Study & Evaluation Scheme

Of

Diploma in Mechanical Engineering
(Production & Automobile)
Lateral Entry
[Applicable w. e. f. session 2012-13 till revised]

TEERTHANKER MAHAVEER UNIVERSITY
Delhi Road, Moradabad, Uttar Pradesh-244001
Website: www.tmu.ac.in

TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)
Delhi Road, Moradabad (U.P)

Study & Evaluation Scheme
of
Diploma in Engineering (Mechanical- Lateral)
SUMMARY

Programme : Diploma in Engineering Lateral Entry

Duration : 2 Years (Semester system)

Medium : English/Hindi

Minimum Required Attendance : 75 %

Assessment (Theory and Project) :

Internal	External	Total
30+10 (Project)	60	100

Maximum Credit : **133**

Minimum Credit required for the degree : **129**

Internal Evaluation (Theory Papers & Project) :

Class Test I	Class Test II	Class Quiz/ Assignment + Project	Attendance	Grand Total
Best two out of the three				
10 Marks	10 Marks	5+10 Marks	5 Marks	40 Marks

Evaluation of Practical/ Dissertation & Project Report :

Internal	External	Total
50	50	100

Duration of Examination :

Internal	External
1 ½ hrs.	3 hr.

To qualify the course a student is required to secure a minimum of 40% marks in aggregate including the semester-end examination and teachers' continuous evaluation. (i.e. both internal and external).
A candidate who secures less than 40% of marks in a course shall be deemed to have failed in that course. The student should have at least 50% marks in aggregate to clear the semester. In case a student has more than 40% in each course, but less than 50% overall in a semester, he/she shall re-appear in courses where the marks are less than 50% to achieve the required aggregate percentage (of 50%) in the semester. It is compulsory for the student to appear in external examination to clear the course.

Question paper structure

1. *The question paper shall consist of eight questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 3 marks each).*
2. *Out of the remaining seven questions, student shall be required to attempt any five questions. There will be minimum one and maximum two questions from each unit of the syllabus. The weightage of Question No. 2 to 8 shall be 9 marks each.*
3. *Weightage to numerical/ case study etc shall be as mentioned at the end of syllabus of each subject.*

Study & Evaluation Scheme

Program: Diploma in Mechanical Engineering (Production & Automobile)- Lateral Entry

Semester- III

S. No.	*Course Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	DIP301	Applied Mathematics	4	-	-	4	40	60	100
2	DIP302	Basic of Electrical & Electronics Engineering	4	-	-	4	40	60	100
3	DIP303	Applied Mechanics	4	-	-	4	40	60	100
4	DIP304	Concepts in Information Technology	4	-	-	4	40	60	100
5	DIP305 OR DIP306 OR DEE304	Building Material OR Basics of Mechanical Engineering OR Electrical & Electronics Engineering Materials	3	-	-	3	40	60	100
6	DIP307	English Communication	3	-	-	3	40	60	100
7	DIP351	Electrical & Electronics Engineering Lab	-	-	4	2	50	50	100
8	DIP352	Information Technology Lab	-	-	2	1	50	50	100
9	DIP353	Engineering Drawing	1	-	3	3	50	50	100
10	DIP354	Workshop Practice	-	-	4	2	50	50	100
11	DIP355	Applied Mechanics Lab	-	-	3	2	50	50	100
Total			**23**	**-**	**16**	**32**	**490**	**610**	**1100**

Semester- IV

S. No.	*Course Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	DME401	Manufacturing Processes – I	3	-	-	3	40	60	100
2	DME402	Metrology & Measuring Instruments	3	-	-	3	40	60	100
3	DME404	Computer Aided Design	3	-	-	3	40	60	100
4	DME478	Strength of Materials & Hydraulics	4	-	-	4	40	60	100
5	DME475	Engineering Materials & Material Science	3	-	-	3	40	60	100
6	DME476	Thermal Engineering	3	-	-	3	40	60	100
7	DME405	Theory of Machines	3	-	-	3	40	60	100
8	DIP401	Technical Communication	3	-	-	3	40	60	100
9	DME461	Strength of Materials &Hydraulics Lab	-	-	2	1	50	50	100
10	DME462	Material Science Lab	-	-	2	1	50	50	100
11	DME463	Thermal Engineering Lab	-	-	2	1	50	50	100
12	DME464	Mechanical Engineering Drawing	-	-	3	1	50	50	100
13	DME465	Manufacturing Processes Lab – I	-	-	2	1	50	50	100
14	DME466	Metrology Lab	-	-	2	1	50	50	100
15	DME467	CAD Lab	-	-	2	1	50	50	100
Total			**25**	**-**	**15**	**32**	**670**	**830**	**1500**

Study & Evaluation Scheme
Program: Diploma in Mechanical (Production & Automobile) Engineering
Semester- V

S. No	*Course Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	DME501	Manufacturing Processes – II	4	-	-	4	40	60	100
2	DME502	Machine Tool Technology	4	1	-	5	40	60	100
3	DME503	Design & Estimation	4	1	-	5	40	60	100
4	*DME504 OR **DME505	Production Technology – I OR Automobile Engineering	4	1	-	5	40	60	100
5	DIP501	Communication Technique	3	-	-	3	40	60	100
6	DIP502 **	Social, Psychological and Economics Factors	3	-	-	3	40	60	100
7	DME551	Manufacturing Processes Lab – II	-	-	4	2	50	50	100
8	DME552	Machine Shop Practice	-	-	8	4	50	50	100
9	*DME553 OR **DME554	Production Technology Lab – I OR Automobile Engineering Lab	-	-	4	2	50	50	100
10	DME556	Industrial Training	-	-	-	4	50	50	100
Total			**22**	**3**	**16**	**37/34**	**440/ 400**	**560/ 500**	**1000/ 900**

**** Only for Production Engineering*** ***** Only for Automobile Engineering***

** The subject -**Social, Psychological and Economics Factors** will be taught in either V or VI semester

Study & Evaluation Scheme
Program: Diploma in Mechanical (Production & Automobile) Engineering
Semester- VI

S. No	*Course Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	DME601	Industrial Management	4	-	-	4	40	60	100
2	DME602	Environment Education	4	-	-	4	40	60	100
3	*DME603 OR **DME604	Production Technology – II OR Automobile Maintenance, Services & Repair	4	1	-	5	40	60	100
4	*DME605 OR **DME606	Production Automation OR Automobile Technology	4	1	-	5	40	60	100
5	DIP601	Corporate Communication	4	-	-	4	40	60	100
6	DIP 603**	Industrial Ecology	3	-	-	3	40	60	100
7	DME651	Mechanical Maintenance Shop	-	-	8	4	50	50	100
8	*DME652 OR **DME653	Production Technology Lab – II OR Automobile Maintenance, Services & Repair Lab	-	-	4	2	50	50	100
9	*DME654 OR **DME655	Project	-	-	8	4	50	50	100
Total			**20**	**2**	**20**	**32/ 35**	**350/ 390**	**450/510**	**800/ 900**

**** Only for Production Engineering*** ***** Only for Automobile Engineering***

Note:

L – Lecture 1L = 1Hr

T- Tutorial 1T= 1Hr

P- Practical 1P= 1 Hr

C-Credits
1C = 1Hr of Theory Paper
2 Hrs of Practical/Tutorial

** The subject -**Social, Psychological and Economics Factors** will be taught in either V or VI semester

APPLIED MATHEMATICS

Third Semester

	L	T	P	C
Course Code: DIP301	**4**	**-**	**-**	**4**

Course Contents:

Unit I

Jacobians:

Definition of Jacobians, Jacobians of functions of functions, Jacobian of implicit function, Functional Dependence theorem. **(8 Lectures)**

Unit II

Matrices:

Definition of matrix, Different types of matrices, Transpose of a matrix, Equality of matrices, Addition and subtraction of matrices, Properties of matrix addition. **(8 Lectures)**

Unit III

Matrices:

Multiplication of matrices, Properties of matrix multiplication, Adjoint of square matrix, Properties of adjoint matrix, Inverse of a matrix. **(8 Lectures)**

Unit IV

Differential Calculus:

Methods of finding derivative- function of a function, logarithmic differentiation, differentiation of implicit functions, higher order derivatives, Liebnitz theorem.

Special functions (Exponential, Logarithmic, Hyperbolic, Inverse circular), definition, graphs, range and domain and derivatives of each of these function.

Application: Finding tangents, normal points of maxima and minima. **(8 Lectures)**

Unit V

Integral Calculus:

Methods of indefinite integration: Integration by substitution, Partial fraction and by parts. Meaning and properties of definite integrals, Evaluation of definite integrals.

Simpson's and Trapezoidal rule: their application and simple cases. **(8 Lectures)**

The question paper shall have weightage to numerical/ case study 70% and to theoretical 30%.

Project work

A project work will be assigned to the students by the concerned subject faculty. It will carry 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty. The students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge. The project will be evaluated by the external examiner.

Text Books:

1. Sharma, R D, *Applied Mathematics.*
2. Grewal B S, *Elementary Engineering Mathematics*, Khanna Publication.
3. Sumha Dr. K. S., *Applied Mathematics (I & II)*, Bharat Bharati Prakashan, Meerut.

Reference Books:

1. Gorakh Prasad, *Differential & Integral Calculus*
2. Mittal S C & Mittal, S K., *Two Dimensional Coordinate,* Pragati Prakashan, Meerut
3. Mittal S C & Mittal, S K., *Three Dimensional Coordinate,* Pragati Prakashan, Meerut
4. Loney, S L, *Trigonometry (I part)*
5. Goel, B S, *Algebra*

BASIC OF ELECTRICAL AND ELECTRONICS ENGINEERING

BASICS OF ELECTRICAL ENGINEERING

Third Semester

	L	T	P	C
Course Code: DIP302	**4**	**-**	**-**	**4**

Course Contents:

Unit -1

BASICS OF ELECTRICAL QUANTITIES: Different forms of energy, Advantages of electrical energy, Uses of electrical energy, Basic concept of charge, Current, Voltage, Resistance Power, Energy and their Units.
BATTERIES: Basic idea about primary and secondary cells, Working principle, Construction and Application of lead acid, Nickel cadmium and Silver Oxide Cells. **(8 Lectures)**

Unit – 2

DC CIRCUIT: Ohms Law, Resistance in series and Parallel, Voltage and current division rule, Kirchhoff's Laws and their application in solving simply D. C. Network.
AC CIRCUIT: Concept of alternating current and voltage, Equation of instantaneous values. Average rules, R.M.S. value, Form Factor and peak factor of sinusoidal waveform. Simple R-L-C Series circuit concept of three phase A.C. **(8 Lectures)**

Unit- 3

Magnetic Circuits: Magnetic flux, flux density, field intensity, B-H Curve, difference between magnetic and electric circuit, Faraday's law, Fleming right hand, left hand rule, Lenzs law, thumb rule, self and mutual, inductance, induced emf, energy stored in magnetic circuit. **(8 Lectures)**

BASIC ELECTRONICS ENGINEERING

Unit- 4

Electronic Component & Voltage and Current Sources:- Application of Electronics in different fields, Brief introduction to active and passive components, Resistor working, specification, testing & colour coding of resistor, Capacitor. Working, specification testing & colour coding, inductor working, RF coils, transformer. Concept of constant voltage & current sources, concept of practical voltage & current sources, conversion of voltage to current & current to voltage sources. **(8 Lectures)**

Unit- 5

Semiconductor Diode:- P-N junction diode, mechanism of current flow in P-N junction, drift and diffusion currents, depletion layer, potential barrier, breakdown, semiconductor diode characteristics, P-N junction diode as rectifier, half wave rectifier, full wave rectifier, bridge rectifier, different type of diode, power diode, zener diodes, varactor diodes, tunnel diode, LED's and photo diodes. **(8 Lectures)**

Unit- 6

Introduction to Bipolar Transistor Biasing and Stabilization of Operating Point:- Concept of bipolar transistor as a two junction three terminal device having two kinds of charge carriers, PNP and NPN transistors, their symbols, concept of leakage current, effect of temperature on leakage current, common base configurations (CB), common emitter configuration (CE), common collector configuration, different types of biasing circuits for fixing the operation points, single stage CE amplifier circuit with proper biasing components. **(8 Lectures)**

The question paper shall have weightage to numerical/ case study 30% and to theoretical 70%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books

1. Garg R.P., *Elements of Mechanical Engineering*, Standard Publishers Distributors, Delhi.
2. Sharma Sanjay, *Basic Electronics*, Publication of Engineering & Computer.
3. Therja B.L., *Fundamental of Electrical Engineering*, S.Chand & Co., Delhi.

APPLIED MECHANICS
Third Semester

	L	T	P	C
Course Code: DIP303	**4**	**-**	**-**	**4**

Course Contents:

UNIT I

Force Analysis: - System of forces, concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces, resultant forces, Equilibrium of forces, Law of parallelogram of forces, Law of triangle of forces and its converse, Law of polygon of forces, solution of simple engineering problems by analytical and graphical methods. Such as simple wall crane, jib crane etc. Determination of resultant of any number of forces in one plane acting upon a particle, Conditions of equilibrium of coplanar concurrent forces system. **(10 Lectures)**

UNIT II

Moment and couple, General conditions of Equilibrium Moment and couple Generalized theorem of moments, Application to simple problem on levers-Bell crank Lever, compound lever, steel yard, beams & wheels, lever safety valve, moment of couple, properties of a couple, simple applied problem such as pulley and shaft. General conditions of Equilibrium: General conditions of equilibrium, rigid body. Under the action of coplanar forces, statement of forces, Laws of equilibrium, moment law of equilibrium, application of above on body. **(10 Lectures)**

UNIT III

Friction: Types of friction: Stoical Limiting and dynamical friction statement of Laws of sliding friction, coefficient of friction, angle of friction: Problems on equilibrium of a body resting on a rough inclined plane, simple problems on friction, conditions of sliding and toppling. **(10 Lectures)**

UNIT IV

Stress and strain : Concept of stress and strain. Concept of various types of stress and Strains, Definition of tension, compression, shear, bending, torsion, concept of volumetric and lateral strain, Poisson's ratio, ultimate stress, Working stress, elasticity, Hook's Law, Load deformation diagram for mild steel and cast iron. Definition of modulus of elasticity, Yield point, modulus of rigidity and bulk modulus. **(10 Lectures)**

UNIT V

Beam and trusses; Definition of statically determinate and indeterminate trusses. Types of supports of tie and struts, Bow's notation space diagram, polar diagram, funicular polygon, calculation of reaction at the support of cantilever and simply supported beams and trusses graphically and Analytically, Graphical solution of simple determinate trusses with reference to forces diagram for determining the magnitude and nature of forces in its various members Analytical method; Methods of joints and method of sections (Simple problems only).

