCHASING:-	
2.6.		Duties of purchasing officer,	
2.7		Tender, purchase order, Hire purchase	
2.8		Procedure for purchasing second hand vehicle.	
2.9		Factors to be considered before purchasing	
2.10		VEHICLE AUCTION	
	C.	AUTO SALES:-	
2.11		Salesmanship,	
2.12		Different techniques of sales,	
2.13		Sales after service	
2.14		Auto Consultant,	
2.15		Market research	
2.16		Advertising & publiciting	
2.17		Forecasting	
2.18		Factors influencing Automobile Customer behaviours,	(208)
2.19		Buying decision, processes and types of buying behavior	

TOPIC - III FUEL AND OIL SALES 08 hrs

- 3.1 Installation of pumps
- 3.2 layout of petrol station
- 3.3 Fuel purchase.
- 3.4 Procedure to get delivery
- 3.5 Oil Dispensing units.
- 3.6 Sales Records
- 3.7 Bonus to station attendant.
- 3.8 Petroleum regulation act.
- 3.9 Weights and measures act.
- 3.10 Standard grading of oils & greases

W.P.S. J

TOPIC - IV SERVICE STATION 10 hrs

- 4.1 Defination of service station
- 4.2 Factors to be considered before selecting a site for service station
- 4.3 Factors to be considered before starting a service station, such as type, capital, location, building, labour, completion, water & electricity, Prospects.
- 4.4 Authorised service station, Procedure for starting authorised service station.
- 4.5 Layout of service station for maintaining 20,50,100, vehicle per month.
- 4.6 Records maintaining in service station, such as Job card, inspection card, vehicle history card etc.
- 4.7 Staff required for service station.
- 4.8 Qualification of foreman, duties & responsibilities of foreman.
- 4.9 Factors responsible for the quality of service.

TOPIC - GARAGE : 06 hrs

- 5.1 Defination & types of Garages
- 5.2 Location of Garage
- 5.3 Factors to be consider before starting a Garage.
- 5.4 Requirement of the Garage.
- 5.5 Layout of Garage (Including major overhauls)
- 5.6 Difference between service station & Garage.

Contd...

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TOPIC - VI MISCELLANEOUS

14 hrs

A) INSURANCE

Business risk, Driving risk, and Garage risk policies, points policies, Third party risk.

B) Vehicle tests, Testing Authorities and test procedures, salient features of Motor vehicle act and Motor vehicle rules.

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SECTION - B

INDUSTRIAL MANAGEMENT

TOPIC : 1 PRINCIPLES OF MANAGEMENT

10 hrs

- 1.1 Define Management
- 1.2 Classification of Management, Top level management, Middle level management & low level Management
- 1.3 State duties & responsibilities of Management.
- 1.4 Functions of Management
- 1.5 Define planning.
- 1.6 Identify its objectives.
- 1.7 Define its organising and staffing.
- 1.8 Explain the steps involved in setting up an organisation.
- 1.9 Name the types of organisation.
- 1.10 Explain the line and staff type of organisation with chart.
- 1.11 State its advantages and disadvantage.
- 1.12 Define directing.
- 1.13 Name the types of administrative communication.
- 1.14 Explain the basic concept of communication.
- 1.15 Define Motivation.
- 1.16 Explain the Importance of Motivation.
- 1.17 Define Leadership
- 1.18 Name the types of leadership.
- 1.19 State the good qualities of a leader.
- 1.20 Define controlling.
- 1.21 State the control process.
- 1.22 Compare the actual result to the standard.
- 1.23 Explain the corrective action taken.

TOPIC - 2 PRODUCTION, PLANNING AND CONTROL (P P C)

07 hrs

- 2.1 Define P.P.C.
- 2.2 State the major functions of PPC
- 2.3 Define pre-planning
- 2.4 Define forecasting
- 2.5 Explain sales forecast
- 2.6 Explain sales forecast technics
- 2.7 Estimate based on past experience.
- 2.8 Explain trend lines and correlation.

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TOPIC : 3 STORES AND STORES FUNCTIONS

08 hrs

- 3.1 State the purpose of store keeping.
- 3.2 Identify the duties of store keeper.
- 3.3 Location of store, centralised and de-centralised stores.
- 3.4 Explain the method of storing storage of inflammable items.
- 3.5 Identify the bin card, Indent on store & material returned note.
- 3.6 State the advantages of good storing.
- 3.7 Describe the store recording.

TOPIC : 4 STAFFING

10 hrs

- 4.1 Definition of staffing
- 4.2 Necessity of staffing
- 4.3 Selection and selection process or technique
- 4.4 Duties and responsibilities of following staff
 - (a) Workshop superintendent
 - (b) Foreman/supervisor
 - (c) Skilled and unskilled mechanics.
 - (d) Receptionist
 - (e) Accountant and clerk
- 4.5 Employees safety

(0)

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COURSE : Auto Business and Industrial
Management

COURSE CODE: A-505

REFERANCE BOOKS

1. M.T.O. & S.S.L. by Milburn
2. Industrial Engg. & Management by O.P. Khanna
3. Industrial organisation and
Engineering Economics.
By. T.R. Banga & S.C. Sharma
4. Industrial management By . K.K. AHUJA
5. Principales of Management by Kazmier
6. Central motor vehicle Rules
7. Motor vehicle Act.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING
COURSE : AUTOMOBILE MAINTENANCE SERVICE AND REPAIR
COURSE CODE : A- 506
PRE-REQUISITE : NONE

RATIONALE :

Automobile maintenance is a key part of smooth running & optimum life of an automobile. This course is prepared with the aim to develop proper way to maintain a vehicle and to develop the maintenance culture in the students. It consists of topics like trouble shooting and remedies, types of maintenance, safety precautions, types of wears and methods repairs which will help the students to grasp the correct maintenance procedure and to guide the other automobile users.

OBJECTIVE :

1. To know the importance of procedures of maintenance.
2. To develop the skill of maintenance of an automobile in scientific way to get the smoother operation and optimum life of an automobile.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

Programme : Diploma in Automobile Engineering
 Course : Automobile Maintenance service and Repairs
 Course code : A - 506
 Pre-requisite : A - 404
 A - 405

S. Topic No.	Lect.Hrs	Pact/Lab Hrs	Total Hrs
1. Introduction	08		
2. Service and Maintenance of two wheelers	14		
3. Servicing and Maintenance of four wheelers.	25		
4. Automobile Repair	06		
5. Types of wear and method of repair.	08		
6. Preparing of Automobile for repair	06		
7. Repairs of tyres and tubes	08		
8. Body Repairs	05		
9. Miscellaneous	11		
Total :	91	37	128

CREDITS - 05

COURSE : AUTOMOBILE MAINTENANCE, SERVICE & REPAIRS.

