

Scheme of Instruction

Of

Diploma in Engineering (First Year)
(Common to all Trades)

(Effective from the academic session 2013-2014)

Invertis Institute of Engineering & Technology
INVERTIS UNIVERSITY
Invertis Village Bareilly-Lucknow
NH-24, Bareilly

SCHEME OF INSTRUCTION

Diploma in Engineering First Year

I - YEAR, I-SEMESTER (Effective from the academic session 2013-2014)

S. No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme					Total	Credit
			L	T	P	CT	TA	AT	Total	E-Sem		
THEORY												
1	DAS101	Mathematics-I	4	0	0	20	10	10	40	60	100	4
2	DAS102 OR DAS103	Physics OR Chemistry	6	0	0	20	10	10	40	60	100	4
3	DEE101 OR DMC101	Fundamentals of Electrical & Electronics Engineering OR Fundamentals of Mechanical & Civil Engineering	4	0	0	20	10	10	40	60	100	4
4	DCS101 OR DME101	Fundamentals of Computer OR Fundamentals of Mechanics	4	0	0	20	10	10	40	60	100	4
PRACTICAL/TRAINING/PROJECT												
5	DAS152 OR DAS153	Physics Lab OR Chemistry Lab	0	0	3	-	-		50	50	100	2
6	DEE151 OR DMC151	Electrical & Electronics Lab OR Civil & Mechanical Lab	0	0	2	-	-		50	50	100	2
7	DCS151 OR DME151	Computer Concept Lab OR Workshop Practice	0	0	2	-	-		50	50	100	2
8	DCE151	Engineering Drawing	0	0	2	-	-		50	50	100	2
9	DGP101	Discipline & General Proficiency	-	-	-	-	-		-	100	100	1
		Total	18	0	7				360	540	900	25

L-Lecture, T-Tutorial, P- Practical, CT-Cumulative Test, TA- Teacher Assessment, AT-Attendance, E-Sem- End Semester Marks

SCHEME OF INSTRUCTION
Diploma in Engineering First Year

I - YEAR, II-SEMESTER (Effective from the academic session 2013-2014)

S. No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme					Total	Credit
			L	T	P	CT	TA	AT	Total	E-Sem		
THEORY												
1	DAS201	Mathematics-II	4	0	0	20	10	10	40	60	100	4
2	DAS203 OR DAS202	Chemistry OR Physics	6	0	0	20	10	10	40	60	100	4
3	DMC201 OR DEE201	Fundamentals of Mechanical & Civil Engineering OR Fundamentals of Electrical & Electronics Engineering	4	0	0	20	10	10	40	60	100	4
4	DME201 OR DCS201	Fundamentals of Mechanics OR Fundamentals of Computer	4	0	0	20	10	10	40	60	100	4
PRACTICAL/TRAINING/PROJECT												
5	DAS253 OR DAS252	Chemistry Lab OR Physics Lab	0	0	3	-	-		50	50	100	2
6	DMC251 OR DEE251	Civil & Mechanical Lab OR Electrical & Electronics Lab	0	0	2	-	-		50	50	100	2
7	DME251 OR DCS251	Workshop Practice OR Computer Concept Lab	0	0	2	-	-		50	50	100	2
8	DGP201	Discipline & General Proficiency	-	-	-	-	-		-	100	100	1
		Total	18	0	7				310	490	800	23

L-Lecture, T-Tutorial, P- Practical, CT-Cumulative Test, TA- Teacher Assessment, AT-Attendance, E-Sem- End Semester Marks



Scheme of Instruction

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Diploma in Engineering (First Year)

(Common to all Trades)

(Effective from the academic session 2013-2014)

(Dr.R.K.Shukla)
Dean-Engineering

(Dr.Y.D.S. Arya)
Director-Engineering

(Prof.(Dr).S.G.Bhat)
Vice-Chancellor

Invertis Institute of Engineering & Technology

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Diploma in Engineering First Year

I - YEAR, I-SEMESTER (Effective from the academic session 2013-2014)