(10 Lectures)

The question paper shall have weightage to numerical/ case study 50% and to theoretical 50%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books

1. Bansal R.K., *Engineering Mechanics*, Laxmi Publication Pvt Ltd., Delhi.
2. Khurmi R.S., *Engineering Mechanics*, S. Chand & Co., Delhi.
3. Kapoor J.K., *Applied Mechanics*, Bharat Bharti Prakashan, Meerut.
4. Yadav K.S., *Engineering Mechanics*, Vayu Education of India.

Reference Books:

1. Kumar D.S., *Engineering Mechanics*, S.K. Kataria & Sons, Delhi.

CONCEPTS IN INFORMATION TECHNOLOGY
Third Semester

	L	T	P	C
Course Code: DIP304	**4**	**-**	**-**	**4**

Course Contents:

Unit I

Concepts in computer & Programming; Computer Appreciation: Definition of electronic Computer, Generations, Characteristic and Application of Computers, Computer Hardware, CPU, RAM/ROM, Various I/O devices, Software Definition, Role and Categories. **(Lectures 08)**

Unit II

Computer Languages: Classification & Program Methodology, Generation of Language, Translators, Interpreters, Assemblers Compilers, Software Development life cycle: Waterfall model. Software Testing.
Number System: Various codes, decimal, binary, octal, hexadecimal conversion. **(Lectures 08)**

Unit III

Internet and Web Technologies; Internet & World Wide Web: Hypertext Marks Language, WWW, Gopher, FTP, Web Browsers, Search Engines, Email. **(Lectures 08)**

Unit IV

Concepts in Operating System & Data Management: Elementary Concepts in Operating System, textual Vs GUI Interface, Introduction to DOS, MS Office Tools MS WORD, MS EXCEL, MS Power Point.
(Lectures 08)

Unit V

Application of IT to Areas like E Commerce, Multimedia, and Entertainment.
Information Representation: Introduction to Information representation in Digital Media, Text, Image, graphics, Animation, Audio, Video etc, Introduction to JPEG & MPEG. **(Lectures 08)**

The question paper shall have weightage to numerical/ case study 20% and to theoretical 80%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books

1. Yadav, DS, *Foundations of IT*, New Age, Delhi.
2. Curtin, *Information Technology: Breaking News*, Tata Mo Grew Hill.
3. Rajaraman, *Introduction to Computers*, Prentice-Hall Indi

The question paper shall have weightage to case study 20% and to theoretical 80%.

Reference Books

1. Nelson, *Data Compression*, BPB.
2. Peter Nortans, *Introduction to Computers*, TME.
3. Leon & Leon, *Fundamental of Information Technology*, Vikas Publishing.
4. Kantar, *Managing Information System*.
5. CIS Tams, *Internet, An Introduction*, Tata Mc Grew Hill.

BUILDING MATERIAL
Third Semester

	L	T	P	C
Course Code: DIP305	**3**	**-**	**-**	**3**

Course Contents:

Unit 1

Building Stone: Classification of Rocks: - Geological and physical classification, Testing of stones for specific gravity, Water absorption, Durability, Weathering.

Quarrying:- Basic Principles involved, Methods of quarrying, Blasting, where used Principals of ballasting, Line of least resistance, Drilling of quarrying, Blasting, where used, Principles of ballasting, Line of least resistance, Drilling of holes (Manually and mechanically), charging, tamping, Fugues and detonators, safety precaution, common explosives – only Name and their use.

Wedging- Where used, Tools required and operation of wedging, stone Crushing; Process and equipment used, crushers, gridding mills.

Availability, Characteristics and uses of the following stone:- Granite, Sand stone, Lime stone, Slate, basalt, trap quartzite and marble, Availability of different stones in the state. **(8 Lectures)**

Unit 2

Bricks & clay Products- Raw material for manufacture, Properties of good brick making earth, field-testing of brick clay. Manufacture of bricks, Preparation of clay-Manually/Mechanically. Molding: hand molding and machine molding, drying of bricks, Burning of bricks, Types of Kilns, Bull's Trench Kiln and Hoffman's kiln, Process of burning, Size of standard Bricks, its classification of brick as per I.S. and testing of common building bricks as compressive strength, water absorption, effloresce test. **(8 Lectures)**

Unit 3

Lime and Cement:- Lime:- Natural sources of lime, Definition of Quick, fat, hydraulic, hydrated lime, calcinations, slaking, manufacture of lime, process of setting and hardening action of lime field test of lime, pozzolonic material types, properties and uses.

Cement: Natural and artificial cement, Raw materials, manufacture of ordinary Portland cement, Flow diagram for dry and wet process, setting and hardening of cement. Types of cement, Properties of cement, Test of cement as per Indian standard. **(8 Lectures)**

Unit 4

Timber, Paints and Insulating Materials Timber:- Classification of Trees,- Cross Section of an Exogenous tree and explanation of terms, identification of different types of timber, teak, Chirr, Shish am, Sal, Mango, deodar, kail etc., Seasoning of Timber – Purpose, Types of seasoning, water, Air, Kiln, Chemical & solar Kiln seasoning.

Defects in Timber:- Decay in Timber, Preservation of timber, Method of treatment, Properties of good timber, common structural timber in India, Plywood, Veneers, Manufacture of plywood & its uses, Laminated Boards, Block Boards, Fiber Boards, Plastic Coated finishes, Water & fire resistant Plywood, PVC Boards.

Paints- Various Types of Paints their function and properties, cement paints their properties and uses, Varnish & polish, Lacquers' and enamels their properties uses and trade names.

Insulating Material:- Properties, uses and requirement of heat and sound insulating materials, properties and uses of cork, Rockwool, Glass wool, Concrete, Aluminum foil, Asbestos sheets for ceiling & their commercial name. **(8 Lectures)**

Unit 5

Glass, Plastic and water Proofing Materials Glass:- Types of glasses and their properties: Sheet, plate frosted, wired fiber and bullet resisting glass colored glass and commercial size, forms & their use.

Plastic:- Properties and uses of plastic, Imported commercial product, use of plastic in civil engineering, Plastic Pipes, Taps, Vales, Plastic coated paper, Polythene sheets, Bakelite, thermocole, P.V.C. Rexene and Linoleum. Water Proofing Materials Properties and commercial trade name. **(8 Lectures)**

The question paper shall have weightage to numerical/ case study 20% and to theoretical 80%.

Project work

A project work will be assigned to the students by the concerned subject faculty. It will carry 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty. The students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge. The project will be evaluated by the external examiner.

Text Books:-

1. Singh Gurcharan, *Building Materials*, Standard Publishers Distributors, Delhi.

Reference Books:-

1. Rangwala S.C., *Engineering Materials*, Charotar Publishing House Pvt. Ltd., Adand.

BASICS OF MECHANICAL ENGINEERING

Third Semester

	L	T	P	C
Course Code: DIP306	**3**	**-**	**-**	**3**

Unit 1:
Sources of energy, Energy sources in nature, conventional and non-conventional energy sources. Fuels, their properties and classification. **(6 Lectures)**

Unit 2:
Machine Components: Brief idea of loading of machine components- pins,cotter and knuckle joints, types of keys, shafts, collars, cranks and eccentrics, couplings and clutches. **(6 Lectures)**

Unit 3:
Bearings- use and types.
Lubrication- types of lubrication systems, selection of lubricants on the basis of their properties. **(5 Lectures)**

Unit 4:
Power transmission: Gears- types of gears, gear trains and their applications, nomenclature.
Belts, ropes, chains and discs. **(6 Lectures)**

Unit 5:
Springs- their types, use and material. **(6 Lectures)**

The question paper shall have weightage to numerical/ case study 20% and to theoretical 80%.

Project work
A project work will be assigned to the students by the concerned subject faculty. It will carry 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty. The students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge. The project will be evaluated by the external examiner.

Text Books

1. Garg R.P., *Elements of Mechanical Engineering*, Standard Publishers Distributors, Delhi.

ELECTRICAL AND ELECTRONICS ENGINEERING MATERIALS
Third Semester

	L	T	P	C
Course Code: DEE304	**3**	**-**	**-**	**3**

Course Contents

Unit 1

Classification

Classification of materials into conducting, semiconducting and insulating materials with reference to their atomic structure and energy bands.

Conducting Materials: Resistivity and factors affecting resistivity, such as temperature, alloying. Super conductivity and super conducting material. Low resistivity materials e.g. copper, aluminum and steel, their general properties as conductor e.g. resistivity, temperature co-efficient, mechanical properties, corrosion, solar ability, contact resistance and practical application. High resistivity materials: manganin, constantan nichrome, carbon, tungsten, their practical applications**.** **(8 Lectures)**

Unit 2

Insulating Materials

Properties of insulating material:- Electrical properties, Mechanical properties, Physical properties, Thermal properties, Chemical properties, Insulating materials and their application-Definition and classification of Thermo setting materials e.g. Phenol Formaldehyde, Resins (i.e. Bakelite), Thermo Plastic materials e.g. Polyvinyl Chloride (P.V.C.), ,Natural Insulating Materials- Mica and Asbestos ,Gaseous Materials e.g. Air, Hydrogen and SF6. **(8 Lectures)**

Unit 3

Magnetic Materials

B-H curve of magnetic materials, Classification of magnetic materials into soft and hard magnetic materials. Soft magnetic materials - high silicon alloy steel for transformers and low silicon alloy steel, for electric rotating machine cold rolled grain oriented and non-oriented steel, Nickel iron alloy, soft ferrites, their properties and uses. Hard magnetic materials - tungsten steel, chrome steel, cobalt steel, alnico, hard ferrites, their properties and applications. **(8 Lectures)**

Unit 4

Semiconductor Materials

Introduction, semiconductor and their applications, Different semiconductor materials used in manufacturing various semiconductors (Si & Ge), Material used for electronic components like resister, capacitor, diode, transistors and inductors. **(8 Lectures)**

Unit 5

Special Purpose Materials:

Thermocouple, bimetals, leads soldering and fuses material, mention their applications, Introduction of various engineering materials necessary for fabrication of electrical machines such as motors, generators, transformers etc. **(8 Lectures)**

The question paper shall have weightage to numerical/ case study 20% and to theoretical 80%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books:

1. Bhattacharya SK, *Electrical and Electronics Engineering Materials*, Khanna Publishers New Delhi.
2. Grover and Jamwal, *Electronics Components and Materials*, Dhampat Rai and Co. New Delhi.
3. Dhir SM, *Electrical Engineering Materials*, Tata Mc Graw Hill, New Delhi.

Reference Books:

1. Kapoor PL, *Electrical Engineering Materials*, Khanna Publishers, New Delhi.
2. Sharma BR and Others, *Electrical and Electronics Engineering Materials*, Sayya Parkashan.
3. DR. Arora, *Electrical and Electronics Engineering Mate*rials, Ishan Publications, Ambata City.
4. Dogra Rakesh, *Electrical Engineering Materials*, SK Kataria and Sons, New Delhi.

English Communication
Third Semester

Course Code: DIP 307

L	T	P	C
3	0	0	3

Course Content:

Unit I

Functional Grammar: Active, Passive voice, Conditional Sentences, Syntax, Concord, Common Errors. **(8 hours)**

Practical (oral): To make students practice the above mentioned grammatical RULES in the practical classes. **(2 hours)**

Unit II

Communication: Meaning & Importance of Communication, Process of Communication, Language as a tool of Communication. **(8 hours)**

Practical (Oral): To make students speak on their understanding of Communication in English. **(2 hours)**

Unit III

Writing Skills: Reporting events, Writing newspaper reports, Bio-data making, Writing of C.V. & Resumes, Writing job application. **(8 hours)**

Practical (Oral): To make students practice writing on the above mentioned processes. **(2 hours)**

Unit IV

Listening Skills: The listening process, hearing & listening, types of listening, Barriers to listening. **(8 hours)**

Practical (oral): To make student develop the skills of listening & thus improve their speaking skills. **(2 hours)**

Recommended Books:

1. Raman Meenakshi & Sharma Sangeeta – Technical Communication – Principles & Practices, - ONP, N. Delhi
2. Wren & Martin : High School English Grammar & Composition- S.Chand & Co. N.Delhi

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

ELECTRICAL AND ELECTRONICS ENGINEERING LAB
ELECTRICAL ENGINEERING LAB
Third Semester

	L	T	P	C
Course Code: DIP351	**-**	**-**	**4**	**2**

PRACTICALS

1) To verify the Ohm's Law.
2) To verify that $R_e = R_1+R_2+\ldots\ldots R_n$ where R_1, R_2 etc. are resistances connected in series.
3) Verification of Kirchhoff's current and Voltage Laws applied to D.C. circuit.
4) To observe the A.C. and D.C. wave shape on C.R.O.
5) To study different types of practical transformer.
6) To verify that $1/R_e=1/R_1/R_2+\ldots..1/Rm$. Where R_1, $R_2\ldots..R_m$ are all resistances connected in parallel.

Evaluation of Practical Examination:- As per Annexure – A

BASIC ELECTRONICS (LAB)

Practical No.- 1
Object: To study, identify & test the passive Components, Resistor Compactor.
Practical No.- 2
Object:- To draw the V-I characteristics of P-N Junction Diode in forward and reverse Bias in the following:

i) Silicon
ii) Germanium

Practical No.- 3
Object :- Draw the input and output wave form of Half wave rectifier using semi conductor diode.
Practical No.- 4
Object :- Draw the input and output wave form of full wave rectifier using semi conductor diode.
Practical No.- 5
Object :- Draw input and output characteristics of Transistor in common base configuration.
Practical No.- 6
Object :- Draw the V-I characteristics of zener diode.