COURSE CODE : A - 506

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COURSE

CURRICLE

- 1.0 INTRODUCTION: Maintenance & service 08 hrs
- 1.1 Define Maintenance
- 1.2 State the different types of maintenance
Preventive maintenance, Operative maintenance and break down maintenance.
- 1.3 Explain the procedure for driving vehicles, daily maintenance, weekly maintenance, periodic maintenance and seasonal maintenance.
- 1.4 Explain the advantages of good maintenance.
- 1.5 Define the term servicing
- 1.6 Explain the necessity of servicing.
- 1.7 State the types of servicing.
- 1.8 Explain the types of servicing.
- 1.9 Explain the procedure of cleaning and lubrication of various components of vehicle.
- 1.10 Diagnosing of engine condition by using compression gauge, vacuum gauge, exhaust gas analyses, oscillo scope etc.
- 1.11 Explain the decarbonising of engine.
- 1.12 Explain the major over hauling of engine.
- 1.13 *Introduction to decision trees* WJ S
- 2.0 SERVICING AND MAINTENANCE OF TWO WHEELERS 14 hrs
- 2.1 Explain the maintenance schedules.
- 2.2 Explain the maintenance schedules of mopeds.
- 2.3 Explain the maintenance schedule of scooter.
- 2.4 Explain the maintenance schedule of motor cycle.
- 2.5 State the general faults, causes and remedise of two wheelers.
- 3.0 SERVICING AND MAINTENENCE OF FOUR WHEELERS 25 hrs
- 3.1 Explain the maintenance schedule of Car, Ambassador, } LHR
- 3.2 Explain the maintenance schedule of Jeep, Mahindra, } e
- 3.3 Explain the maintenance schedule of Matador, LCV
- 3.4 Explain the maintenance schedule of Truck (TATA)
- 3.5 Explain the servicing of Dynamo.
- 3.6 Explain the servicing of lead acid battery.
- 3.7 Explain the servicing of self-starter.

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- 3.8 Explain the servicing of Alternator
- 3.9 Explain the servicing of Injector.
- 3.10 Explain the servicing of fuel injection pump.
- 3.11 State the troubles, causes, remedies of engine.
- 3.12 State the troubles, causes, remedies and explain the servicing of carburettor.
- 3.13 State the trouble, causes and remedies and the servicing of clutch.
- 3.14 State the trouble, and remedies, causes and the servicing of gear box.
- 3.15 State the trouble, causes, and remedies and servicing of universal joint.
- 3.16 State the trouble, causes and remedies and servicing of differential.
- 3.17 State the trouble, causes, remedies and servicing of break system, Hydraulic, servo and air brakes.
- 3.18 State the trouble, causes, remedies and servicing of steering.
- 3.19 Explain the servicing of suspension system.
- 3.20 Explain the necessity and procedure of wheel alignment.

4.0 AUTOMOBILE REPAIR.

06 hrs

- 4.1 Explain repair system.
- 4.2 Explain over hauling, minor and major over hauling of engine.
- 4.3 Running repair methods.

5.0 TYPES OF WEAR AND METHOD OF REPAIRS.

08 hrs

- 5.1 Define the term wear.
- 5.2 Classification of wear, natural wears and accidental wears.
- 5.3 Causes of wears, ways to increase service life of component.
- 5.4 Various methods of repairs such as
 - a) Machining.
 - b) Metallization
 - c) Electroplating.
 - d) Brush plating.

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- 5.5 Application of adhesive composition.
- 5.6 Repairing of partes of by welding.
- 5.7 Repairing of parts by electric resistance machining.
- 6.0 PREPARING OF AUTOMOBILE FOR REPAIR. 06 hrs
- 6.1 Automobile repair process.
- 6.2 Acceptance of automobile for repairs.
- 6.3 Disassembly work.
- 6.4 Cleaning and degreasing of component.
- 6.5 washing.
- 6.6 Checking and storing of component.
- 6.7 Maching of components.
- 6.8 Fundamentals of assembly of mating components.
- 7.0 REPAIRS OF TYRES AND TUBES. 08 hrs
- 7.1 State the causes and remedies of tyres.
- 7.2 State the necessity and procedure of tyre rotation.
- 7.3 Explain the procedure of tyre retreading and resoling.
- 7.4 Explain the procedure of mending a puncture.
- 8.0 BODY REPAIRS 05 hrs
- 8.1 Explain the procedure of vehicle body repairs.
- 8.2 Explain the procedure of spray painting of a car.
- 9.0 MISCELLENEOUS 11 hrs
- 9.1 State the factors of governing the fuel Economy.
- 9.2 Explain the factors to be consider for crapping the vehicle.
- 9.3 Explain the prodedure of wheel balancing.
- 9.4 EX lain the procedure to trace out the faults using engine analysis.
- 9.5 Explain the use of degreasing plant and necessity of crack detector.
- 9.6 Explain the procedure of engine tuner.

REFERENCE BOOKS

- | | | | |
|----|------------------------|---|---------------|
| 1. | Automobile Engineering | - | R B Gupta |
| 2. | Automobile Engineering | - | G.B.S. Narang |
| 3. | Automobile Engineering | - | C.B. Nakra |

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4. Diesel engine ~~maneuver~~ manual WV - Black
5. Automobile maintenance and trouble shooting. Venk
6. Work shop ~~managers~~ manuals WV of Indian-
Vehicle,
TATA, LEYLAND, MAHINDRA,
SAJAJ CHETAK, HERCHONDA, CD- 100,
YAMAHA, KINETIC HONDA, TVS SUZAKI,
TVS - 50, AMBASSADOR, MARUTI -800.
7. Automobile maintenance - M/R publication
and repairs MOSCOW
- Automobile Mechanics - Crouse
-

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PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING
COURSE : AUTOMAINTE NANCE SERVICE & REPAIR
COURSE CODE: A 506

SUGGESTED LIST OF PRACTICALS

37 hrs

1. Demonstration of various Km internal services.
2. Practice of compression and vaccum gauge.
3. Measurement of Emission through exhaust gas analyser.
4. Practice for finding faults, repair and Maintenance of any two wheeler.
5. practice for routine maintenance of any four wheeler.
6. Servicing & repairing of an Alternater
7. Servicing & repairing of an self starter,
8. Engine tune up by engine analyser.
9. Practice of wheel balancing machine.
10. Practice of major overhauling of any available engine.
11. Make a chart of trouble, causes and remedies of clutch, gear box and differential.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)
COURSE : METROLOGY AND INSTRUMENTATION
COURSE CODE NO : M - 404/A-507

R A T I O N A L E.

This subject has earned its importance in the curriculum due to major activities of inspection department. Today in almost all factories search is going on for answers to the problems of production, materials, design, improved machines, better way of making and assembling parts. Many of these answers are provided by Metrology through accuracy in production, high standards of inspection, new and improved use of instrument etc. Metrology, therefore, is a fast growing, changing and increasingly significant field.

The subject is based on two sequential steps i.e. introducing concepts, and providing practice in applying/interpreting these concepts.

After going through this subject the technicians would be able to develop skill in using, selecting and servicing the instrument. Also by actually using the equipment, the technician will appreciate the suitability of method or instrument for any measurement and to develop the general technique of measurement.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPDCS)
 COURSE : METROLOGY AND INSTRUMENTATION
 COURSE CODE NO : M - 404 / A - 507
 equivalent M - 503
 PRE-REQUISITE : 203

SCHEME OF STUDIES.