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			L	T	P	CT	TA	AT	Total	E-Sem		
THEORY												
1	DAS101	Mathematics-I	4	0	0	20	10	10	40	60	100	4
2	DAS102 OR DAS103	Physics OR Chemistry	6	0	0	20	10	10	40	60	100	4
3	DEE101 OR DMC101	Fundamentals of Electrical & Electronics Engineering OR Fundamentals of Mechanical & Civil Engineering	4	0	0	20	10	10	40	60	100	4
4	DCS101 OR DME101	Fundamentals of Computer OR Fundamentals of Mechanics	4	0	0	20	10	10	40	60	100	4
5	DAS104	Foundation English – I	3	0	0	20	10	10	40	60	100	4
PRACTICAL/TRAINING/PROJECT												
7	DAS152 OR DAS153	Physics Lab OR Chemistry Lab	0	0	3	-	-		50	50	100	2
8	DEE151 OR DMC151	Electrical & Electronics Lab OR Civil & Mechanical Lab	0	0	2	-	-		50	50	100	2
9	DCS151 OR DME151	Computer Concept Lab OR Workshop Practice	0 0	0 0	2 4	-	-		50	50	100	2
10	DAS154 OR DCE151	Language Lab OR Engineering Drawing	0 0	0 0	2 4	-	-		50	50	100	2
11	DGP101	Discipline & General Proficiency	-	-	-	-	-		100		100	1
		Total	21	0	9/ 13				500	500	1000	29

L-Lecture, T-Tutorial, P- Practical, CT-Cumulative Test, TA- Teacher Assessment, AT-Attendance, E-Sem- End Semester Marks

SCHEME OF INSTRUCTION
Diploma in Engineering First Year

I - YEAR, II-SEMESTER (Effective from the academic session 2013-2014)

S. No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme					Total	Credit
			L	T	P	CT	TA	AT	Total	E-Sem		
THEORY												
1	DAS201	Mathematics-II	4	0	0	20	10	10	40	60	100	4
2	DAS203 OR DAS202	Chemistry OR Physics	6	0	0	20	10	10	40	60	100	4
3	DMC201 OR DEE201	Fundamentals of Mechanical & Civil Engineering OR Fundamentals of Electrical & Electronics Engineering	4	0	0	20	10	10	40	60	100	4
4	DME201 OR DCS201	Fundamentals of Mechanics OR Fundamentals of Computer	4	0	0	20	10	10	40	60	100	4
5	DAS204	Foundation English – II	3	0	0	20	10	10	40	60	100	4
PRACTICAL/TRAINING/PROJECT												
7	DAS253 OR DAS252	Chemistry Lab OR Physics Lab	0	0	3	-	-	-	50	50	100	2
8	DMC251 OR DEE251	Civil & Mechanical Lab OR Electrical & Electronics Lab	0	0	2	-	-	-	50	50	100	2
9	DME251 OR DCS251	Workshop Practice OR Computer Concept Lab	0 0	0 0	4 2	- -	- -	- -	50 50	50 50	100 100	2 2
10	DCE251 OR DAS254	Engineering Drawing OR Language Lab	0 0	0 0	4 2	- -	- -	- -	50 50	50 50	100 100	2 2
11	DGP201	Discipline & General Proficiency	-	-	-	-	-	-	100	-	100	1
		Total	21	0	13/9				500	500	1000	29

L-Lecture, T-Tutorial, P- Practical, CT-Cumulative Test, TA- Teacher Assessment, AT-Attendance, E-Sem- End Semester Marks

DCS-101 Computer Fundamentals**Unit-I****Introduction to Computer**

Characteristics of Computers, What Computers can do, What computers can't do, Classification of Digital Computer Systems, Anatomy of a Digital Computer Usage of computer system in different domains like office, book publication, ticket reservation, banks etc. Components of PC – Mouse, keyboard, CPU, monitor, printers, scanners, modem, memory, sound cards, pen drives.

Unit-II**Introduction to Operating System(Windows 7)**

Working with Windows desktop, icons, taskbar, menu bar options, My Documents, My Computer, Control Panel, Recycle bin Concept of drives, folders, files Windows accessories – Notepad, WordPad, paint, clock, calendar, calculator

Unit-III

Data Representation- Representing different symbols, minimizing errors, Representing more Symbols, Generic Formula, the ASCII code, the EBCDIC code, Rules of Decimal number System and its conversion to Binary **Multimedia-** Digital images, analog to digital conversions, digital audio and digital video

Unit-IV**GUI Based Software – MS – Office 2010**

MS-Word – Opening menus, toolbars, opening and closing documents, clipboard concept MS – Excel – Working and manipulating data with excel, formulas, functions, chart and its types MS – PowerPoint – Working with PowerPoint and presentation ,Changing layout, Graphs , Auto content wizard ,Slide show, Animation effects, Normal, outline, Slide sorter, Reading view.