Evaluation of Practical Examination:- As per Annexure – A

INFORMATION TECHNOLOGY LAB
Third Semester

	L	T	P	C
Course Code: DIP352	**-**	**-**	**2**	**1**

1. Create a document using functions: Save as, page number, Bullets and numbering.
2. Create a document using styles and Formatting options.
3. Create a document using different fonts.
4. Create a document, using the function page set up, & page preview, then print that document.
5. Create a table & perform operation in it.
6. Create a table, chart in excel and implement all formula as addition, subtraction, multiplication and division.
7. How to use Mail Merge in MS Word.
8. Create a Power point presentation using slide designing.
9. Create, Save & print the power point presentation.
10. Create a power point presentation using clipart, Word art gallery & then add transition & Animation effects.

Evaluation of Practical Examination:- As per Annexure – A

ENGINEERING DRAWING

Third Semester

	L	T	P	C
Course Code: DIP353	**1**	**-**	**3**	**3**

Course Contents:

1. Drawing, instruments and their uses.

1.1. Introduction to various drawing, instruments.
1.2. Correct use and care of Instruments.
1.3. Sizes of drawing sheets and their layouts.

2. (a) Lettering Techniques **1 Sheet**

Printing of vertical and inclined normal single stroke capital letters and numbers.

(b) Conventional Representation:

Types of lines, Conventional representation of materials.

3. Introduction to Scales **1 Sheet**

Necessity and use, R F**,** Types of scales used in general engineering drawing. Plane, diagonal and chord scales.

4. (a) Principles of Projection

Orthographic, Pictorial and perspective.
Concept of horizontal and vertical planes.
Difference between I and III angle projections.
Dimensioning techniques.

(b) Projections of points, lines and planes. **1 Sheet**

5. Orthographic Projections of Simple **2 Sheet**

Geometrical Solids: Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles with reference planes.

6. Section of Solids **1 Sheet**

Concept of sectioning

Cases involving cutting plane parallel to one of the reference planes and perpendicular to the others. Cases involving cutting plane perpendicular to one of the reference planes and inclined to the other plane, true space of the section.

7. Development of Surfaces **1 Sheet**

Parallel line and redial line methods of developments.

Development of simple and truncated surfaces (Cube, prism, cylinder, cone and pyramid).

8. Isometric Projection. **1 Sheet**

Isometric scale

Isometric Projection of solids.

9. Orthographic projection: **1 Sheet**

Nut and Bolt, Rivets and Riveted Joints.

10. Practice on auto cad:

To draw geometrical figures using line, circle, arc, polygon, ellipse, rectangle – erase and other editing commands and snap commands (two dimensional drawing only).

Books:

1. Bhatt N.D., *Engineering Drawing*, Charotar Publishing House Pvt. Ltd., Anand.
2. Upadhayay S.D., *Engineering Drawing*, Bharat Bharti Prakashan, Merrut.
3. Goyal B.K., *Engineering Drawing*, Asian Publishers, Muzaffarnagar.

Evaluation of Practical Examination:- As per Annexure – A

WORKSHOP PRACTICE
Third Semester

	L	T	P	C
Course Code: DIP354	**-**	**-**	**4**	**2**

1. Carpentry Shop Work:

- **Ex-1** Planning and sawing practice.
- **Ex-2** Making of Lap Joint.
- **Ex-3** Making of Mortise and tendon Joint
- **Ex-4** Making of Briddle Joint.
- **Ex-5** Making of Dovetail Joint.
- **Ex-6** Making of any one utility articles such as wooden-picture frame, hanger, peg, name plates etc.

2. Fitting Shop:

- **Ex-1** Hacks awing and chipping of M.S. flat.
- **Ex-2** Filing and squaring of chipped M.S. job.
- **Ex-3** Filing on square or rectangular M.S. piece.
- **Ex-4** Making Bolt & Nut by Tap and Die set.
- **Ex-5** To drill a hole in M.S. Plate and taping the same to create threads as per need.
- **Ex-6** Utility article-to prepare a screw driver or paper weight, double open mouth spanner for 18" hexagonal head of a bolt.

3. Welding Shop:

- **Ex-1** Welding practice-Gas and Electric.
- **Ex-2** Welding for lap joint after preparing the edge.
- **Ex-3** Welding of Butt joint after preparation of the edge.
- **Ex-4** 'T' joint welding after preparation of edge.
- **Ex-5** Spot welding, by spot welding Machine.
- **Ex-6** Welding of Plastic by Hot strip method.

4. Machine Shop :

- **Ex-1** Study & sketch of Lathe machine.
- **Ex-2** Plane and step turning & knurling practice.
- **Ex-3** Study & sketch of planning machine and plane a rectangle of cast iron.

Evaluation of Practical Examination:- As per Annexure – A

APPLIED MECHANICS LAB
Third Semester

Course Code: DIP355

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. To verify the law of Polygon of forces.
2. To verify the law of parallelogram and triangle of forces.
3. To verify the law of principle of moments.
4. To find the coefficient of friction between wood, steel, copper and glass.
5. To find the reaction at supports of a simply supported beam carrying point loads only.
6. To find the forces in the jib & tie of a jib crane.
7. To find the forces in the members of a loaded roof truss. (King / Queen post truss)

Evaluation of Practical Examination:- As per Annexure – A

MANUFACTURING PROCESS – I

Fourth Semester

	L	T	P	C
Course Code: DME401	**3**	**-**	**-**	**3**

Course Contents:

Course Contents:

Unit:- I

GENERAL FORMING PROCESSES:- Classification and elementary idea of metal forming processes on the basis of the properties of deformability (Plasticity), fusibility and divisibility Viz Rolling, Forging, Drawing, Extruding, Spinning, Punching, Blanking.

WELDING:-

Weld edge preparation, Introduction to various welding processes with procedure equipments and applications such as

(i) Electric arc welding., **(ii)** Resistance welding-Spot welding, Flash butt, Percussion welding., **(iii)** Thermit welding., **(iv)** Carbon arc welding, **(v)** Metal-Inert-Gas welding (MIG)., **(vi)** Tungsten arc welding (TIG)., **(vii)** Laser Beam, Electron Beam Welding, Explosion Welding, Ultrasonic Welding., **(viii)** Under water welding, **(ix)** Submerged Arc welding. **(8 Lectures)**

Unit:- II

WELDING:- Definition, arc initiation, arc structures, types of arc, metal transfer characteristics and influencing parameters, weld bead geometry, various types of

Electrodes used in various processes. Selection of electrode from catalogue, current and voltage setting from welder's hand book. **(8 Lectures)**

Unit:- III

WELDING OF SPECIAL MATERIALS:- (i) weld ability **(ii)** Welding of Grey Cast Iron **(iii)** Welding of Aluminum **(iv)** Welding of copper, Brass and Bronze, TIG., Oxyacetylene method., **(v)** Welding of Alloy steels welding, Stainless steel, welding by oxyacetylene process, MIG, TIG. Specification of electrode as per latest I.S. code.

(8 Lectures)

Unit:- IV

TESTING OF WELDS & RELEVENT WELDING CODES:- (a) Destructive methods., **(b)** Non destructive methods-visual, X-ray, Gamma-ray,

Magnetic particles, flaw detection, fluorescent, dye penetrate and ultrasonic testing. **(8 Lectures)**

Unit:- V

COST ESTIMATION OF WELDING:- Material cost, Fabrication cost, Preparation cost, Welding cost and Finishing cost, Over head cost, Cumulative effect of poor practices on cost, Calculation of cost of welding gas consumption and welding electrodes. **(8 Lectures)**

The question paper shall have weightage to case study 30% and to theoretical 70%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Books:-

1. Sharma & Bhatnagar, *Manufacturing Process – II*, Nab Bharat Pranshan, Meerut.
2. Rao M.M., *Manufacturing Technology*, Language Book Society, Delhi.
3. Sinha & Goel, *Foundry Technology*, Standard Publishers Distributors, Delhi.

Reference Books:-

1. Hitomi, *Manufacturing System Engineering*, Standard Publishers Distributors, Delhi.

METROLOGY AND MEASURING INSTRUMENTS
Fourth Semester

	L	T	P	C
Course Code: DME402	**3**	**-**	**-**	**3**

Course Contents:

Unit:- I

INTRODUCTION: Meaning and scope of metrology in field of engineering. standards and types of measurements (Line and Wave length, Primary, Secondary and Tertiary measurement concept only). Limits, Fits and Tolerances. Interchangeability, precision and accuracy, Sources of error.

PRINCIPLES AND CLASSIFICATIONS OF MEASURING INSTRUMENTS

Principle of Mechanical Measuring Instruments:- vernier method, screw and screw nut method, Principle of Electrical measuring instruments. Principle of Hydraulic and Pneumatic Instruments. **(8 Lectures)**

Unit:- II

TRANSDUCERS:- Definition, various types of transducers such as resistive, capacitive, inductive, electromagnetic, photo electric, piezo electric and their use in instrumentation.

COMPARATORS:- General principles of constructions, balancing and graduation of measuring instruments, characteristics of comparators, use of comparators, difference between comparators, limit gauges and measuring instruments. Classification of comparators, construction and working of dial indicator, Johansson "Mikrokator", read type mechanical comparator. **(10 Lectures)**

Unit:- III

SURFACE FINISH:- Geometrical characteristics of surface roughness- Waviness. Lay, flaws. Effect of surface quality on its functional properties. Factor affecting the surface finish. Evaluation of surface finish. RMS and CLA values. Methods of measuring surface roughness.

Mechanical Quantities :- Displacement, velocity, acceleration, speed, torque-Use of transducers and electronic counters, stroboscope, vibrating reeds and techno meters. Pressure and Vacuum - Idea of atmospheric pressure, Gauge pressure and vacuum - Use of instruments such as manometers and pressure gauge using elastic elements such as diaphragm, Capsule, Bellows, Bourdon tube and various transducers and thermo couple, vacuum gauges. **(10 Lectures)**

Unit:- IV

TEMPERATURE MEASUREMENT:- Various types of thermometers, thermocouples, pyrometers (Radiation and optical type both). **(6 Lectures)**

Unit:- V

MEASUREMENT OF VIBRATIONS:- Use of seismic Accelerometer, Potential metric type.

INSPECTION OF GEOMETRICAL ERRORS:- Construction and working of auto collimator, checking of straightness, flatness, queerness and parallelism, circularity (By dial gauge and tiered). **(6 Lectures)**

The question paper shall have weightage to case study 30% and to theoretical 70%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Books:-

1. Bhatnagar S., *Metrology & measuring Instrument*, Nav Bharat Prakshan, Meerut.
2. Vikram Sharma, *Measurement, Metrology and Control*, S.K. Kataria & Sons, New Delhi.

Reference Books:-

1. Rajput R.K., *Mechanical Measurement and Instrument*, S.K. Kataria & Sons, New Delhi.

COMPUTER AIDED DESIGN
Fourth Semester

Course Code: DME 404

L	T	P	C
3	-	-	3

Course Contents:

Unit: I

CAD Hardware: Different types of graphics display devices - Stroke writing, Raster, Beam Penetration colour CRT, Shadow mark colour CRT, TFT Monitor. Input devices such as mouse, digitizer, light pen, joy stick, thumb wheel, track ball, Scanner. Graphics output devices - plotters and printers. **(8 Lectures)**

Unit: II

CAD Software - Application of CAD Software.

Design process and role of computers in design process, Benefits of CAD. **(8 Lectures)**

Unit: III

2-D transformations: Translation, scaling, rotation, mirror and share, Zooming, Panning and Clipping. **(8 Lectures)**

Unit: IV

Conventional Numerical Control: Introduction, Basic components of an NC system, NC procedure, NC coordinate systems, NC motion control systems, Applications and Economics of NC. **(8 Lectures)**

Unit: V

NC Part Programming: Introduction, punched tape in NC, Tape coding and format, Manual part programming, computer-assisted part programming, APT language, Manual data input. **(8 Lectures)**

The question paper shall have weightage to case study 20% and to theoretical 80%.

Project work

A project work will be assigned to the students by the concerned subject faculty. It will carry 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty. The students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge. The project will be evaluated by the external examiner.

Text Books:-

1. Ganesh M., *Basics of Computer Aided Geometric Design*, I.K. International Publishing House Pvt. Ltd., New Delhi.

Ref. Books.:-

1.Srinivasa Prakash Regalla, *Computer Aided Analysis and Design*, I.K. International Publishing House Pvt. Ltd., New Delhi

STRENGTH OF MATERIAL & HYDRAULICS

Fourth Semester

	L	T	P	C
Course Code: DME478	**4**	**-**	**-**	**4**

Course Contents:

{A Part} STRENGTH OF MATERIALS

Unit:- I

Bending Moment and Shear Force: Concept of a beam, and supports (Hinged, Roller and Fixed). Types of Beams: Simply supported, cantilever, fixed, overhang and continuous beams. Types of loads (distributed and point). Concept of Bending Moment & Shear Force. Bending moment and shear force diagrams for simply supported beams subjected to uniformly distributed and concentrated loads. Point of maximum B.M. and contra flexure. **(8 Lectures)**

Unit:- II

Bending Stresses: Assumptions of theory of simple bending. Derivation of the equation. M/I=F/Y=E/R. Concept of centroid and second moment of area, Radius of gyration, Theorems of parallel and perpendicular axes, Second Moment of area for sections: rectangle, triangle, T and I Channel. Moment of resistance, section modulus and permissible bending stresses, Bending stresses in circular rectangular, I,T and L section. Comparison of strength of above sections. **(8 Lectures)**

Unit:- III

Columns & Struts:

Definition of long column, short column and strut, slenderness ratio, equivalent length, critical load, End conditions of column. Application of Eular's formula (no derivation), simple numerical problems based on Euler's formulae. **(8 Lectures)**

{B Part} HYDRAULICS

Course Contents:

Unit:- I

Properties of Fluids: Fluid, Real fluid, ideal fluid., Fluid Mechanics. Hydrostatic Pressure: Pressure, intensity of pressure, pressure head, Pascal's law and its applications. Total pressure, resultant pressure, and centre of pressure.

Measurement of Pressure: Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Use of simple manometer, differential manometer. Various types of Flow. Discharge and continuity equation (flow equation) Types of hydraulic energy. Potential energy, Kinetic energy, Pressure energy Bernoulli's theorem; statement and description (without proof of theorems). **(8 Lectures)**

Unit:- II

Flow through open channels: Definition of a channel, Discharge through channels using.

(i) Chezy's formula (no derivation) **(ii)** Manning's formula. **(iii)** Calculation for the most economical rectangular section of channel. **(8 Lectures)**

Unit:- III

Orifice:

Definition of Orifice, and types of Orifices, Hydraulic Coefficients.