<u>S.No.</u>	<u>TOPIC</u>	<u>THEORY HRS.</u>	<u>PR.HRS.</u>	<u>TOTIL HRS.</u>
1.	Inspection.	03	-	03
2.	General Measurement concept.	04	-	04
3.	Linear Measurement.	06	06	12
4.	Angular Measurement.	06	04	10
5.	Straightness, Flatness, Squareness and Roundness Testing.	08	04	12
6.	Surface Roughness.	07	02	09
7.	Screw thread measurement.	04	02	06
8.	Gear measurement.	04	04	08
9.	Limit Gauges.	06	04	10
10.	Transducers.	04	-	04
11.	Temperature Measurement.	04	02	06
12.	Pressure Measurement.	04	02	06
13.	Flow Measurement.	04	02	06

TOTAL		64	32	96

CREDITS - 5

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MFECS)

COURSE : METROLOGY AND INSTRUMENTATION

COURSE CODE NO : M- 404/A-507

PRE-REQUISITE : 203

C O N T E N T S.

TOPIC 1. INSPECTION :

Meaning and application of inspection, Daily life example of inspection, concept of inspection as applied to daily life and industries. Effect of absence of inspection in an industry. Classification of inspection function, meaning and advantages of each concept of inspection applied to metrology. Definition/meaning of precision, accuracy and error. Differentiation between precision measurement in industry, Meaning of standard inspection and specifications, Relationship between cost and accuracy, Interchangeability and selective assembly.

TOPIC 2. GENERAL MEASUREMENT CONCEPT : Limits, fits and tolerance definition, selection of fit, calculation of fundamental deviation, limit of sizes, selection of limits, tolerances and allowances.

TOPIC 3. LINEAR MEASUREMENT : STANDARDS OF LENGTH, classification and use of slip gauges, wiring process, gauge block calibration precautions to be observed while using gauge blocks, classification of linear measuring instrument- direct and indirect, construction and working of vernier caliper, micrometers- outside and inside and depth, vernier height gauge, dial vernier and dial height gauge- identification of parts. finding least count, precautions of each type, types of errors, Dial gauge types, construction, principle, accuracy and precautions to be observed in handling, field of application, comparators-

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principle, type, working, use field of application of Mechanical, Electrical, Optical and Pneumatic comparators- Selection for specific work, Measuring Machines-type, application limitations, working principle. Interferometer type, working principle, application.

TOPIC 4. ANGULAR MEASUREMENT : Classification- direct and indirect, protractor- vernier and optical, universal- working use and limitation, precautions, Angle blocks- set size, accuracy, calibration, method of measuring unknown angle and checking known angle. sine bar- common types, use in actual practice for finding out known and unknown angle. Spirit levels- types, use field of application, sensitivity, clinometer- types, working principle, accuracy, field of application, Angle Dekker-type, principle of working method, field of application.

TOPIC 5. STRAIGHTNESS, FLATNESS, SQUARENESS & ROUNDNESS TESTING : Concept of squareness, flatness, squareness and roundness, straight edge method- light gap and feeler gauge method, wedge method, precision level method, Auto collimeter method. Squareness- Indicator method, square tester, Autocollimeter method Determination of straightness, flatness, squareness of a given piece use of v-block and dial indicator for determining roundness.

TOPIC 6. SURFACE ROUGHNESS : Definition of primary and secondary texture, real surface, geometrical surface, effective surface, real profile, geometrical profile, effective profile, reference line, lay, traversing length, sampling length, mean line, centre line of profile 'M' and 'E' system of surface assessment- salient features, merits and demerits of each basic unit of indicating surface roughness- CL No., R.M.S., Ten point height. Interpretation of units graphically and mathematically. Types of surface measuring instrument, Method of surface measurement- stylus, stylus skid, stylus pressure, Mechanical

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amplification, Tomlinson mechanical surface finish recorder, working principle. Electrical amplification principle of current-generating type and voltage variation type stylus instrument. Profilographits units, advantages, working principle, surface inspection by comparison methods. (a) Touch inspection (b) visual inspection (c) scratch inspection (d) Microscope inspection-Limitations of each.

TOPIC 7. SCREW THREAD MEASUREMENT : Types of screw threads, threads nomenclature, error in screw thread pitch errors (Progressive and periodic) instrument, equipment required for measuring pitch, effective diameter and angle-procedure, advantages, limitations and precautions of each method. Limit gauges for screw thread measurement-Procedure, advantages and limitation of each gauge. Precautions observed while using a limit gauge.

TOPIC 8. GEAR MEASUREMENT : Types of gears, gear nomenclature, gear elements requiring measurements. Necessity of measuring gear elements accuracy. Types of gear tests. Different method of inspecting gear tooth form. Measurement of chordal thickness and constant chord using vernier tooth caliper. Gear tooth profile check-involute testing M/c-principle and use. Electric tests-Principle and use. Parkson gear master principle and use.

TOPIC 9. LIMIT GAUGES : Definition of gauge and gauging, Necessity of gauging in industrial practice. Gauges types-according to use (shop, inspection and reference gauge), type (fixed limit, indicating and combination), specific use (Screw pitch, gauge, template, feeler gauge-and their uses, application, identification, selection and precautions, working tolerance of gauges. Maximum and minimum metal conditions of tolerances. Calculation of maximum and minimum metal conditions from given tolerances, tolerance frames and their use, selection and specification as per IS 2251, 3455, 3484. Wear allowances and its selection for design Taylor's principle for design of 'Go' and 'No Go' gauges. Application of principle, deviation. Calculation

of gauge dimensions from formulae given in IS 3455 and selection of parameters necessary for calculation.

- TOPIC 10. TRANSUCERS** : Meaning, function. Primary and secondary transducers. Classification-mechanical, electrical, active, passive. Advantages of electrical transducer. working principle and application of resistance type, inductance type, capacitance type and piezo electric type. Transducers for pressure, temperature and flow measurement.
- TOPIC 11. TEMPERATURE MEASUREMENT** : Principles on which temperature measuring device work-Example of each type Temperature range. Various instruments/devices used, Bimetal thermometer, pressure spring thermometer, resistance thermometer, thermistor working principle, range, application, materials used and their characteristics, application. Comparison of resistance thermometer and thermistor. Thermo couple-principle, material, working compensating lead, working range, methods of measuring output i.e. mill voltmeter, potentiometer- application, comparison of various thermocouple. Pyrometer-radial and optical-working principle, construction, advantages, limitations, application in industrial situation. Types of error in temperature measurement (instrument error, thermal probe error)-reasons and effects of these errors way of reducing error.
- TOPIC 12. PRESSURE MEASUREMENT** : List of devices used (Manometer, elastic gauges and transducers), differential and inclined manometers. Elastic gauge diagram, pressure capsules, bellows, pressure spring. Transducers-principle, types, applications and limitations. Selection of instruments.
- TOPIC 13. FLOW MEASUREMENT** : Flow measuring devices- type (volumetric meters and rate of flow meters)- functions, types and applications. volumetric meters (Bellow type, rotating impeller and rotating lobe)- Working principle, applications and limitations of each. Rate of flow meters- (obstruction meters, velocity probes)-Classification of each type, comparison. Relative merits and demerits of each, working principle, construction, limitation and application of each type.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)

COURSE : METROLOGY AND INSTRUMENTATION

COURSE CODE NO : M- 404 / A-507

LIST OF EXPERIMENTS.