Unit-V**Internet**

History of Internet, equipments required for Internet connection, browser (Internet Explorer, Mozilla and Firefox, Google Chrome) **Algorithms-**Introduction, Three Basic Operations, Procedures and Programs

VDU and Printers-Human-computer interface, Keyboard, Raster Scanning, Frame Buffer, Basics of Graphics, Black and White/ Color Terminals, Text based terminals, LEDs/LCDs, Inkjet Printers, Laser Printer

Learning Resources:**1. Books:**

No	Author	Title	Publisher
1	Achyut Godbole	Demystifying Computer	TMH
2	Alexis Leon	Introduction to Computers	Vikas Publishing House
3	Vikas Gupta	Comdex Computer Course Kit	Dreamtech Press
4	Steve Schwartz	Microsoft Office 2010	Pearson
5	Elaine Marmel	Microsoft Project 2010 (Bible)	Wiley India
6	Preppernau Cox	Windows 7 Step by Step	PHI

DCS-151 Computer lab

1. Demonstration of Computer peripheral devices to students
2. Moving from one window to another window Opening task bar buttons into a window. Arranging icons on the desktop and create shortcuts.
3. Creating folders and files. Copy, rename, delete files and folders. Moving folders and files from one drive to another drive.
4. Create and edit notepad document. Create and edit WordPad document. Create paint file by using different drawing tools.
5. Creating, editing, saving word document. Entering and formatting text. Paragraph formatting, use bullets and numbering.
6. Page formatting – page margins, page size, orientation, page break, headers and footers. Create tables, insert, and delete rows and columns.
7. Printer installation and printing document. Create and print mail merging address for envelop and letters.
8. Create, open and print worksheet with page setup and print options. Enter data and format cells. Select, insert, delete cells, rows and columns. Insert formulas, functions and named ranges in worksheet.
9. Create chart of different types in Excel.
10. Create a simple text slide using formatting, Selecting a slide layout. And insert pictures & backgrounds. Insert auto shapes, clip-arts and form group/un group objects from slides. Apply slide transitions and slide timings and animation effect for slide show
11. Perform Internet connection.
Create own e-mail id, send and receive mail with attachment. Searching information using search engine (Google, MSN, bing etc.) Do Internet chatting and understand the chat toolbar. Organize favorite websites in different browsers.

Unit 1

Basic Terminology and their concepts: Current, EMF, potential difference (voltage), resistance, resistivity their units conductors & insulators, Insulation resistance of a cable. Effect of temperature on the resistance of conductors, temperature coefficient of resistance. Electrical power, energy and their units (SI), Heating effect of electric current and its practical examples. Relationship between electrical, mechanical and thermal SI units of work, power and energy, Electrical Safety and precautions.

Unit 2

D.C. Circuits: Kirchoff's laws. Different types of voltage and current sources, Introduction to Thevenin, super-position, and maximum power transfer theorem.

Unit 3

A.C. Circuits: Instantaneous value, maximum (peak) value, cycle, frequency, alternate current and voltage. Equation of an alternating voltage and current and wave shape varying sinusoidally. Average and RMS value of alternating voltage and current. Concept of phase, phase difference and phasor representation of alternating voltage and current with pure resistance, inductance, capacitance.

Unit 4

Components and Diodes : Basic concepts of energy bands in materials, concept of forbidden gap, Intrinsic and extrinsic semiconductors, donors and acceptors impurities

Junction diode: p-n junction, depletion layer, v-i characteristics, diode resistance, capacitance diode ratings.

Unit 5

Breakdown diodes : breakdown mechanisms (zener and avalanche) breakdown characteristics, zener resistance, zener diode ratings

Diode Applications : rectifiers (half wave and full wave), calculation of transformer utilization factor and diode ratings.

Unit 6

Bipolar Junction Transistor

Basic construction, transistor action CB, CE and CC configurations, input/output characteristics, basics of JFET and MOSFET.

Switching theory and logic design

Number systems, conversion of bases Boolean algebra, logic gates, concept of universal gate.