Notches

Measurement of discharge by a notch, Difference between notches and orifices. Discharge formulae for rectangular notch, Difference between notches and weirs. **(8 Lectures)**

The question paper shall have weightage to case study 50% and to theoretical 50%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books:-

1. Rajput R. K., *Strength of Materials*, S.Chand & Co. Ltd., Delhi.
2. Kapoor J.K., *Strength of Materials,* Asian Publication, Muzaffarnagar.
3. Punmia B.C., *Strength of Materials*, Laxmi Publication, Delhi.
4. *Fluid Mechanics & Hydraulic Machines,* Laxmi Publaction (P) Ltd., New Delhi.
5. Vijay Gupta & Gupta S.K., *Fluid Mechanics*, New Age International Publishers, New Delhi.
6. Kapoor J.K., *Hydraulics,* Bharat Bharti Prakashan, Merrut.
7. Likhi S.K., *Hydraulics Laboratory Manual*, New Age International Publishers, New Delhi.

Reference Books:-

1. Ramamarutham S., *Strength of Materials*, Dhanpat Rai & Sons, Delhi.
2. Garde R.J., *Fluid Mechanics*, New Age International Publishers, New Delhi.
3. Jagdish Lal, *Hydraulics & Hydraulic Machines*, Metropolitan Book Depot, Delhi.
4. Modi P.N., *Fluid Mechanics*, New Age International Publishers, New Delhi.

ENGINEERING MATERIALS & MATERIAL SCIENCE
Fourth Semester

Course Code: DME475	L	T	P	C
	3	-	-	3

Unit I

Classification of Materials; Thermal, Chemical, Electrical and Mechanical Properties of Various Materials; Selection Criteria for Use in Industry. **(6 Lectures)**

Unit II

Metal Structure; Relation of Metal Structure to its Properties; Arrangement of Atoms in Metals (Basic Idea); Crystalline Structure of Metals. **(6 Lectures)**

Unit III

Classification of Iron and Steel; Sources of Iron Ore and its Availability; Manufacture of Pig Iron, Wrought Iron, Cast Iron and Steel (Flow Diagrams Only); Types of Cast Iron, White,\ Malleable, Grey, Mottled, Modular and Alloy and their Usage. **(7 Lectures)**

Unit IV

Important Ores and Properties of Aluminum, Copper, Zinc, Tin and Lead; Properties and Uses of Al Alloys and Copper Alloys; Bearing Metals; Solders. **(6 Lectures)**

Unit V

Important Sources of Plastics; Classification; Thermoplastic and Thermo-set; Various Trade; Names of Engineering. Plastics; Plastic Coating; Fibers and their Classification.

Heat treatment processes – Their purpose and types; Theory of Solid Solution; Iron-carbon Diagram; TTT Curve in Steels and its Importance. **(15 Lectures)**

The question paper shall have weightage to case study 20% and to theoretical 80%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books:

1. Hajra Choudhury S.K., *Materials Science & Processes*, Indian Book Distributing Company, Kolkata.
2. Bhatnagar S.K., *Material & Materials Science*, Nav Bharat Prakashan, Meerut.
3. Kashyap K.T., *Materials Science for Engineers*, I.K. International Publishing House Pvt. Ltd., New Delhi.
4. Purohit R.K., *Materials Science & Processes*, Standard Publishers Distributors, Delhi.

Reference Books:-

1. Rajput R.K., *Text book of Material Science*, S.K. Kataria & Sons, Delhi.
2. Varinder Kumar, *Text book of Material Science*, Eagle Publisher, Delhi.

THERMAL ENGINEERING
Fourth Semester

Course Code: DME476

L	T	P	C
3	-	-	3

Course Contents:

Unit:- I

FUNDAMENTAL OF THERMODYNAMICS (part a):- Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system. Zeroth law of thermodynamics. First law of thermodynamics. Idea of internal energy and enthalpy. Thermodynamic processes - constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic process and polytropic process, their representation on P-V diagram and calculation of work done. Simple numerical problems. **(8 Lectures)**

Unit:- II

FUNDAMENTAL OF THERMODYNAMICS(part b):-

Second law of thermodynamic concept of perpetual motion machine of first order and that of second order. Concept of heat engine, heat pump and refrigerator. Co-efficient of performance for refrigerator and heat pump. Simple numerical problems concerning the above. **(8 Lectures)**

Unit:- III

AIR COMPRESSOR:- Definition and their use, Difference between reciprocating
And rotary air compressor, their types and working, work done during compression in single stage and two stage reciprocating air compressor. Inter cooling in two stage compression. **(8 Lectures)**

Unit:- IV

INTERNAL COMBUSTION ENGINE:-Engine history, Definition, classification, Four Stroke Engine working. C.I. and S.I. engine working. Comparison between C.I and S.I Engine. Comparison of two stroke and four stroke engine. Comparison of petrol and diesel engine. **(8 Lectures)**

Unit:- V

REFRIGERATION AND AIR CONDITIONING:- Introduction to refrigeration system, methods of refrigeration, unit of refrigeration, open and closed air refrigeration cycles. Introduction to air conditioning, psychometric properties and their definitions, different psychometric processes. Elementary knowledge of refrigeration and air conditioning equipments e.g. compressors, condensers, evaporators, expansion devices and air washers. **(8 Lectures)**

The question paper shall have weightage to case study 40% and to theoretical 60%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books:-

Bhatnagar S.K., *Thermal Engineering*, Nav Bharat Prakashan, Meerut.

Reference Books:-

1. Ballaney P.L., *Thermal Engineering*, Khanna Publishers, Delhi.

THEORY OF MACHINES
Fourth Semester

	L	T	P	C
Course Code: DME405	**3**	**-**	**-**	**3**

Course Contents:

Unit:- I

MECHANISMS AND MACHINES :- Definition, Kinematic pairs, types of mechanism, Special types of mechanism, Space mechanisms.

KINEMATIC ANALYSIS & SYNTHESIS :- Displacement, Velocity and Acceleration of plane mechanism, Graphical techniques. **(8 Lectures)**

Unit:- II

DYNAMICS OF MACHINES :- Engine mechanisms, Turning moment diagram, Flywheel analysis, Gyroscopic action in machines.

GOVERNORS: - Types and classification, Principle of working of gravity controlled and spring controlled governors, Stability, Isochronisms, Sensitivity and capacity. **(8 Lectures)**

Unit:- III

UNBALANCE IN MACHINES, ENGINES AND BALANCING :- Origin of unbalanced forces and moments and effects of unbalance, Unbalance in rotating bodies and balancing of discs. Unbalance in reciprocating machines - engine. Unbalance force and moment in a single cylinder engine and balancing. **(8 Lectures)**

Unit:- IV

CAMS AND CAM FOLLOWER MECHANISMS :- Purpose of using cam- Follower mechanisms, types of cams and cam follower mechanisms, Nomenclature synthesis of disc cam profiles for prescribed follower motion, determination of basic dimension, Graphical for different types of followers. Jump and crossover stock. **(8 Lectures)**

Unit:- V

GEARS AND GEAR DRIVES :- Power transmission by gears and fundamental law of gearing, Involutes profile and conjugate action, Characteristics of in volute tooth gear - Pinion to system, Under cutting and interference, Minimum number teeth, types of gears, Various gear drives - Spur, Helical, worm and Bevel gear, Gear train - Simple compound and epicyclical gear trains.

VIBRATION :- Vibration of single degree of freedom, Systems, Free forced, Damped and undammed vibration, Frequency response and resonance, Bare excitation - Transmissibility and Isolation, Free vibration 2 DOF system - Concept of normal mode, vibration absorber, Multidegree of freedom systems, Free vibration of bars, Shafts and beams, Energy methods and approximate methods. **(8 Lectures)**

The question paper shall have weightage to case study 50% and to theoretical 50%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books:-

1. Jadon V.K., *Machine Design Data Book*, I.K. International Publishing House Pvt. Ltd., New Delhi.
2. Rao T. Krishna, *Design of Machine Elements Volume II*, I.K. International Publishing House Pvt. Ltd., New Delhi.

Ref. Books.:-

1. Sharma P.C., *Machine Design*, S.K. Kataria & Sons, New Delhi.

Technical Communication
Fourth Semester

Course Code: DIP 401

L	T	P	C
3	0	0	3

Course Content:

Unit I

Pre-requisites of Technical Written Communication: One Word Substitution, Spelling process, words often confused and misused, Technical terms. **(8 hours)**

Practical (oral):

To make students practice the above mentioned topics & take care of the technical terms & also use those in different sentences. **(2 hours)**

Unit II

Technical Communication: Nature, origin & development, salient features, significance, Difference between Technical Communication & General Writing. **(8 hours)**

Practical (oral) : To make students speak on the development of Technical Communication. **(2 hours)**

Unit III

Forms of Technical Communication: What is a Report ? Characterstics of Report, steps to be followed for Report writing, Structure of Report, Importance of Report Writing. **(8 hours)**

Practical (oral): To make students practice how to write a report and then speak on the subject matter of the report. **(2 hours)**

Unit IV

Technical Proposal: What is Proposal ? Significance of proposal, format of proposal, characteristics' of a good proposal. **(8 hours)**

Practical (oral): To make students practice writing a proposal. **(2 hours)**

Recommended Books:

1. Raman Meenakshi & Sharma Sangeeta –Technical Communication – Principles & Practices,-O.N.P. N. Delhi .
2. Mohan K & Sharma R –Business Correspondence and Report writing –TMH, New Delhi.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

STRENGTH OF MATERIALS & HYDRAULIC LAB
Fourth Semester

Course Code: DME461	L	T	P	C
	-	-	2	1

1. Determination of shear force at different sections on a simply supported beam under points loads.
2. Determination of bending moment at different sections on a simply supported beam under different types of loading.
3. Determination of yield stress, ultimate stress, percentage elongation, plot the stress strain diagram and compute. the value of Young's Modulus of mild steel.
4. Determination of the maximum deflection and Young's Modulus. of elasticity by deflection apparatus.
5. Determination of modulus of rigidity of material by Torsion apparatus.
6. Determination of hardness of a metal plate by Rock Well Brinell hardness testing machine.
7. To perform impact test on Izod Impact testing machine.
8. To verify Bernoullis Theorem.
9. To find out venturimeter coefficient.
10. To determine coef. of velocity (Cv), Coef. of discharge(Cd) Coef. of contraction (Cc) and verify the relation between them.
11. To perform Reynold's Experiment.
12. To determine Darcy's coefficient of friction for flow through pipes.
13. To verify loss of head due to:
    - **a.** Sudden enlargement
    - b. Sudden Contraction.
14. Study of the following
    - **a.** Reciprocating Pumps or Centrifugal Pumps.
    - **b.** Impulse turbine or Reaction turbine
    - **c.** Pressure Gauge /pitot tube.

Evaluation of Practical Examination:- As per Annexure – A

MATERIAL SCIENCE LAB
Fourth Semester

Course Code: DME462

L	T	P	C
-	-	2	1

1. Study of diamond polishing apparatus.
2. Study metallurgical microscope.
3.(a) To prepare specimens for microscope examination (For Polishing and etching).
(b) To examine the microstructure of the above specimens under metallurgical microscope.
(c) To know composition of alloy steel by spebber stereoscope
(d) To know carbon in steel by carbon steel estimation apparatus
4. Preparation of specimens and study of microstructure of eight given metals and alloys on metallurgical microscope.
i. Brass. **ii.** Bronze. **iii.** Grey Cast Iron. **iv.** Malleable Cast Iron. **v.** Low Carbon Steel. **vi.** High Carbon Steel. **vii.** High Speed Steel.
viii. Bearing Steel.
5. To perform heat treatment process on materials of known carbon percentage -
1. Annealing **2**. Normalizing **3**. Case Hardening
6. Mini Project
i. Collect samples of heat insulating materials
ii. Collect samples of various steels and cast iron.
iii. Collect sample of Non-Ferrous alloys.
iv. Collect samples of Non-Metallic engineering materials

Evaluation of Practical Examination:- As per Annexure – A

THERMAL ENGINEERING LAB
Fourth Semester

Course Code: DME463	L	T	P	C
	-	-	2	1

1. Study of fire tube boiler (locomotive boiler).
2. Study of water tube boiler (Babcock and Wilcox boiler).
3. Study and working of four stroke petrol engine.
4. Study and working of four stroke diesel engine.
5. Study and working of two stroke petrol engine.
6. Study and working of two stroke diesel engine.
7. Study of steam engine model.
8. Study of gas turbine model.
9. Study of impulse and reaction turbine.
10. Study of velocity compounded steam turbine.

Evaluation of Practical Examination:- As per Annexure – A

.

MECHANICAL ENGINEERING DRAWING
Fourth Semester

Course Code: DME464

L	T	P	C
-	-	3	1

GENERAL CONCEPT OF MACHINE DRAWING

(a) Views and sections (Full and half), dimensioning. Technique -Unidirection and aligned practice conventions as per latest code of practice for general engineering drawing. General concept of IS working drawing symbols for

(i) Welding &Rivetting **(ii)**Serews& Screw threads **(iii)**Surface Finish Marks

(iv) Limits, Fits & Tolerances

Sectioned View of

(i) Foundation bolts

(ii) Pipe Joints - Flanged, Socket, Hydraulic joint and Union joint.

Assembly Drawing of

(i) Knuckle joint- Part drawing, Solid Modeling, Assembly and Sectioning.

(ii) Protective type flange coupling- Part drawing, Solid Modeling, Assembly and Sectioning.

(iii) Bench vice - Part drawing, Solid Modeling, Assembly and Sectioning.

Assembly drawing from detail and vice versa:

(i) Tail stock of Lathe machine **(ii)** Screw jack **(iii)** Drilling Jig

Spur gear profile drawing from given data Free hand sketching of

(i) Pipe fittings-Such as-Elbows-Reducers, T-Cross and Bibcock.

(ii) I. C. engine piston, Simple bearing, Cottor and Knuckle joint, pulleys and flywheel-Sectioned views.

(iii) Cutting tools of Lathe machine, shaper and common milling cutters.

(iv) Gear puller and C-clamp

(v) Sketching of ortho graphics views from isometric views be practiced.