1. Measurement of a gap by means of slip gauges.
2. Measurements of diameter and height of a circular spigot.
3. Comparing methods of internal measurement.
4. Comparing methods of external measurement.
5. Comparing methods of angular measurements.
6. Checking a wire bar.
7. Comparing methods of external taper measurements.
8. Comparing methods of internal taper measurements.
9. Given a set of slip gauges, straightedge to be tested and surface plate, the student will test the straightness error in the given straightedge.
10. Given the surface plate, spirit level and straight edge the students will test the flatness of surface plate in the laboratory.
11. Check an engineers square in the laboratory provided with parallel set, slip gauges and plate and determine the squareness error.
12. Examination of the surface texture of the work piece or machined surface by a microscope when specimen of corresponding standard surface is provided.
13. Determination of effective diameter of a screw with the help of screw thread micrometer and three wire and hand micrometer. Compare these two methods.
14. Determination of screw plug core diameter with the help of two vee shaped steel pieces and micrometer.
15. Determination of out-side diameter of a screw by a micrometer.

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16. Determination of core diameter of an internal screw gauge with the help of a pair of precision wedge parallels and outside micrometers.
17. Preparation of a cast of internal screw thread with sulphur and graphites.
18. Setting of a roller type of adjustable thread gauge and inspection of given make screw of given nominal size.
19. (a) Inspect the gear tooth form by direct measurement.
(b) Inspect the gear tooth spacing by any one method.

NOTE: The experiments for instrumentation topics can be designed depending upon the type of instruments available in the Laboratories.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPECS)

COURSE : METROLOGY & INSTRUMENTATION

COURSE CODE NO : M-404 / A-507

LIST OF BOOKS.

S. No.	Name of book.	Author	Publisher.
1.	Engineering Metrology.	R.K.Jain.	Khanna Publishers Delhi.
2.	Inspection & gauging.	Kennedy.	The Industrial Press, 93, Wortinstreet, NEW YORK.
3.	Engineering Metrology.	K.J. Tume	Macdonal & Co.Ltd, LONDON.
4.	Practical Metrology.	K.J. Hume & C.H. Sherd.	-do-
5.	Handbook of Industrial Metrology.	A.S.T.M.E.	Prentice Hall of India.
6.	Metrology & Gauging.	S.A.J.Parsons.	Macdonald & Erass Ltd, LONDON.
7.	Industrial Instrumenta- tion.	D.F.Eckman.	Wiley Easter Ltd, NEW DELHI.
8.	Measurement Techniques in Mechanical Engineering.	R.J.Sweeny.	Jon Wiley & Sons, New York. Addison Wesley Publishing, LONDON.
9.	Mechanical Measurement.	Becjwith & Buck.	Addison-Wesley Publi.-London.
10.	Instruments for Measurement centred.	W.G.Holzbock	Rainold Publishing Co-operation.
11.	Mechanical and Industrial Measurement.	R.K.Jain.	Khanna Publishers New Delhi.
12.	DS: 2986, 5979, 5876, 5939		

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PROGRAMME :- DIPLOMA IN AUTOMOBILE ENGINEERING

COURSE :- PROJECT WORK

COURSE CODE:- A508

PRE-REQUISITE:- 70 CR

Sl. No.	TOPIC
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- I. To know aims of the project works
 - 1) To foster the creative talents in students
 - 2) To give the students a taste, 'Real life' problem, solving in their stimulates 'Industrial environment' with in the polytechnic.
 - 3) To develop those abilities, which can not be developed normal class room situations such as working in groups, accepting responsibility, persistence, initiative original things, innovativeness, self study etc.
- II. Project work is included in the curriculum to develop the following objectives.

The students will able to understand.

 - 1) Appreciate the procedure that can be followed in the solving of "real life" problems of automobile industries.
 - 2) Select a suitable problem that can be solved with the facilities & resources.
 - 3) Analyse the various options available for solving the selected problems.
 - 4) Evaluate the options available with the view to selection of the best.
 - 5) Do the detail drawings of all components of the process.
 - 6) Prepare the project report.
 - 7) Prepare & submit project report.
- III. Note to teacher on Project work.
 - 1) The project work has the advantages of introducing a bit of "real life" situations with in the polytechnic. The students therefore must be guided to select those project which will benefit them when leave to take up work as automobile engineering technician in industry. The Teachers therefore must be in direct contact with local automobile industry of automobile workshop & have list of feasible project that can be completed with the available facilities resources that in polytechnic.

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The students are usually grouped in to 2,3 or 4 in 4 group each group, identifies a project and start and preparing in a group. The teacher acting as a guide. The project should be prepared by the talent involvement of students. The students will be able to develop their inherent competences & talents by this method which they can not do by conventional teaching method.

IV. Steps in project solution.

1. Identified the project/problem
2. Suggest possible solutions.
3. Propose alternative solutions
4. Select the best solutions.
5. Do the detail design & drawings.
6. Select the materials parts & equipment needed for the preparation of project.
7. Plan for preparing of project.
8. Identification of parts.
9. Preparing the detailed project report.

V. Assessment of project work.

The students should be assessed both continuously and in the end by a viva voce. The continuous assessment should have the following factors.

1. Project/problem selected and students understanding.
2. Information retrieval
3. Creativity & Design & application.
4. Initiative & interest exhibited.
5. Final project report individual submission.
6. Personal qualities of a students such as group work etc. The viva voce in the end can be used to check the complete project, the project report and the student. Overhaul understanding in the solution of the project selected.

IV. A simple list of projects that can be done in a polytechnic.

- 1) Major overhauling of the engine.
- 2) Minor overhauling of the engine.
- 3) Complete reconditioning any one of the major assembly.
- 4) Complete rewinding and electrical repairs. Including structure rewinding (track or trolley)
- 5) Construction of body for auto-rickshaw, diesel bus/Trucks (table model)
- 6) Complete repainting of vehicle.

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- 7) Project to start a service station at a town.
- 8) Project to start agro engineering oriented repair shop rural area.
- 9) Project to start a ancillary auto industry in a industrial area.
- 10) Project to start two Wheeler repair work shop.
- 11) Project to start a engine testing & performance lab.
- 12) Performance of engines by using different fuel (Bi-fuel engine testing)
- 13) Development of software on performance of different vehicles considering speed wind resistance and torque.
- 14) Complete retreading and resolving of tyres.
- 15) Fuel economy.
- 16) Design of fabrication of under spring toolset, connecting aligner, subhook arrangement for vehicles, moving in steep hill or gradient, a axial tools, pullers, measuring instruments etc.

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MULTIPOINT ENTRY AND CREDIT SYSTEM

DIPLOMA IN AUTOMOBILE ENGG.