Text Books:-

1. Sharma S.C., *Machine Drawing*, Standard Publishers Distributors, Delhi.
2. Gill P. S. ,*Machine Drawing*.

Evaluation of Practical Examination:- As per Annexure – A

MANUFACTURING PROCESSES – I LAB
Fourth Semester

	L	T	P	C
Course Code: DME465 (Common with **DME451)**	**-**	**-**	**2**	**1**

ADVANCE WELDING SHOP:

(a) Study of various Gas cutting and welding equipments: Welding transformer, Generator/rectifier, Gas cylinder, Gas cutting machines, Cutting torches etc., Various electrodes and filler metals and fluxes. Practice of welding and cutting of different metals by making suitable jobs by different methods:

1. Arc Welding practice of mild steel (M.S.) and Spot welding on stainless steel jobs.
2. Tag Welding practice of Non-Ferrous metals, like Copper, Brass and Aluminum.
3. Practice of Gas cutting manually.
4. Practice of Gas cutting by cutting machine.
5. Practice of Arc cutting.
6. Study of Welding defects.
7. Inspection and Tests of welded joints.
8. Practice of Spot and Seam welding.
9. Practice of Welding pipe joints, Pipes and Pressure vessels.

Evaluation of Practical Examination:- As per Annexure – A

METROLOGY LAB
Fourth Semester

	L	T	P	C
Course Code: DME466 (Common with **DME452**)	**-**	**-**	**2**	**1**

1. Use of linear measuring instrument such as venire caliper and micrometer.
2. Study of limits, fits and tolerances.
3. To check circularity of rod using Dial Indicator.
4. Study of Height Gauge.
5. Study of feeler gauge to check the spark plug gap.
6. Measurement of angle with the help of sine bar.
7. Measurement of angle with the help of venire Bevel protractor.
8. Use of slip gauge in measurement of centre distance between two pin.
9. Calibration of venire calipers/micrometers with slip gauge.
10. Calibration of height gauge/depth gauge with slip gauge.

Evaluation of Practical Examination:- As per Annexure – A

CAD LAB
Fourth Semester

	L	T	P	C
Course Code: DME467	**-**	**-**	**2**	**1**

LIST OF PRACTICALS

1. Development of simple graphic package using 2-D and 3-D transformation and algorithms for generation of lines and circles (programming using C)
2. Development of wire frame models of simple 3-D objects like box , cylinder, cone, pyramids, prisms and sphere (programming using C).
3. FEM Mesh generation
4. Stress analysis / heat conduction analysis using standard FEM package.
5. Stress analysis of cantilever using U.D.L.
6. Stress analysis of simply supported beam using point load.
7. Benching of circular plate and analysis of stress and strain.
8. Heat conduction analysis using circular bar.
9. Design and analysis of crank shaft.

Evaluation of Practical Examination:- As per Annexure – A

MANUFACTURING PROCESS – II
Fifth Semester

	L	T	P	C
Course Code: DME 501	**4**	**-**	**-**	**4**

Course Contents:

Unit:- I

FOUNDRY PRACTICE:-

PATTERN AND MOULDING: The pattern materials used, Types of patterns, Allowances and pattern layout, Types of cores and their utility.

Molding Processes:- Classification of mould materials according to characteristics, Types of sands and their important test, parting powders and liquids. Sand mixing and preparation, Moulding defects. **(8 Lectures)**

Unit:- II

MELTING AND POURING:- Fuels and metallic materials used in foundry. Melting furnaces used in foundry such as pit furnace, Tilting and cupola furnaces, metals and alloys. Additions to molten metal, Closing and pouring of the moulds.

Coring-up, venting and closing, use of ladles, spur and risers, Defects due to closing and spurring. Basic idea of fettling operations. Surface treatment, Salvaging of castings, Factors determining soundness of casting. Handling of molten metal from furnace to mould. **(8 Lectures)**

Unit:- III

SPECIAL CASTING:- Elementary idea of special casting processes-Shell mould casting, die casting, investment mould casting, centrifugal and continuous casting full mould casting. Elementary idea of mechanization of foundries. **(8 Lectures)**

Unit:- VI

POWDER METALLURGY:- Introduction, principle, scope and names of processes. Production of metal powders, compaction, sintering and sizing. Self lubricated bearings. Advantages of the process and its limitations. (Elementary concept only). **(8 Lectures)**

Unit:- V

ESTIMATING AND COSTING:- Calculation of material cost for casting and Forging. **(8 Lectures)**

The question paper shall have weightage to case study 30% and to theoretical 70%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books:-

1. Sharma & Bhatnagar, *Manufacturing Process – II*, Nab Bharat Pranshan, Meerut.
2. Rao M.M., *Manufacturing Technology*, Language Book Society, Delhi.
3. Sinha & Goel, *Foundry Technology*, Standard Publishers Distributors, Delhi.

Ref. Books.:-

1. Hitomi, *Manufacturing System Engineering*, Standard Publishers Distributors, Delhi.

MACHINE TOOL TECHNOLOGY
Fifth Semester

	L	T	P	C
Course Code: DME 502	**4**	**1**	**-**	**5**

Course Contents:

Unit:- I

CENTRE LATHE:- The centre lathe and its principle of working. Types of lathes, Lathe specification and size, Features of lathe bed. Head stock and tail stock. Feed mechanism and change-gears, carriage saddle, Cross slide, Compound rest, Tools post, Apron mechanism, lathe accessories, Chucks, Face plate, Angle plate, Driving plate, Lathe dogs, mandrills, Steady rest, Lathe attachments. Lathe operations-plane and step turning, Taper turning, Screw cutting, Drilling, Boring, reaming, Knurling, Parting off, Under cutting, Relieving. Types of lathe tools and their uses. Brief description of semi automatic and automatic lathes such as capstan and turret lathes, their advantages and disadvantages over centre lathe, types of job done on them. General and periodic maintained of a centre lathe. **(8 Lectures)**

Unit:- II

SHAPING, PLANING & SLOTTING MACHINES:- Working principles of planer, shaper and slitter. Differences and similarities among them, quick return mechanism applied to the machines.

DRILLING & BORING MACHINES:- Types of tools used in drilling and boring. Classification of drilling and boring machines, principle of working and constructional details of simple and radial drilling M/C and general and periodic maintenance. Operations like facing, counter boring, tapering. **(8 Lectures)**

Unit:-III

MILLING MACHINES:- Types of milling machines, constructional features of horizontal milling M/C.. Simple, compound and Differential indexing, milling of spur gears and racks.

GRINDING MACHINES:- Common abrasive grinding wheel materials, Bonds, Grain or grits of abrasive, Grain structure and shapes of common wheels, various speeds and feeds, Use of coolants, Methods of grinding. Types of grinding machines, precision finishing operations like honing. **(8 Lectures)**

Unit:-IV

BROACHING MACHINES:- Broaching- internal and external surface Types of work done on broaching machine. Simple types of broaches and their uses, Types of broaching machines. Comparison of broaching with others processes.

JIGS AND FIXTURES:- Object of Jigs and Fixture. Difference between jigs and fixtures. Principle of location. Principle of clamping. Locating and clamping devices. Types of jigs -Simple open and closed (or box) jigs. Drill jigs- Bushes (Fixed liner, Renewal slip). Template. Plate jigs. Channel jigs, Leaf jigs. Simple example of milling, turning, grinding, horizontal boring fixtures and broaching fixtures. Welding fixtures. devices. **(8 Lectures)**

Unit:-V

COOLING PROCESS:- Coolants and cutting fluids difference between coolant and cutting fluid, Function and action of cutting fluids. Requirement of good cutting fluids, their selection for different materials and operations.

AUTOMATION OF MACHINING CENTRES :- Introduction to CNC Machine tools (Computer Numerical Control Lathe) and FMS (Flexible Manufacturing System) Introduction only. **(8 Lectures)**

The question paper shall have weightage to case study 20% and to theoretical 80%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Books:-

1. Chapman W.C., *Workshop Technology*, Macmillom and Co, Delhi.
2. Kapoor J.K., *Machine Tool Technology,* B. Bharti Prakashan Meerut.

Ref. Books.:-

1. Hazara and Chaudhary, *Machine Tool Technology Vol - I & II,* Oxford & IBH, Delhi.

DESIGN AND ESTIMATION
Fifth Semester

	L	T	P	C
Course Code: DME 503	**4**	**1**	**-**	**5**

Course Contents:

Unit: I

INTRODUCTION TO DESIGN: General design consideration in machine parts. Mechanical properties of materials of construction, steps in machine design. Factor of safety, Selection of materials. **(6 Lectures)**

Unit: II

MACHINE PARTS SUBJECTED TO DIRECT LOADS AND SHEAR LOADS:-

Threaded connections, core and nominal diameter of screw, boiler-Stay. Design for number of studs or bolts and their diameter for cylinder covers due to external forces. Punching and shearing. Design of cotter and Knuckle joints. **(8 Lectures)**

Unit: III

RIVETED AND WELDED JOINTS: Types of riveted joints, possible failure of riveted joints. Strength and efficiency of riveted joint. Unwinds formula. Determination of safe load and pitch of rivets. Design of lap and butt joints. Common type of welded joints, definition of leg length, throat thickness and size of weld. Simple design for 'V' butt welded joint, Transverse fillet and parallel fillet welded joints. **(8 Lectures)**

Unit: IV

MACHINE PARTS SUBJECTED TO BENDING MOMENT: Semi-elliptic Laminated spring-Proof load and proof stress stiffness. Expression for max, stress and deflection, determination of different dimensions number of Laminations, Central deflection in a Laminated spring.

MACHINE PARTS SUBJECTED TO TWISTING MOMENT: Design of solid and hollow shafts. Close-coiled helical spring. Maximum shear stress induced for given axial load. Expression for axial deflection, spring index, solid length and stiffness. Calcualtion for number of coils, mean coil dia and dia of spring wire for axial gradual loads. Simple cases of composite springs. Design of keys and coupling bolts for a rigid flanged coupling. **(10 Lectures)**

Unit: V

ESTIMATION OF MATERIAL REQUIREMENT: Estimation of weight of simple machine parts. Review of the area/volume of triangle, equilateral triangle, Hexagon, rectangle, Square rhomboid, parallelogram, Octagen, circle, Hollow circle, Sector of circle, Sector of Hollow circle circular, Semi circle, Cube prism, Square prism, general prism, Cylinders, Sphere, Hollow sphere segment of sphere, Zone of a sphere, Cones pyramids, Frustum of a pyramid, Frustum of a cone.

ESTIMATION OF TIME FOR DIFFERENT MACHINING OPERATIONS: Turning, Facing, Chamfering, Knurling, Taper Turning, Threading, Drilling, Boring, Shaping and planning, Milling, Broaching, Simple problems pertaining to above. **(8 Lectures)**

The question paper shall have weightage to case study 50% and to theoretical 50%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Books:-

1. Khurmi R.S., *A.T.B. of Machine Design,* Eurasian Publishing House, New Delhi.

Ref. Books.:-

1. Sharma P.C., *Design and Estimating,*S.K. Kataria & Sons, Delhi.

PRODUCTION TECHNOLOGY - I
Fifth Semester

	L	T	P	C
Course Code: DME 504	**4**	**1**	**-**	**5**

Course Contents:

Unit:- I

INTRODUCTION:- Concept of manufacturing processes, classification and application.

METAL FORMING PROCESSES:-

FORGING:- Hammer forging, drop-forging, dies for drop-forging, drop hammers, press forging, forging machines or up setters, forging tools, forging defects and remedies.

ROLLING:- Elementary theory of rolling, hot and cold rolling, types of rolling mills, rolling defects and remedies.

PRESS FORMING:- Types of presses, working, selection of press dies, die-material. Press operation-Shearing, piercing trimming, shaving, notching guering or rubber forming, embossing, stamping, punching. Drawing, extrusion, pipe and tube drawing. **(8 Lectures)**

Unit:- II

CONVENTIONAL METAL CUTTING PROCESSES:

Gear manufacturing process- Gear hobbling, gear shaping gear shaving, gear generating, gear burnishing, straight bevel gear manufacturing, spiral bevel gear manufacturing.

External threading process-Roll threads, thread milling, thread grinding, thread rolling

Machining of cylindrical holes - Multiple spindle drill press, gang drill press, drilling deep holes and small diameter holes, boring. **(8 Lectures)**

Unit:- III

METAL FINISHING PROCESS:- Grinding Process, Diamond machining, Honing, Lapping, Super finishing, Polishing and buffing.

SURFACE TREATMENT & FINISHING:- Meaning of the terms surface treatment and its purpose. Elements of surface treatment cleaning protecting, Coloring, Altering surface properties. Surface Treatment Processes- Wire brushing. Belt sanding., Vapor degreasing. Ultrasonic cleaning. Solvent cleaning. Painting application by dipping. Hand spraying. Automatic spraying. Buffing. Blackening, Anodizing. Electro Nickel Plating. Nickel carbide plating. Sputtering. **(10 Lectures)**

Unit:- IV

Plant Maintenance:- Maintenance: maintenance definition, scope of maintenance,
maintenance strategies, economics and performance measures, objective of maintenance, classification of maintenance-corrective, scheduled, preventive, predictive and productive maintenance. common techniques to monitor the conditions of systems-vibration based, , forms of wear, wear on guide surfaces, breakdown and remedies of machine tools,
repair cycle, installation and maintenance of machine tools, PERT in maintenance. **(8 Lectures)**

Unit:- V

Organization-Objective of maintenance organization, function and duties of maintenance department, inspections and scheduling, routine-servicing and scheduled repair, maintenance planning, concepts of maintenance management. **(6 Lectures)**

The question paper shall have weightage to case study 30% and to theoretical 70%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Books:-

1. Pandey & Singh, *Production Engineering & Science,* Standards Publishers Distributors, Delhi.

Ref. Books.:-

1. Choudhury Hajra S.K., *Elements of Workshop Technology Vol – I,* Media Promoters & Publishers Pvt. Ltd Delhi.

AUTOMOBILE ENGINEERING
Fifth Semester

	L	T	P	C
Course Code: DME 505	**4**	**1**	**-**	**5**

Course Contents:

Unit:- I

GENERAL CONCEPT OF AUTOMOBILES:- Their classification name and make of some India made automobiles. Layout of chassis. Meaning of the terms :- Front wheel drive, Rear wheel drive, Four wheel drive, Front and Rear wheeled vehicles. Basic requirements of an automobile. study of specifications of different engines used in Indian vehicles. **(8 Lectures)**

Unit:- II

I.C. ENGINE:- Multicylinder engine, Construction and material of its Piston and Connecting rod Assembly; Crank shaft, Fly wheel and Bearings; Engine valve and Valve operating mechanism (Cam shaft, Valve timing gears, Tappet, Push rod, Rocker and Valve springs). Advantage of multicylinder engine for automobiles use, Firing order, Arrangement of cylinders. Winkle rotary engine. Idea of super charging, its advantages phenomenon of knocking or detonation, its cause and effect on engine. Octane number and cetane number. **(8 Lectures)**

Unit:- III

FUEL SUPPLY AND IGNITION SYSTEM:

(i) PETROL ENGINE:- Fuel supply circuit components (fuel tank to engine), their function.. Construction and working of mechanical and electrical fuel pumps, carburetor, its function. Simple carburetor, its limitations. Modified carburetor- Solex and S.U. carburetors, their construction and working. Carburetor Controls-Throttle, Choke (Conventional, Automatic). Air fuel ratio, its variation with speed. Magneto and Coil Ignition Systems-Working of coil ignition system for multicylinder engine and electronic ignition system, Ignition timing, Ignition advance and retard-Their need and factors on which they depend. Spark Plugs-their types as used in automobile engines. Location of spark plug.

(ii) DIESEL ENGINE:- Fuel supply circuit for Diesel engine, Primary and secondary fuel filter, their positioning in the circuit. Construction and working of fuel pump and fuel injection pump. Governor and injector, Solid and Air injection in Diesel engine. Distributor types of diesel injection pump. Inlet and exhaust manifolds arrangement.

(iii)MULTI POINT FUEL SUPPLY FOR PETROL ENGINE :- Construction, Fuel Supply system and working (iv) Introduction to other fuels - CNG, Battery, etc. **(10 Lectures)**

Unit:- IV

COOLING SYSTEM:- Necessity for cooling the engine Air cooling, Shapes of
cooling fins. Field of application for air cooling. Water Cooling- Thermosyphon system, Pump circulated water cooling system. Details of water cooling system-Water jackets, Hose, radiators and fans. Thermostat, Water pump and pressure type
radiator cap, Anti freeze and anti corrosive additives. Engine cooling liquids other than water and their characteristics. **(8 Lectures)**

Unit:- V

LUBRICATION SYSTEM OF AUTOMOBILE ENGINES:- Principle of lubrication on petrol/diesel engine. Types of lubrication systems-Splash type, Pressure type and Combined. Types of lubrication pumps, pump drive, Relief valves, Oil pressure, Oil filters and their location in lubrication system, Crank case ventilation, Crank case dilution. **(6 Lectures)**

The question paper shall have weightage to case study 50% and to theoretical 50%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Book:

1. Singh Kirpal, *Automobile Engineering Vol – I & II,* Standard Publishing E.R.S. & Distributors.

Ref. Books.:-

1. Poonia M.P., *Objective I.C. Engines & Automobile Engineering,* Standard Publishing E.R.S. & Distributors Delhi.

Communication Technique
Fifth Semester

Course Code: DIP 501	L	T	P	C
	3	0	0	3

Course Content:

Unit I

Oral Communication: Principles of effective Oral Communication, Vitals of Communication, Interpersonal Communication, persuasive Communication. **(8 hours)**

Practical (oral): Practice of oral Communication. **(2 hours)**

Unit II

Presentation Strategies: Purpose, Audience & Locale, Audio-visual aids, Body Language, Voice dynamics. **(8 hours)**

Practical (oral): Making students develop presentation skills. **(2 hours)**

Unit III

Speaking Skills: Improving voice & speech, Art of public speaking, Dealing with the Boss, Dealing with subordinates. **(8 hours)**

Practical (oral): Making the students speak on topic. **(2 hours)**

Unit IV

Group Discussion: Tips & Style. **(8 hours)**

Practical (Oral): To make students participate in G.D. **(2 hours)**

Recommended Books:

1. Raman Meenakshi & Sharma Sangeeta – Technical Communication – Principles & Practices, - ONP, N. Delhi.
2. Mitra Barun K.-Effective Technical Communication –O.U. P N.Delhi.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

SOCIAL, PSYCHOLOGICAL AND ECONOMICS FACTORS*
Fifth Semester

Course Code: DIP 502/603	L	T	P	C
	3	-	-	3

Course Content:

Unit-I

Introduction to Industrial Psychology – definition, scope and importance

Unit-II

Motivation: Meaning, factors, motivation theories (Maslow, Herzberg and McGregor); understanding stress and its consequences, causes of stress, managing stress; group dynamics: features of group, group cohesiveness

Unit-III

Work Environment: Design of work place; fatigue: causes and prevention, work place boredom, accidents and safety.

Conflict: Concept, sources and types

Unit –IV

Constituents of Indian economy: - Agriculture, Industry and Service;

Innovation and Entrepreneurship: Industrial growth in India, role and challenges of small scale industries, sources of funding for small scale industries, industrial sickness

Unit –V

Privatization and globalization in India

Problems of industry- technology, waste disposal, industrial law and dispute

Project work

A project work will be assigned to the students by the concerned subject faculty. It will carry 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty. The students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

References:

1. Miner J.B. (1992) Industrial/Organizational Psychology. McGraw Hill.
2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.
3. Aswathappa K. (2008). Human Resource Management, New Delhi: Tata McGraw Hill.
4. Ramnath Sharma and S. S Chandra Advanced Industrial Psychology: Atlantic publishers, New Delhi
5. Vasant Desai, Small Scale Industries and Entrepreneurship, Himalaya publications
6. Ruddar Dutt and K.P.M. Sundaram, Indian Economy, S. Chand Publications
6. Samuelson, Economics, Tata McGraw Hill

MANUFACTURING PROCESSES – II LAB
Fifth Semester

	L	T	P	C
Course Code: DME 551	**-**	**-**	**4**	**2**

FOUNDRY PRACTICE (WORKSHOP):- Minimum work in each section is indicated against that

1. PATTERN MAKING:-

(a) Making Patterns (At least two).

(i) Solid one piece pattern. **(ii)** Split two piece pattern. **(iii)** Split three piece pattern. **(iv)** Gated pattern.

(v) Four Piece pattern. **(vi)** Sweep pattern. **(vii)** Skeleton pattern. **(viii)**Segmental pattern.

(b) MAKING CORE BOXES (At Least 2) For:

(i) Straight Core Box. **(ii)** Bent Core Box. **(iii)**Unbalanced Cores.

2. SAND PREPARATION AND TESTING:

(a) Sand Testing (At Least 2 Experiments).

(i) Grading (Grain Size). **(ii)** Determination of Moisture content

(iii) Determination of Clay content. **(iv)** Determination of Permeability for gases.

(b) Preparation of :

(i) Green Sand Composition.**(ii)** Dry Sand Composition.**(iii)** Loam Sand Composition.**(iv)** Oil Sand For Cores.

3. MOULDING:

(a) Making at least 8 sands moulds of different forms with differenttypes of pattern using.

(i) Floor Moulding. **(ii)** Two Box Moulding.

(iii) Three Box (or more) Moulding.

(b) At least one of the following :

(i) Making and setting of cores of different types.

(ii) Making one shell mould apparatus.

4. MELTING AND POURING:

(Each to be Demonstrated at least once in the session).

(a) Demonstration of Melting of cast iron in

(i) Pit Furnace. **(ii)** Cupola.

(b) Demonstration of melting a Non-Ferrous metal in :

(i) Pit Furnace. **(ii)** Tilting Furnace.

(c) Pouring of Metals in Moulds (Ferrous and Non Ferrous).

5. CLEANING, INSPECTION AND NON DESTRUCHIVE TESTING:

(a) Shaking,cleaning and fettling of casting (At least 2 Casting).

(b) (i) Inspection of cast component (visual) and perparing inspection report (At least one report).

(ii) Establishing cause of Defects seen (At least one cause).

(iii) Dye penetration test for casting

(iv) Magnetic flw detection test/Ultra sound flaw
detection test for castings.

6. CASE STUDY OF:

At least 2 sand casting products from sand preparation, pattern layout to final finished casting by shell moulding, centrifugal casting, investment casting and continuous casting.

Evaluation of Practical Examination:- As per Annexure – A

MACHINE SHOP PRACTICE
Fifth Semester

	L	T	P	C
Course Code: DME 552	**-**	**-**	**8**	**4**

NOTE:

At least Four jobs against jobs at No. 1. Two jobs against jobs at No. 2A and 2 jobs against jobs at No 2B. Four jobs against at No. 3.

1. MAKING UTILITY JOBS ON LATHE INVOLVING:-

(a) Step turning, Parallel Turning, Taper turning 2 jobs and Knurling

(b) Drilling, Boring, Counter boring and Internal 2 jobs taper turning under cutting, Chamfering & Facing.

(c) V. thread cutting (Internal and External) 2 jobs

(d) Square thread Cutting (internal and external) 1 jobs

(e) Multistate thread cutting 1 jobs

(f) Eccentric Turning. 2 jobs

(g) Study & Operate CNC trainer lathe & prepare 1 job a stud of given specification.

(h) Study & operate Turret/Capstan lathe to 2 jobs prepare a plug gauge & finish it to given specification on cylindrical grinder.

Note:

Students be giving opportunity to try their hands for these exercises on capstan/turret & CNC trainer lathe also.

2A. MAKING UTILITY JOBS ON :

(i) Planer - Planing of C.I Block 1 job & finish it on suface grinder to given specification.

(ii) Shaper - 'V' Block of different size 1 job

(iii) Slotter- Key Way Cutting 1 job

(iv) Tool & Cutter Grinder

(a) To Grind Lathe Tools (All Angles) 1 job

(b) To Grind A Shaper/Planer Tools 1 job

(c) To Grind A Drill Bit 1 job

B. GROUP WORK ON MILLING MACHINE INVOLVING DOWN AND CLIMB MILLING:

(a) Slab Milling

(b) Straddle Milling 2 job.

(c) Gang Milling. 1 job.

(d) Spur Gear Cutting 1 job.

(e) Groove Cutting(Dovetail, Square, T-slot and 1 Job Radius)

3. FITTING SHOP:

(a) To make different types of keys 3 job.

(b) To make template gauge 2 job.

(c) To make limit gauge (Plate shape) 2 job.

(d) Making male and female fitting jobs 3 job.

Evaluation of Practical Examination:- As per Annexure – A

PRODUCTION TECHNOLOGY LAB – I
Fifth Semester

	L	T	P	C
Course Code: DME 553	**-**	**-**	**4**	**2**

1. Inspection of casting
(a) Flange of pipe **(b)** Pulley **(c)** Gear blank **(d)** Bush
2. Turning, boring, internal threading of cost iron flange.
3. Marking and drilling holes in cost iron flange 75 mm. size pipe.
4. Boring hole in cast iron pully and cutting key way slot.
5. Turning bottom shaft of cycle and milling cotter slot.
6. Turning hub axle of cycles.
7. Turning and internal threading of cone of cycle.
8. Turning bearing races and cups of cycle.
9. Turning plug gauge.
10. Case hardening of
(a) Plug gauge **(b)** Bottom saft of cycle **(c)** Gear

Evaluation of Practical Examination:- As per Annexure – A

AUTOMOBILE ENGINEERING LAB
Fifth Semester

	L	T	P	C
Course Code: DME 554	-	-	4	2

1. Study and sketch of
i. Battery Ignition System **ii.** Magnetic Ignition System

2. Study and sketch of
i. Head Light Model **ii.** Wiper and Indicator

3. Study and Sketch of
i. Radiator **ii.** Water Pump
iii. Oil Pump **iv.** Shock Absorber

4. Study and sketch of
i. A. C. Pump **ii.** S. V. Pump
iii. Master Cylinder

5. Study and sketch of
i. Rear axle **ii.** Differential
iii. Stearing System **iv.** Bendix Drive

6. Checking and setting of ignition on timing useing timing light for advance and retard

7. Fault finding practice of an automibile vechile foru wheelers(Petrol and Diesel vechile)

8. Driving practice of four wheeler

9. Charging of Automobile battery and measuring cell voltage and specific gravity of electolyte.

10. Determination on of gear ratio of an auto engine tachometer/stroboscope

11. Cleaning and adjustment a carburetor.

12. Changing of wheels and checking the alignment of wheels.

Evaluation of Practical Examination:- As per Annexure – A

INDUSTRIAL TRAINING
Fifth Semester

Course Code: DME556

L	T	P	C
-	-	-	4

Students will attend Industrial training of four week in any industry or reputed organization after the IV semester examination in summer vacation. The evaluation of this training shall be included in the V semester evaluation.

The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the IV semester and shall be the nodal officer for coordination of the training.

Students will also be required to prepare an exhaustive technical report on format (Annexure – I) of the training during the V semester which will be duly signed by the officer under whom training was taken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in-charge of the trainee would also give his rating of the student in the standard University format (Annexure – II) in a sealed envelope to the Principal of the college.

The student at the end of the V semester will present his report about the training before a committee constituted by the Principal of the College which would be comprised of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Principal. The students guide would be a special invitee to the presentation. The
seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Principal.

The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned.

Not more than three students would form a group for such industrial training/ project submission.

The marking shall be as follows.

Internal: 50 marks
By the Faculty Guide - 25 marks
By Committee appointed by the Principal – 25 marks

External: 50 marks
By Officer-in-charge trainee in industry – 25 marks
By External examiner appointed by the University – 25 marks

INDUSTRIAL MANAGEMENT
Sixth Semester

	L	T	P	C
Course Code: DME 601	**4**	**-**	**-**	**4**

Course Contents:

Unit:- I

PRINCIPLES OF MANAGEMENT :- Definition of management, Administration organization, Functions management, Planning, Organizing, Co-ordination and control, Structure and function of industrial organizations, Leadership- Need for eldership, Factors to be considered for accomplishing effective leadership, Communication -Importance, Processes, Barriers to communication, Making communication, Effective, formal and informal communication, Motivation - Factors determining motivation, Positive and negative motivation, Methods for

improving motivation, Incentives, Pay promotion and rewards, Controlling - Just in time, Total quality management, Quality circle, Zero defect concept. Concept of Stress Management. **(8 Lectures)**

Unit:- II

HUMAN RESOURCE DEVELOPMENT :- Introduction, Staff development and career development, Training strategies and methods.

HUMAN AND INDUSTRIAL RELATIONS :- Human relations and performance in organization, Understand self and others for effective behavior, Industrial relations and disputes, Characteristics of group behavior and Trade unionism, Mob psychology, Lab our welfare, Workers participation in management.