A 509 IMPLANT TRAINING/SEMINAR/G.D./FLCH.VISIT

APPLIED TECHNOLOGY COURSE, CREDITS-5

- (A). In between Vth and VIth semester, the students will undergo for atleast 2 weeks for implant training in
- (a) Any automobile service at authorized dealerships.
 - (b) Any body building unit for vehicles.
 - (c) Any fuel injection pump service station.
 - (d) Any car A.C. repair/maintenance centre.
 - (e) Any tyre retreading unit.
 - (f) Any Battery charging, repair, maintenance centre.
 - (g) Any centre for measuring exhaust emissions.
 - (h) Any vehicle manufacturing unit.

The placement will be done by the I.P.U. or concerned Institution during training, the student will maint. a daily diary in which he will record the daily activities, observations and collected data. Every day the diary will be signed by the responsible officers at the training unit. After completion of the training the student will submit the daily diary, training report and certificate from training organisation. The learnings and performance of students will be assessed by an external examiner as well as internal examiner during VIth semester exams.

(B) If implant training will not be feasible in any particular session then department will organise an industrial visits of atleast 2 weeks to get the students to learn about the industrial environment and related activities.

(C) Students will learn to participate in group discussions effectively. The department will organise at least 2 group discussion per week. Each group discussion cycle will be of 3 phases. (a) Preparation (b) G.D. (c) Analysis and feedback. The group discussion practice will be recorded and data will be interpreted. The topic of G.D. will be decided by concerned teacher.

(D) Students will practice to write technical papers to be presented at seminar. In seminar presentation practice topics will be decided by the concerned teacher. The department will organise atleast one seminar perweek. Each paper presentation will be of 10 min. duration and 20 min. time will be provided for cross questioning by other participants. After each seminar, the analysis and feedback session will be organised.

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ASSESSMENT OF PERFORMANCE:-

During Final Examinations, the department will organise a seminar and a G.D. session. External examiner will conduct viva to assess their performance and teachings during industrial training or technical visit.

	L/W/Tut.	Viva Voce
Industrial training	15	15
Technical visit	20	20
Group discussion	15	15
Seminar Presentation	50	50 = 100

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION
 SPECIFIC SCHEME OF STUDIES AND EXAMINATION OF DIPLOMA IN AUTOMOBILE ENGINEERING
 (CREDITS - 12)

Course code	Course	Pre Requisite	Hours/Week	Credits	Seasonal Term Lab. Work	Prog. Asst. I	Prog. Asst. II	Board Paper	Exam Dur.	Theory Marks	Practical/ Viva	Total		
A - 601	Refrigeration and Vehicle Air Conditioning	-	4	6	20	30	10	10	10	OR 1	3Hrs 100	1 3Hrs 50	220	
A - 602	Vehicle Emission Control	-	4	6	20	30	10	10	1	3Hrs 100	1 3Hrs 50	220		
A - 603 (M - 504)	Industrial Engineering	-	4	6	20	30	10	10	1	3Hrs 100	1 3Hrs 50	220		
A/M - 604	CAD/CAM	301	4	6	20	30	10	10	1	3Hrs 100	1 3Hrs 50	220		
A - 605	Special Vehicle & Equipments		4	6	20	30	10	10	1	3Hrs 100	1 3Hrs 50	220		
TOTAL CREDITS				12	40	60	20	20	2		200	2	100	440

NOTE : (1) Allowed to take these courses unless clears all foundation courses.
 Diploma will be Awarded on the basis of Total Credits = 24+12+9+40+43+12 = 140 CR.
 Total Marks in Applied Tech. = 600+400+440+120 = 1560 Marks
 Total Marks Diversified courses = 200+100+100+40 = 440 Marks
 On the Basis of Integrated Diploma will be awarded out of 3550 Marks (350 + 1200 + 2000)
 per A/R/M/B/N/C/E
 Total of Applied Tech. & Diversified courses = 1560 + 440 = 2000

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MILLINGTON COLLEGE AND COLLEGE SYSTEM

DIPLOMA IN AUTOMOBILE ENGG.

DIVISION OF COURSE, CREDITS-4

REFRIGERATION AND

A 501x Vehicle Air Conditioning

SCHEME OF STUDIES AND SPECIFICATION TABLE :

TOPIC NAME OF TOPIC No.		TH. HRS.	LAB HRS.	TOTAL HRS.	T	C	A	TOTAL
1	Concept of refrigeration	4	4	12	4	4	2	10
2	Vapour compression refrigeration	10	5	15	10	7	7	24
3	Air conditioning	12	2	14	11	9	0	20
4	Vehicle air conditioning	7	4	11	7	3	2	12
5	Vehicle A.C. systems	4	4	12	7	4	4	15
6	Maintenance of VAC	7	2	10	4	4	2	10
Total		44	24	68	42	37	24	103

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REFRIGERATION AND

Air Conditioning

CONTENT OUTLINE

1. Concept of refrigeration & its reduction: Various common methods of cooling such as refrigeration, concept of heat pump and heat engine, C.O.P., use and use of thermodynamics applicable to refrigeration reversed Carnot cycle, Bell Coleman cycle, Calculation of work done required, Net refrigeration effect, C.O.P. etc using simple formula only, refrigeration, Properties of an ideal refrigerant and various commercial refrigeration.
2. Vapour compression refrigeration: Introduction to vapour compression cycle, calculation of working required and net refrigeration effect, C.O.P., study of various components of vapour compression refrigeration system. Simple numerical problems based on use of formula only.
3. Air conditioning: Air conditioning, its meaning, need for air conditioning properties of air to be regulated during air conditioning based comfort, Environmental factors for human comfort, Evaluation of factors related to air conditioning, air conditioning systems, Psychrometric charts simple numerical problems based use of formula only.
4. Vehicle air conditioning (Wd) need for vehicle air conditioning standard heat loads for a given vehicle components and human beings other external and internal heat load. Heat insulation, various methods of heat insulation. Simple numerical problems based on use of formula only for calculation of power, *Heat load calculation* *Wd*
5. Vehicle Air conditioning systems: Various methods of vehicle air conditioning regarding working principle & method of working, study of components layout of a vehicle air conditioning system. Recommendations for heat insulation. Important parameters to be checked and regulated for proper and smooth operation.
6. Maintenance of Vd: Various types of common troubles in V.A.C.S., Possible causes for each trouble possible remedies, Routine and scheduled checkups for V.A.C.S. precaution to be taken up while maintaining the V.A.C.S. Gas charging procedure.

REFERENCE BOOKS :

1. Refrigeration & Air conditioning by Searis & Gabbi
2. Refrigeration & Air conditioning by C.P. Arora
3. Automotive Mechanics by W.H. Crouse

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL

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PROGRAMME : DIPLOMA IN AUTOMOBILE ENGINEERING
COURSE : REFRIGERATION AND VEHICLE AIR CONDITIONING
COURSE CODE NO: A-601
PREREQUISITE :

LIST OF EXPERIMENTS AND VISITS :

- 1) Handling and use of tools such as - 04
Tube cutter, Tube bender (Spring and mechanical Type)
Flaring and swaging tool, wrenches, pliers,
Service valves, service gauges, preparation of soldered
and brazing joints.
2. Study of packaged/window/Air conditioner with respect
to- 02
 - a) Capacity
 - b) Electric circuit
 - c) Air flow path.
 - d) Specification of main components used.
 - e) Refrigerant used.
3. Leakage detection using-
 - a) Soap and water 02
 - b) Halide Torch
 - c) Vacuum Method
 - d) Pressure method
4. Operating service valves and gauge manifold.
5. Removing air from Refrigeration system before 02
charging.
6. Removing Refrigerant from system. 02
7. Charging/Recharging the vehicle air conditioning
systems 02

8.

Contd..2

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8) Testing refrigeration and Air conditioning system control components for proper functioning and replacement :

- a) Capacitor
- b) Starting and running windings of hermetically sealed compressor.
- c) Overload.
- d) Relay
- e) L P And H P
- f) Thermostat.

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MULTIPOINT ENTRY AND CREDIT SYSTEM

DIPLOMA IN AUTOMOBILE ENGG.

A 602 VEHICLE EMISSION CONTROLS

DIVERSIFIED COURSE, CREDITS-A

RATIONALE :

Today one of the most serious and dangerous things for the environment and human being is air pollution. Half of the air pollution is contributed by the automobile industry. It is our responsibility to save our environment and to this regard vehicle emission control is very necessary.

This curriculum is confined as to topics e.g. introduction to emission control, Control of unburned hydrocarbons, Exhaust emission control, Emission measurement and quality awareness which will help us to keep our environment clean.

OBJECTIVE :

1. To know the importance of vehicle emission control.
2. To know the sources of vehicle air pollutants and prevention.
3. To know about the measurement of exhaust emission.

A 602 VEHICLE EMISSION CONTROLS

:SCHEME OF STUDIES AND SPECIFICATION TABLE :

TOPIC No.	NAME OF TOPIC	TH. HRS.	TUT/ LAB HRS.	TOTAL HRS.	K	C	A	100%
1	Introduction	6	4	10	4	4	2	
2	Control of unburned Hydrocarbons	12	6	18	10	7	7	
3	Control of exhaust Emission	14	12	30	11	9	8	
4	Exhaust Measurement	5	4	9	7	7	5	
5	Quality Awareness	2	2	6	7	4	4	
6	Nonconventional Vehicles	2	2	5	4	4	2	
Total		41	37	78	42	31	26	100

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1992 VEHICLE EMISSION CONTROLS

CONTENT OUTLINE

TOPIC 1 : INTRODUCTION 6 + 4 = 10

Environment, atmosphere, clean air. Pollution, different types of air pollutants, date of various air pollutions, Two types of vehicle emissions, viz. unburned hydrocarbons and exhaust emissions, meter systems of automobile emission control, Role of state administration to control vehicle emissions.

TOPIC 2 : CONTROL OF UNBURNED HYDROCARBONS 12 + 4 = 16

Sources of unburned hydrocarbons vapour leakage, Evaporation characteristics of automotive fuels, Positive crank case ventilation, Hermetic vapour recovery system, Various vapour recovery systems such as fuel return line, charcoal canister, vapour separation from fuel, fuel tank (sealed), Carburettor injectors, vapour storage in crank case, Evaporation tank etc.

TOPIC 3 : CONTROL OF EXHAUST EMISSIONS 12

Composition of exhaust gases, Pollutants in Exhaust, various factors responsible for combustion of fuel, effect of combustion quality on exhaust pollutants, various methods to improve combustion quality such as control of air ratio, fuel injection timing, design of combustion chamber surface, exhaust injection, inerting combustion temperature, other method of controlling such as exhaust gas recirculation, valve overlap, timing of vacuum advance, Exhaust gas treatment by air cleaners and catalytic converter, Concept of Electronic engine control and microprocessor based engine control.

TOPIC 4 : EXHAUST MEASUREMENT 4 + 4 = 8

Concept of exhaust measurement for S.I. and C.I. engines measurement of Co, HCN, HC and smoke test for S.I. and C.I. engines.

TOPIC 5 : QUALITY AGREEMENTS 4 + 4 = 8

Quality agreements, Concept of performance and fuel economy, I.D.D. and I.D.C. (Only introductory)

TOPIC 6 : 2 + 2 = 4

Recent developments in engine technology and its applications in automobiles, test methods, future.

REFERENCE BOOKS :

1. Vehicle Emission Control by S.H. Crandall
2. Automobile Engines by W.H. Crompton
3. I.C. Engines by Dennis H. Heywood

COURSE : Vehicle Emission Controls

COURSE CODE: A-602

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LIST OF PRACTICES

1. study of positive Crankcase Ventilation System.
 2. study of Charcoal Canister & its types.
 3. Study of Carbon tor Insulator.
 4. study of EGR System (Exhaust gas re-circulation)
 5. Study of Catalytic Converters & its types.
 6. study of Electronic Engine Control.
 7. Study of Exhaust gas analysis.
 - (a) Smoke testing equipments.
 - (b) Measurements of CO, HC & NO by different equipments.
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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING.

COURSE : INDUSTRIAL ENGINEERING.

COURSE CODE NO : M 504 / A-603

PRE-REQUISITE : M 402

R A T I O N A L E.

Industrial Engineering is such a subject which can significantly contribute towards the cost-saving and help in increasing the productivity. Adequate opportunities have been planned for the technician to apply theory to solve practical/simulated industrial problems.

The course is kept under Applied Technology with a view to appreciate the changes and alternation proposed by Industrial Engineering for shop floor-methods and process.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING.

COURSE : INDUSTRIAL ENGINEERING.

COURSE CODE NO : M- 504/A-603

PRE-REQUISITE : M 402

SCHEME OF STUDIES.

S.No.	Topic.	Duration in Hrs.		
		Theory	Pract./Lab.	Total
1.	Introduction.	02	-	02
2.	Productivity.	03	-	03
3.	Work study.	04	-	04
4.	Method study.	08	06	14
5.	Principles of Motion economy.	02	02	04
6.	Material handling and Plant layout.	06	-	06
7.	Micro-motion study.	02	02	04
8.	Work measurement.	08	06	14
9.	Job evaluation, wages and incentives.	06	02	08
10.	Statistical quality control.	08	04	12
11.	Control charts for variables.	05	02	07
12.	Control charts for attributes.	04	04	08
13.	Acceptance sampling.	04	04	08
14.	Reliability.	02	-	02
TOTAL:		64	32	96

CREDITS - 5

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING.
COURSE : INDUSTRIAL ENGINEERING.
COURSE CODE NO : M -504 /A-603
PRE-REQUISITE : M- 402

TOPIC 1. INTRODUCTION:

Definition of Industry and Industrial engineering, scope and role of industrial engineering, fields of application.

TOPIC 2. PRODUCTIVITY:

Production and productivity, production systems and their impact on productivity, its significance and benefits of higher productivity. Long term and short term factors affecting productivity, Productivity cycle.

TOPIC 3. WORK STUDY: Introduction, its relation with productivity, aims, objectives and application of work study, basic procedure and techniques of work study. Human factors in work study. Role of manager, supervisor and workers. Working conditions, environment of industry affecting work-study.