PERSONNEL MANAGEMENT :- Responsibilities of human resource management - Policies and functions, Selection - Mode of selection - Procedure -

training of workers, Job evolution and Merit rating - Objectives and importance wage and salary administration - Classification of wage, Payment schemes, Components of wage, Wage fixation. **(8 Lectures)**

Unit:- III

FINANCIAL MANAGEMENT :- Fixed and working capital - resource of capital, Shares, types preference and equity shares, Debenture types, Public deposits, Factory costing, Direct cost, Indirect cost, Factory over head, Fixation of selling price of product, Depreciation- Causes, Methods.

MATERIAL MANAGEMENT :- Objective of a good stock control system - ABC analysis of inventory, Procurement and consumption cycle, Reorder level, Lead time, Economic order quantity, Purchasing procedure, Stock keeping, Bin card. **(8 Lectures)**

Unit:- IV

LABOUR, INDUSTRIAL AND TAX LAWS :- Importance and necessity of industrial legislation, Types of lab our laws and dispute, Factory Act 1948, Payment of Wages Act 1947, Employee State Insurance Act 1948, Various types of taxes - Production Tax, Local Tax, Trade tax, Excise duty, Income Tax. **(8 Lectures)**

Unit:- V

ENTREPRENEURSHIP DEVELOPMENT :- Concept of entrepreneurship, need of entrepreneurship in context of prevailing employment conditions of the country. Successful entrepreneurship and training for entrepreneurship development. Idea of project report preparation.

INTELLECTUAL PROPERTY RIGHTS :- Introduction to IPR (Patents, Copy Right, Trade Mark), Protection of undisclosed information, Concept and history

of patents, Indian and International Patents Acts and Rules, Patentable and No patentable invention including product versus Process. **(8 Lectures)**

The question paper shall have weightage to case study 30% and to theoretical 70%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Book:

1. Bhatnagar & Jain, *Industrial Management and Entrepreneurship Development,* Asin Publication, Muzaffarnaagar.

Ref. Book:

1. Mittal D.C., *Industrial Management and Entrepreneurship Development,* Dhanpat Rai & Sons, Delhi.

ENVIRONMENTAL EDUCATION
Sixth Semester

	L	T	P	C
Course Code: DME 602	**4**	**-**	**-**	**4**

Course Contents:

Unit:- I

INTRODUCTION: - Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects. - Lowering of water level , Urbanization. - Biodegradation and Biodegradability, composting, bio remediation, Microbes .Use of biopesticidies and biofungicides. - Global warning concerns, Ozone layer depletion, Green house effect, Acid rain, etc. **(8 Lectures)**

Unit:- II

POLLUTION :- Sources of pollution, natural and man made, their effects on living environments and related legislation. **(8 Lectures)**

Unit:- III

WATER POLLUTION :- Factors contributing water pollution and their effect. - Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal. - Physical, Chemical and Biological Characteristics of waste

water. - Indian Standards for qulity of drinking water. - Indian Standards for quality of treated waste water. - Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal. **(8 Lectures)**

Unit:- IV

AIR POLLUTION :- Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO2, NH3, F, CL, causes and its effects on the environment. - Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.

A. Settling chambers **B.** Cyclones
C. Scrubbers (Dry and Wet) **D.** Multi Clones
E. Electro Static Precipitations **F.** Bog Fillers.

- Ambient air qulaity measurement and their standards.
- Process and domestic emission control
- Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV. **(8 Lectures)**

Unit:- V

NOISE POLLUTION :- Sources of noise pollution, its effect and control.

RADISACTIVE POLLUTION :- Sources and its effect on human, animal, plant and material, means to control and preventive measures.

SOLID WASTE MANAGEMENT :- Municipal solid waste, Biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

LEGISLATION :- Preliminary knowledge of the following Acts and rules made there under-

- The Water (Prevention and Control of Pollution) Act - 1974.
- The Air (Prevention and Control of Pollution) Act - 1981.
- The Environmental Protection (Prevention and Control of Pollution) Act -1986. Rules notified under EP Act – 1986 Viz.

The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000
The Hazardous Wastes (Management and Handling) Amendment Rules, 2003.
Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.
The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.
Municipal Solid Wastes (Management and Handling) Rules, 2000.
The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) :

- Basic concepts, objective and methodology of EIA.
- Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction).

(8 Lectures)

The question paper shall have weightage to case study 10% and to theoretical 90%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Books:-

1. Gaur R.C., *Basic Environmental Engineering*, New Age International Publishers, Delhi.
2. De Anil Kumar, *Environmental Education*, New Age International Publishers, Delhi.

Reference Books:-

1. Khopkar S.M., *Environmental Pollution Monitoring and Control*, New Age International Publishers, Delhi.
2. Srivastava Smriti, *Environment and Ecology*, S.K. Kataria & Sons, Delhi.

PRODUCTION TECHNOLOGY – II

	L	T	P	C
Course Code: DME 603	**4**	**1**	**-**	**5**

Course Contents:

Unit:- I

PRODUCTION MACHINE TOOLS:- Machine tools used for quantity production. Semi automatic multirole centre lathe.

Auto lathes: Single spindle automatics. Sliding head types. Single spindle automatics. Multispindle automatics, Ultra high speed machining. External centrals grinding. Internal center less grinding. Mechanical copying systems. Hydraulic servo copying systems for lathe. Electric copying systems, special purpose machines - Brake Drum Turning Lathe. **(8 Lectures)**

Unit:- II

Unconventional Machining Processes-

MECHANICAL PROCESS- Abrasive Jet Machining (A.J.M.):Fundamental principles, basic mechanisms of material removal, application & process. Ultrasonic machining(U.S.M):Fundamental Principles, basic mechanism of material removal application, uses & its limitations.

CHEMICAL MACHINING: Introduction, fundamental principles, process & its advantages & limitations.

ELECTRO CHEMICAL PROCESS:

Electrochemical machining(E.C.M.):- Fundamental, principles, basic mechanism of material removal, application, uses and its limitations.

ELECTRIC DISCHARGE MACHINING (E.D.M.):- Fundamental principles, basic mechanism of metal removal, application & its limitations.

LASER BEAM MACHINING(L.B.M.): Fundamental principles, basic mechanism of material removal, uses & its applications.

ELECTRON BEAM MACHINING(E.B.M.):- Fundamental principles, basic mechanism of material removal, uses & its applications.

PLASMA ARC MACHINING(P.A.M):- Fundamental, principle, basic mechanism of material removal. uses and its application. **(10 Lectures)**

Unit:- III

PRODUCTION OF PLASTICS:- Polymers. Thermo plastics. Molding of thermoplastic. Extrusion process. Sheet forming process. Machining of thermoplastics. Thermosetting Plastics. Molding of Thermosetting plastics. Machining of thermosetting plastics. Other processing methods for plastics. Plastic component design. Mould design. **(8 Lectures)**

Unit:- IV

CUTTING TOOLS FOR MACHINING:- Elementary theory of metal cutting, Single point tools- Basic angles. Chip formation and their classification, basic mechanism of chip formation, geometry of chip formation, forces on chip. Effect of manipulating factors such as velocity, size of cut, effect of tool geometry, Specific power consumption. Tool material. Tool wear and Tool life. Tailor's tool life equation. Machining economics. Properties of tool materials. Tool materials. Tool steels. High speed steel. Cast cobalt alloys. Carbides or cantered carbide. Ceramics. UCON. Surface treatment of cutting tools- Its advantage. Tin coated high speed steel, diamonds, Cubic boron nitrides. **(8 Lectures)**

Unit:- V

PRESS TOOLS:- Elements of Press tools, Factors affecting press tool design. Shearing. Bending. and Drawing operation. Combination. Progression and compound die. Rubber die forming.

MODERN CONCEPT OF QUALITY CONTROL :- Do it right first time, Just in time (JIT), Process Control, ZD production (Zero Defect Production). **(6 Lectures)**

The question paper shall have weightage to case study30% and to theoretical 70%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Books:-

1. Pandey & Singh, *Production Engineering & Science*, Standards Publishers Distributors, Delhi.

Reference Books:-

1. Choudhury Hajra S.K., *Elements of Workshop Technology Vol – I,* Media Promoters & Publishers Pvt. Ltd, Delhi.

AUTOMOBILE MAINTENANCE, SERVICES & REPAIR

Sixth Semester (only for Automobile Engineering)

	L	T	P	C
Course Code: DME604	**4**	**1**	**-**	**5**

Course Contents:

Unit: - I

ENGINE MAINTENANCE &REPAIRING:-Maintenance, Maintenance schedule, Routine Maintenance schedule for petrol engine and diesel engine, preventive maintenance, trouble shooting for faults in engines. Overhauling of engines, engine timing, Maintenance and adjustment of carburetor and fuel injection pump. Checking the valve clearance and adjustment, valve grinding and lapping, engine tuning, general methods of redelivery inspection of vehicle

REPAIRING PROCESSES :- Cylinder rebooting and relieving, Removal of liners and fitting, inspection; Repair and fitting of valve and valve guides, inspection of crank shaft for ovality and regrinding, Phasing and calibration of fuel injection pump, nozzle testing, cleaning and grinding. **(8 Lectures)**

Unit: - II

REPAIR AND MAINTENANCE OF RADITOR AND LUBRICATING SYSTEM:-

Radiator repair and maintenance, Maintenance of lubricating system, Flushing the lubricating system, Change of used lubricating oils, clearing and fitting of oil filter lubrication of water pump, grades of oils, multi grade oil, additives for improving the quality of oil. **(8 Lectures)**

Unit: - III

CHASIS REPAIR AND MAINTENANCE :- Grease and greasing points requiring greasing, specifications of greases to be used for different parts, repair of tyres and tubes, greasing of wheel bearing, rotating schedule for front and rear tyres, bleeding of brakes, pedal play adjustment in clutch and brakes, adjustment, change of brake lining, testing of brakes. Starter motor. **(8 Lectures)**

Unit:- IV

Electric system maintenance:

Battery testing method, starter motor, charging system- a DC generator, AC alternator, regulator, ignition system- coil ignition, transistor assisted ignition, capacitor discharge ignition. Electric horn, wiper motor, flasher, electric fuel

Pump, gauges. Lighting system- head lights focusing. Wiring harness testing. **(8 Lectures)**

Unit: - V

Body repair: minor body panel beating, tinkering, shouldering.

Painting : Introduction of automotive paints , types of paints, corrosion and anticorrosion method, rubbing polishing, working of paint booth ,door lock mechanism, window glass actuation mechanism. **(8 Lectures)**

The question paper shall have weightage to case study 20% and to theoretical 80%.

Project work

A project work will be assigned to the students by the concerned subject faculty. It will carry10 marks and will be evaluated by the faculty itself. The topic of the project will be decidedby the faculty. The students will work in a group of 3 – 5 on each topic. The topic should berelated to the subject taught by the faculty and should have proper utility and importance toenhance his practical skill & knowledge. The project will be evaluated by the externalexaminer.

Text Book:

1. Singh Kirpal, *Automobile Engineering Vol – I & II,* Standard Publishing E.R.S. & Distributors.

Ref. Books.:-

1. Poonia M.P., *Objective I.C. Engines & Automobile Engineering,* Standard Publishing E.R.S. & Distributors Delhi.

PRODUCTION AUTOMATION

Sixth Semester

	L	T	P	C
Course Code: DME 605	**4**	**1**	**-**	**5**

Course Contents:

Unit:- I

GENERAL:- Automation-Definition, Scope, its types and their merits, Reasons for automation. Its appreciation and criticism. Introductory Idea and meaning of the terms CNC, DNC, Adaptive control, FMS & CIM and machining centre. Current trends in NC, CAD, CAM. Introduction to Robotics.

FUNDAMENTALS OF MANUFACTURING AND AUTOMATION:- Plant Layout- Its meaning and concept of fixed position layout, Process layout, Product layout and Group technology layout. Product design, Manufacturing planning and Manufacturing control. Production Concept- Such as-Manufacturing Lead Time (MLT), Production rate, Production Capacity (PC), Work in Process (WIP), Time in Plant (Tip), WIP Ratio, Tip ratio, their meaning and significance. Combined operations, Simultaneous operations, Integration operations, Increase flexibility, Improved material handling and storage, on-line inspection, process control and optimization, Plant operation control, Computer integrated manufacturing. **(10 Lectures)**

Unit:- II

PRODUCTION ECONOMICS:- Methods evaluating investment alternatives, Constraints in manufacturing, Break Even Analysis, Cost of manufacturing lead time and work in process. **(4 Lectures)**

Unit:- III

HIGH VOLUME PRODUCTION SYSTEMS:- Type of production, types of layout, concepts of different flow lines for automatic loading and transferring, buffer storage, automatic inspection, tools servicing, design and fabrication considerations, optical measurement. Methods of work part transport, Transfer mechanism, Buffer storage, Automation for manufacturing operations, Design of fabrication considerations. **(10 Lectures)**

Unit:- IV

ASSEMBLY SYSTEM AND LINE BALANCING:- The assembly process, Assembly system, Manual assembly lines. flexible manual assembly line, Partial Automation.

AUTOMATED ASSEMBLY SYSTEMS:- Design for automated assembly, Types of automated assembly systems, Parts feeding devices, Part orienting devices, Feed tracks, Role of industrial robot in automatic assembly. **(8 Lectures)**

Unit:- V

NUMERICAL CONTROL PRODUCTION SYSTEM:- Numerical machine Tool, Binary System, Coordinate system and Machine motions, Types of N.C. systems, Machine tool applications.

N.C. PART PROGRAMMING:- Methods of N. C. part programming, Computer assisted part programming, The APT Language, N. C. part programming using CAD/CAM, use of computer as support in design and manufacturing. **(8 Lectures)**

The question paper shall have weightage to case study 20% and to theoretical 80%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Book:

1. Visal S., *Computer Aided Manufacturing*, S.K. Kataria & Sons, Delhi.
2. Srinivasa Praksh Regalla, *Computer Aided Analysis & Design*, I.K. International Publishing House Pvt. Ltd, Delhi.

Ref. Books.:-

1. Sawhney G.S., *Fandamental of Computer Aided Manufacturing (CAM)*, I.K. International Publishing House Pvt. Ltd, Delhi.