TOPIC 4. METHOD STUDY:

Definition, objectives, basic procedures of method study. Recording techniques, operation process chart, flow process chart, Man-Machine chart, Flow diagrams, string diagrams, two hand process charts, Questioning technique procedure to develop, install and maintain new method.

TOPIC 5. PRINCIPLES OF MOTION ECONOMY: Meaning, Basic rules, design of efficient work-place-layout, classification of human body movements and their preferred order.

TOPIC 6. MATERIAL HANDLING AND PLANT LAYOUT:

Importance and its effect on productivity, Requirements of good material handling system Classification and selection of material handling equipment. Requirements of good layout. Effect of bad layout. Factors affecting plant

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layout, Types of layout, advantages and limitations of each type of layout, section of layout, factors affecting the plant location.

TOPIC 7. MICRO-MOTION STUDY:

Definition and objectives, Techniques of micromotion study, Therbligs and their symbols, use of therbligs, SIMO chart and its application.

TOPIC 8. WORK MEASUREMENT:

Definition, Basic procedure and technique of work measurement. Stop watch time study, Types of stop watch study, Factors considered in selecting a job for time study, qualified and representative workers, procedure of stop watch time study, job element and their need of identification, General rules for break down of job into elements, work cycle, methods of time measurement, performance rating, its meaning, standard rating, Rating of operators, conditions for operators variation at work-place Rating scale, rating factors, calculation of basic time. Allowances- Purpose, types. Calculation of standard time synthesis method- meaning, data, complication, advantages and limitations.

PMTS- Definition, principle and use, calculation of standard time.

MTM- Meaning, tables and use. Application of MTM analysis for IH-RH charts, Calculation of standard time.

WORK/ACTIVITY SAMPLING- Definition, statistical basis determination of number of observations for given accuracy Sources of error, Application and calculation of standard time.

TOPIC 9. JOB EVALUATION, WAGES AND INCENTIVES- Definition, need and scope of job evaluation. Job evaluation systems and their comparative merits and demerits and limitations.

WAGE- Definition, wage components, wage fixation, Real, minimum and fair wage. Financial and non-financial incentives and their examples. Wage plans- Halsey, Taylor, Differential plan, Gantt task and bonus plan, 100% Premium plan.

- TOPIC 10. STATISTICAL QUALITY CONTROL: Definition of quality and total quality, three stages of quality, quality control, and S.Q.C, difference between inspection and quality control, concept of variability natural variation, its importance to quality control, classification of quality characteristics, Basic tools of S.Q.C. and their application, Frequency distribution, measures of central tendency and dispersion, their need and calculations. Normal curve - Definition, characteristics, calculation of area under normal curve and its application, statistical tolerancing- their calculation and application, Process capability-meaning, calculation and use.
- TOPIC 11. CONTROL CHARTS FOR VARIABLES: Statistical basic for control charts for variables, Construction of \bar{X} and R charts - their interpretation, use of \bar{X} and R chart in establishment of process capability.
- TOPIC 12. CONTROL CHARTS FOR ATTRIBUTES : Limitation of \bar{X} and R charts, meaning and use of attributes, their advantages. Calculation, construction, interpretation and application of p-chart, C-chart, D-chart. Need of calculating the revised values of mean, and control limits and their calculation.
- TOPIC 13. ACCEPTANCE SAMPLING: Meaning, different techniques, procedure involved, sampling, inspection-meaning and comparison with 100% inspection. Factors affecting sampling and their effects. single and double sampling plans, use of IS codes. O.C.CURVE- Meaning, terms used, their definition, construction and use of O.C. curves. Selection of sampling plans.
- TOPIC 14. RELIABILITY: Definition, quality control and reliability factors affecting reliability of product. Measures to ensure reliability of product, Effect of product reliability marketing. M.T.B.F. and M.T.T.F. - Definition, programme for reliability.

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MIDHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING.

COURSE : INDUSTRIAL ENGINEERING.

COURSE CODE NO : M- 504 / A-603

PRE-REQUISITS : M- 402

REFERENCE BOOKS.

1. Introduction to Industrial Engineering (by Phillip Hicks.) McGraw Hills.
2. Productivity means property. Asian Productivity Organisation, Tokyo.
3. Introduction to work study. International labour office.
4. Work study. M.D. Schmid & Subramaniam.
5. Motion & time study. Ralph M. Barnes, John Willey, New York.
6. Work study. Dalela.
7. Wage Administration. D.K. Roy, N.P.C. Pub.
8. Quality Assurance Engineering. M.D. Schmid & Subramaniam
9. S.Q.C. E.L. Grant.
10. S.Q.C. R.C. Gupta.
11. Industrial Engineering & Management O.P. Khanna.
12. Industrial Engineering. Saxena.
13. Material handling Equipment N. Rudenki Place Pub.
14. Learning package in Industrial Engineering. C.D.C., T.T.T.I. Bhopal.
15. Laboratory manual Industrial Engineering. C.D.C., T.T.T.I. Bhopal.

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(162) : (171)
MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

DETAILED CURRICULUM

COURSE TITLE : CAD/CIM
COURSE CODE NO. : M - 604 / A - 604
PREREQUISITE : 301 (CPMP. APPLICATION)
CATEGORY : DIVERSIFIED COURSE

DIPLOMA PROGRAMME IN
MECHANICAL 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 TEACHER'S TRAINING INSTITUTE, BHOPAL

Sponsored by

DIRECTORATE OF TECHNICAL EDUCATION, BHOPAL.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPE & CS)
COURSE : CAD/CAM
COURSE CODE NO.: M - 604 / A-604
PREREQUISITE : 301 - (Comp. Appl.)

"R A T I O N A L E"

Computer based numerically controlled machine tools are increasingly finding place in industries. Further integration of the computer Aided Design and Drafting (CADD), which has been in use in the industry for some years now, with CAM Operations has lead to efficient product design & phototyping and shorter production runs. The need to absorb CAD/CAM technology for its effective and efficient use has, therefore, become imperative.

This course is being introduced as diversified course of Diploma Programme in Mechanical Engineering under Multi Point Entry and Credit system, and has the hard core course on computer Applications (301) as prerequisite. The course aims at developing appreciation of the use of CAD/CAM as a computer based tool in drafting, designing and manufacturing processes. The focus is therefore, to familiarise students with a CAD/CAM environment, its components, their functions, and methods of using the existing CAD/CAM software, in general, with a view to improve efficiency in drafting and designing.

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(165)
MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MEE & CS)
COURSE : CAD/CAM
COURSE CODE NO.: M - 604 / A-604
PREREQUISITE : 301 (Comp. Appl.)

"SCHEME OF STUDIES"

S.No.	Topic	Theory Hrs.	Practical Hrs.	Total Hrs.
1.	Fundamentals of CAD/CAM	05	02	07
2.	CAD/CAM hardware	06	02	08
3.	Software of CAD/CAM System	06	08	14
4.	Introduction to Auto CAD	10	14	24
5.	Introduction to Conventional	05	-	05
6.	Introduction to Part Programming through numerical control.	05	12	17
7.	Introduction to different types of Computer based numerical control system.	05	-	05
TOTAL :		42	38	80

CREDITS : 04

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(166) 1975,
MADHYA PRADESH BOARD OF TECHNICAL EDUCATION,
BHOPAL.

PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MEE & CS)
COURSE : CAD/CAM
COURSE CODE NO.: M - 604 /A-604
PREREQUISITE : 301 - Computer Application.

"CONTENT"

TOPIC 1. FUNDAMENTALS OF CAD/CAM :

1. History of CAD/CAM
2. Concept of CAD/CAM
3. General design steps in CAD/CAM
4. Benefits of CAD/CAM

(5+2=7)

TOPIC 2. HARDWARE OF CAD/CAM SYSTEM IN CIM ENVIRONMENT :

1. Introduction
2. Block diagram of integrated CAD/CAM system.
3. Hardware components of CAD system in CIM environment. (CAD workstation input, process & output unit details).
4. Hardware components of CAM system in CIM environment. (CNC controller and CAD interfacing, CNC components, conveyors and robot units).
5. Functions of each hardware unit in CIM.

(6+2=8)

TOPIC 3. SOFTWARE OF CAD/CAM SYSTEM :

1. Introduction.
2. Software configuration of a CAD system.
3. Functions of a CAD package.
4. Constructing the geometry.
5. Effects of transformations.
6. Wireframe versus solid modeling.
7. CAD/CAM integration.
(e.g. through intermediate codes & post Processor.

(6+8=14)

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TOPIC 4. INTRODUCTION TO AUTO CAD :

(167)

1. Introduction
2. Features of Auto Cad.
3. Important commands, their functions & applications
(Incremental approach to design/drafting.

(10+14=24)

TOPIC 5. INTRODUCTION TO CONVENTIONAL NUMERICAL CONTROL :

1. Introduction.
2. Basic components of NC system.
3. The NC procedures.
4. NC coordinate systems.
5. NC motion control systems.
6. Applications of Numerical control and potential applications of NC machine tools.

(5+0=5)

TOPIC 6. INTRODUCTION TO PART PROGRAMMING THROUGH NUMERICAL CONTROL :

Purpose of part programming, steps of part-programming, Difference between manual and computer assisted part programming, Difference between language based and CAD package based part programming.

(5+12=17)

TOPIC 7. INTRODUCTION TO DIFFERENT TYPES OF COMPUTER BASED NUMERICAL CONTROL SYSTEMS :

Classification of NC controller technology as:-

1. Computer numerical control.
2. Direct numerical control.
3. Adaptive control machining systems.

(5+5=10)

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PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MPE & CS)
COURSE : CAD/CAM
COURSE CODE NO.: M - 604 / A-604
PREREQUISITE : 301 - COMPUTER APPLICATION.

"LIST OF EXPERIMENTS"

1. Auto CAD commands and their applications in various types of Designs/Drawings
Ten/Fifteen experiments.
2. CAM experiments on:
 - 2.1 Entry of part programme.
 - 2.2 Preparation of control tape.
 - 2.3 Development and execution of programmes using following features :
 - (a) Tool Control.
 - (b) Base Control.
 - 2.4 Use of point cut, point to point cut and continuous cutting following tool path.
 - 2.5 Execution of programme using linear cutting and contour interpolation.
3. Material job handling using robot system and conveyer assembly.

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PROGRAMME : DIPLOMA IN MECHANICAL ENGINEERING (MEE & CS)

COURSE : CAD/CAM

COURSE CODE NO.: M - 604 / A-604

PREREQUISITE : 301 (Computer Application)

"LIST OF SUGGESTED REFERENCE TEXT BOOKS"

TEXT BOOKS :

1. CAD/CAM ; Computer - Aided Design and Manufacturing by H.F. Groover, & E.W. Zimmers, Sr., Prentice-Hall of India Pvt. Ltd., (BEE), New Delhi, 1986.
2. Inside Auto CAD, by Daniel Raker and Herbert Rice, BFB publications, Delhi (Latest edition).

REFERENCE BOOKS :

2. (I) Working out with Auto CAD.
(II) Working out with Auto CAD disc.
(III) The Auto CAD videos.
(IV) Stepping Auto CAD - instructor's guide New Riders publishing, P.O. Box, 4846.
Thousand Oaks CA 91360 U.S.A.
C/o - BFB Publications, Delhi -110 006.
(376, Old Lajpat Rai Market).
4. Introduction to Computer Aided Drafting by Donald D. Voisinet (2nd Ed.), Mc-Graw-Hill.
5. Mastering Auto CAD by BFB publication, Delhi.
6. Illustrated Auto CAD by - T.W. Berghauer and P.L. Schlieve, BFB Publications, Delhi.
7. Numerical Control by Marthin, E.I.A.S.
8. Understanding CAD/CAM- Design with computer, by D.J. Bowman, and R.N. MC - Dougal, BFB Publications, Delhi.
9. Numerical Control by Child -

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

Programme : Diploma in Automobile Engineering
 Course : Special vehicles & Equipments
 Course code : A - 605
 Pre-Requisite : NIL

SCHEME OF STUDIES

S. No.	TOPIC	TH. Hrs	Practical Hrs	Total Hrs
1.	Tractors	15		
2.	Agricultural implements	10		
3.	Construction Equipments	11		
4.	Dezers	10		
5.	Rollers & Compactions	10		
6.	Battery Operated vehicles	04		
7.	Miscellaneous	04		
EXHIBIT TOTAL		64		64 Hrs

CREDITS : 36

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

Programme : Diploma in Automobile Engineering
Course : Special Vehicles & Equipments
Course code : A - 605
Pre requisite : NIL

CONTENTS OUTLINE

TOPIC - 1 TRACTORS

- History & development of tractors
- Manufacturers in India
- Types of Tractors
- Lubrication system
- Cooling system
- Transmission system
- Power take off shaft steering system
- Tractors efficiency
- Types of tyres, their life
- Tractors brakes

TOPIC - 2 AGRICULTURAL IMPLEMENTS

Introduction, Trailer, Integral & Mounted implement machines, advantages, Implements, Types of Implements.

TOPIC - 3 CONSTRUCTION EQUIPMENTS

Introduction, Classification, Constructional features of various construction equipments, Uses of & operations of Dumpers, Scrapers, Shakeles, Road Rollers, Excavators, Bulldozer, Cranes, Rippers.

TOPIC - 4 DOZERS

Introduction, Types of dozers, various components of dozers, control method, Types of steering mechanisms.

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TOPIC - 5 ROLLERS & COMPACTION.

Introduction, types of rollers, various manufactures in India, Transmission system, steering system, Braking system, Application.

TOPIC - 6 BATTERY OPERATED VEHICLES.

Introduction, Types of Batteries, Charging process, Advantages & Disadvantages.

TOPIC - 7 MISCELLANEOUS

Gas turbine, comparison of Gas turbines with I.C. Engines, fuel cell, elementary idea of fork lift trucks.

REF : BOOKS : Auto Engg. - C P Nakra
Tractor Mechanics - R P Gupta
Tractor Engines -
~~Tractor~~ Maintenance & Repairs - SC Jain & CR Rastogi
Truck & Tractor Guide - Front D Graham
Manuals of Earth moving equipments.

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