AUTOMOBILE TECHNOLOGY

	L	T	P	C
Course Code: DME 606	**4**	**1**	**-**	**5**

Course Contents:

Unit:- I

AUTO TRANSMISSION SYSTEM:

(a) CLUTCH:- Function of clutch in an auto mobile, Construction detail of single plate and multi plate friction clutches, Centrifugal and semicentriufugal clutch. Construction and working of fluid flywheel. **(b) GEAR BOX:-** Its function, Assembly detail and working of sliding Mesh, constant mesh, Synchromesh and epicyclical gear boxes. Simple concept of over drive, overrunning clutch, transfer case and torque converter. **(c) PROPELLER SHAFT:-** Its function, Universal joint and slip joint, Hotchkiss drive and Torque tube drive. **(10 Lectures)**

Unit:- II

STEERING SYSTEM:- Its function, Principle of steering. Ackerman and Davis steering gears, Steering gear types, Worm and nut, Worm and wheel, Worm and roller, Rack and pinion type. Concept of steering locking assembly, introduction to power steering.

BRAKING SYSTEM:- Construction details and working of mechanical, Hydraulic and Vaccum brakes, disc brake, air brake, Introduction to power brake. Details of master cylinder , Concept of brake drum and brake linings and brake adjustment.

SUSPENSION SYSTEM:- Function of suspension system. Types of suspension systems, Working of leaf springs, Coil springs. Mac pension system. **(10 Lectures)**

Unit:- III

Storage Battery:- Storage Battery constructional detail of lead acid cell battery. Specific gravity preparation of electrolyte, effect of temperature, Charging and discharging on specific gravity of electrolyte. Capacity and efficiency of battery. Battery charging from D.C. mains, A.C. mains, Battery charger-Charging circuit, care and maintenance of batteries. Checking of cells for voltage and specific gravity of electrolyte.

ENGINE STARTING:- Engine starting circuit, Drive motor and its characteristics, Conditions of starting and behavior of motor at starting. Starter Drive-Bendix pinion, Torsion, compression, Clutch and sliding armature type. Turbo charging and inter-cooling. **(8 Lectures)**

Unit:- IV

AUTOMOBILE WIRING & LIGHTING SYSTEM:- Earth return and insulated return systems-6 volts, 12 volts and 24 volts systems, Positive and negative earthling, Fuse in circuit, Diagram of a typical wiring systems. Fore head lamp systems. Other lamps-Pass lamps, Fog lamp, reversing lamps. Switching of lamps. Parking brake, Direction indicators. Electric horns, Speedometer, Fuel gauge, Pressure gauge, Temperature gauge, Wind screen wipers, stereo system and speaker, introduction to remote sensing devices. Microprocessor control of automobile. **(6 Lectures)**

Unit:- V

Vehicle Air-conditioning :- Meaning of air-conditioning and its applications, brief idea of various type heat loads in vehicles, concepts of room air conditioner, fundamental of comfort air conditioning and its conditions, brief idea of air-conditioning cycle and its layout, fundamental and working of compressor magnet clutch, condenser, evaporator, expansion valve, thermo switch, three way solenoid valve, chech valve, fan assembly and air conditioners relay, H.V.A.C. **(6 Lectures)**

The question paper shall have weightage to case study 20% and to theoretical 80%.

Project work

There will be a project work assigned to students by the subject faculty. It will be of 15 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Text Book:

1. Sethi H.M., *Automobile Technology*, Tata McGraw Hill, New Delhi.
2. Singh Kirpal, *Automobile Engineering Vol – I & II*, Standard Publishing E.R.S. & Distributors.

Ref. Books.:-

1. Poonia M.P., *Objective I.C. Engines & Automobile Engineering*, Standard Publishing E.R.S. & Distributors Delhi.

Corporate Communication

Sixth Semester

Course Code: DIP 601	**L**	**T**	**P**	**C**
	4	**0**	**0**	**4**

Course Content:

Unit I

Corporate Behaviour: Corporate expectation, office etiquettes, Telephonic Conversation & etiquette. **(8 hours)**

Practical (oral): To make the students aware of Corporate life & culture & also to teach them about telephone courtesy etc. **(2 hours)**

Unit II

Communication: Press Communication, Press note, e-mail, Inviting tenders, Writing advertisements, Writing notices. **(8 hours)**

Practical (oral): To make students develop the understanding of media importance. **(2 hours)**

Unit III

Interview Skills: Concept & Process, Preparing for the Interview, Types of Interview. **(8 hours)**

Practical (oral): Mock Interview Practice. **(2 hours)**

Unit IV

Modern Technology & Communication: Globalization impact, Role of Information Technology, Tele-Communication, Internet, Tele- Conferencing and Video-Conferencing. **(8 hours)**

Practical (oral): To make students speak on I.T./Internet/Tele & Video Conferencing.**(2 hours)**

Recommended Books:

1. Chhabra T.N. – Business Communication Sun India Pub. N.Delhi.
2. Raman Meenakshi & Sharma Sangeeta – Technical Communication – Principles & Practices, - ONP, N. Delhi.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

Industrial Ecology*

Sixth Semester

Course Code: DIP 502/603	L	T	P	C
	3	-	-	3

Course Content:

Unit-I

Introduction to Industrial Psychology – definition, scope and importance

Unit-II

Motivation: Meaning, factors, motivation theories (Maslow, Herzberg and McGregor); understanding stress and its consequences, causes of stress, managing stress; group dynamics: features of group, group cohesiveness

Unit-III

Work Environment: Design of work place; fatigue: causes and prevention, work place boredom, accidents and safety.

Conflict: Concept, sources and types

Unit –IV

Constituents of Indian economy: - Agriculture, Industry and Service;

Innovation and Entrepreneurship: Industrial growth in India, role and challenges of small scale industries, sources of funding for small scale industries, industrial sickness

Unit –V

Privatization and globalization in India

Problems of industry- technology, waste disposal, industrial law and dispute

Project work

A project work will be assigned to the students by the concerned subject faculty. It will carry 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty. The students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

References:

1. Miner J.B. (1992) Industrial/Organizational Psychology. McGraw Hill.
2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.
3. Aswathappa K. (2008). Human Resource Management, New Delhi: Tata McGraw Hill.
4. Ramnath Sharma and S. S Chandra Advanced Industrial Psychology: Atlantic publishers, New Delhi
5. Vasant Desai, Small Scale Industries and Entrepreneurship, Himalaya publications
6. Ruddar Dutt and K.P.M. Sundaram, Indian Economy, S. Chand Publications
6. Samuelson, Economics, Tata McGraw Hill

MECHANICAL MAINTENANCE SHOP
Sixth Semester

	L	T	P	C
Course Code: DME 651	**-**	**-**	**8**	**4**

List of Practical's

BEARINGS:- Inspection, Removal, Cleaning, Lubrication and refitting of bearings.
Maintenance, repair and replacement of couplings and alignment of shafting's.

Belts and Chain drives :

(i) Mounting of belts and checking of slip.
(ii) Fighting and replacement of chains.
Removal and replacement of springs and keys.

To do following exercise with the given small subassembly units :

(i) To select tools cor removing sub assembly.
(ii) To remove the sub assembly unit from the equipment/machine.
(iii) To disassemble unit.
(iv) To clean the parts, prepare a list and draw sketches.
(v) To inspect and identify workouts parts.
(vi) To suggest whether the part deserve replacement, readjustment or recovery. Method of recovery if wanted so.
(vii) To reassemble sub assembly replacing worn out parts.
(viii) To Lubricate the parts and refit the subassembly on the machine or the equipment and test the assembly after fitting.

Given subassembly units are tailstock of lathe, Head stock of lathe, Lathe chuck three jaw or four jaw, Gear box, Piston assembly with rings, Clutch, Foot valve, Safety valve of the boilers, Hydraulic jack, Mechanical jack, Bench vise, guide ways, bed shaft, gear tooth. Preparing decision tree for fault Location. Locating fault and rectifying that for equipment such as Bicycle, Hydraulic pump, water cooler, Refrigerator, A machine tool and An Air Compressor. Maintenance of the various system including Lubrications service for system such as I.C. Engine, Pump, centrifugal , Reciprocal, Air compressor Rotary and reciprocating, Refrigerator, Air conditioner, Any machine tools. Preparation of preventive maintenance schedule for institution machine shop. Serviceing and operation of protable tools pneumatic and electrical. Maintenance of meterial handling equipment available in the institution. Checking and testing of starter switches used with machine tools. Small armature winding. Fault finding and repair of automoble wiring. Testing of electical installation as per I.S. Battery Charging. Setting on regulator of cutoun testing of dynamo and its Minor repair.

Evaluation of Practical Examination:- As per Annexure – A

PRODUCTION TECHNOLOGY LAB – II
Sixth Semester

	L	T	P	C
Course Code: DME 652	**-**	**-**	**4**	**2**

1. Hobbing or Gear cutting process.
2. Milling of snap gauge plate.
3. Tool grinding.
4. Hardness testing on Rockwell machine.
5. Sheet metal shop- working and of machines.
6. Study of forging tools.
7. Power Hammer.
8. Study of Heat treatment processes.

Evaluation of Practical Examination:- As per Annexure – A

AUTOMOBILE MAINTENANCE, SERVICES & REPAIR SHOP
Sixth Semester

	L	T	P	C
Course Code: DME 653	**-**	**-**	**4**	**2**

1. Study and sketch of hand tools different gauges and their use.
2. Automobile engine cylinder boring practice.
3. Valve face grinding, tapping and reaming of valve guide.
4. Light vehicle brake drum turning practice.
5. Nozzle cleaning, testing and adjustment.
6. Assemble and dissemble of petrol and diesel engine of an automobile vehicle.
7. Setting a regulator of cut out and testing of dynamo and rectify its minor repairs.
8. Phasing and calibration of diesel fuel injection pump.
9. Engine tuning of an automobile engine.
10. Checking and adjusting a clutch pedal play and brake pedal play, tightness of fan belt and brake shoe.
11. Checking and over handling of car radiator.
12. Automobile engine cylinder honing practice.
13. Over handling of hydraulic brake system.
14. Measuring spark plug gap, valve clearance and ring clearance, grinding and lapping operation for adjustment.
15. Care and servicing of following Air conditioning components for automibile vehicle:-

i. Auto control unit **ii.** Temperature control unit
iii. Soleniod valve **iv.** Expansion valve
v. Relays.

Evaluation of Practical Examination:- As per Annexure – A

PROJECT (only for Production Engineering)
Sixth Semester

	L	T	P	C
Course Code: DME 654	**-**	**-**	**8**	**4**

Project Problems (Examples) For Spl. in Production Engineering:- Four problems on design and drawing of simple machine/machine parts and preparing project report for loan to establish small scale industry to fabricate the item designed. A few examples of such items are given below. Bench Vice, Small centrifugal pump, Screw jack, Hand Shearing Machine, Hand blower, Main Switch outer casing (Cost Iron), Stepped Motor Pulley, Biogas Plant, Smoke Less Chulha, Hand Operated Grinder/Juicer, Agricultural Implements, Material Handling Equipments for small scale industry. Solar Cooker or any other simple items of general utility or industrial use.

Evaluation of Practical Examination:- As per Annexure – A

PROJECT
Sixth Semester (only for Automobile Engineering)

	L	T	P	C
Course Code: DME655	**-**	**-**	**8**	**4**

Choose any one problem to establish auto workshop. Servicing and repairing of Auto engines (Diesel/Petrol). Reconditioning and overhauling of Diesel and Petrol engine, Phasing and calibration of fuel injection pump and Adjustment of injector, Tyre retreading, Adjustment and\ repairing of Auto electrical system - Self starter, Dynamo & Cutout, Charging of Battery (Old/New), Cylinder Boring, Turning of Brake Drum, Valve Grinding, remote sensing devices in vehicle, air-conditioning installation in vehicles.

Evaluation of Practical Examination:- As per Annexure – A

Evaluation of Practical Examination:

EVALUATION CRITRIA (INTERNAL)

S. No.	Details	Marks (50)
1	Regularity/Attendance	05
2	Performance of Practical/Skill/Creativity/Innovation	20
3	Knowledge, Findings and Results regarding practical conducted	10
4	File Presentation	05
5	Response to questions during Viva	10
	Total (Out of 50)	

External examiner appointed by University shall conduct the practical along with internal faculty and shall assess out of 50 marks. The student would be required to complete an experiment during the practical examination and write the detail process, findings/ result and conclusions in the examination evaluation copy.

EVALUATION CRITRIA (EXTERNAL)

S. No.	Details	Marks (50)
1	Performance of Experiment/ Practical and Observations taken	20
2	Result/ Conclusion	10
3	Records/ File Presentation	10
4	Viva – Voce	10
	Total (Out of 50)	

Industrial Training

After IVth Semester examination, in the summer vacation, students of mechanical Engineering will have a four week Industrial Training in units not less than small scale industries. It should preferably be arranged in manufacturing (producing machines, equipments or their parts), structural or processing organizations. They will work and focus their attention there on following points to incorporate them in their reports.

1. Name & Address of the unit

2. Date of
i. Joining.
ii. Leaving.

3. Nature of Industry
i. Product.
ii. Services.
iii. Working Hrs.

4. Sections of the unit visited and activities there in.

5. Details of machines/Tools & instruments used in working in the section of the unit visited.

6. Work procedure in the section visited.

7. Specifications of the product of the section and materials used.

8. Work of repair and maintenance cell.

9. Details of the shops (welding, Foundry, Machines shop etc) related to repair and maintenance work.

10. Name of checking and Inspecting Instruments and their details. Quality controls measures taken.

11. Details of hydraulics/pneumatic/ thermal units or appliances used if any.

12. Description of any breakdown and its restoring.

13. Use of computer - if any.

14. Visit of units store, Manner of keeping store items, Their receiving & distribution.

15. Safety measures on work place & working conditions in general - comfortable, convenient & hygienic.

Date :-

Student Signature
Name
Class
Branch
Enrollment No.

Annexure – II

Trainee Assessment Format

This institution invites the comments on the training of its students (work and behavior) from their immediate supervisors on the following points.

1. Name of the trainee

2. Date of

   - Joining
   - Leaving

3. i. Regularity & Punctuality
   ii. Sense of responsibility
   iii. Readiness to work/ learn
   iv. Obedience
   v. Skill acquired

4. Name of the works of the Department he attended during his stay.
   His activity/ worth of being there.

5. Any thing specify.

Signature of the Assessor

Date :-

Designation