Reference Books:

1. Robert L. Boylestad/ Louis Nashelsky "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education 2007
2. David A. Bell "Electronic Devices and Circuits", 5th Edition, OXFORD University Press 2008
3. Morris Mano "Digital Computer Design", PHI 2003
4. A Text Book of Electrical technology: B.L. Theraja, A.K. Theraja., Volume-I, S.Chand Publication.
5. Basic Electrical and Electronics Engineering: By G. Rajalakshmi, N. Srivanandham.
6. Fundamentals of Electrical and Electronics Engineering: By Smarajit Ghosh.
7. Basic Electrical and Electronics Engineering: by J.B. Gupta.

ENGINEERING DRAWING/DCE151

NOTE : Latest Indian Standards Code of Practice to be followed.

1.0 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.

1. (a) Lettering Techniques 1 Sheet

Printing of vertical and inclined, normal single stroke capital letters. Printing of Vertical and inclined normal single stroke numbers. Stencils and their use.

(b) Introduction to Scales 1 Sheet

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

2. Conventional Presentation : 2 Sheet

Thread (Internal and External), Welded joint, Types of lines, Conventional representation of materials, Conventional representation of machine parts.

3. (a) Principles of Projection 1 Sheet

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

4. (a) Orthographic Projections of Simple : 3 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.

(b) Orthographic views of simple composite solids from their isometric views.

(c) Exercises on missing surfaces and views

5. 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 others plane, true shape of the section.

6. Isometric Projection : 2 Sheet

Isometric scale Isometric projection of solids.

7. Free hand sketching : 1 Sheet

Use of squared paper Orthographic views of simple solids Isometric views of simple job like carpentary joints

8. Development of Surfaces :1 Sheet

Parallel line and radial line methods of developments. Development of simple and truncated surfaces (Cube, prism, cylinder, cone and pyramid).

9. Assembly and Disassembly Drawings : 2 Sheet

Plummer block, Footstep bearings Couplings etc. Riveted & Welded Joints Screw and form of screw thread

10. Orthographic Projection Of Machine Parts : 2 Sheet

Nut and Bolt, Locking device, Wall bracket

11. Practive On Auto Cad :

To draw geometrical figures using line, circle, arc, polygon , ellipse, rectangle - erase and other editing Commands and osnap commands (two dimensional drawing only)

NOTE

The drawing should include dimension with tolerance wherever necessary, material list according to I.S. code. 25% of the drawing sheet should be drawn in first angle projection and rest 75% drawing sheet should be in third angle figure.

FUNDAMENTALS OF MECHANICS /DME-101

1. Introduction :

Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

2. System of Forces :

Concept of coplaner and non-coplaner forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. 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 and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplaner concurrent force system.

3. Moment & couple :

Concept of Varignon's theorem. Generalised theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.

4. General Condition of Equilibrium :

General condition of equilibrium of a rigid body under the action of coplaner forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

5. Friction :

Types of friction:statical,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.

6. Machines :

Definition of a machine. Mechanical advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel.

7. Stresses and strains :

Concept of stress and strain. Concept of various types of stresses and strains . Definitions of tension, compression shear, bending, torsion. Concept of volumetric and lateral strains, Poisson's ratio. Changes in dimensions and volume of a bar under direct load (axial and along all the three axes). 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. Stresses and strains for homogeneous materials and composite sections.

8. Beams & Trusses :

Definition of statically determinate and indeterminate trusses. Types of supports. Concept of tie & strut, 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 force diagram for determining the magnitude and nature of forces in its various members. Analytical methods: method of joints and method of sections.(simple problems only)

9. Thin cylindrical and spherical shells :

Differentiation between thick and thin shells, cylindrical and spherical shells, thin spherical and cylindrical shells subjected to internal pressure, longitudinal stresses, circumferential or hoop stresses. Longitudinal, circumferential and volumetric strains. Changes in the dimensions and volume of a thin shell subjected to internal fluid pressure.

WORKSHOP PRACTICE/DME-151

1. Carpentry Shop :

EX-1 Introduction & demonstration of tools used in carpentry shop

EX-2 Planing and sawing practice

EX-3 Making of lap joint

EX-4 Making of mortise and tenon joint

EX-5 Making of bridle joint

EX-6 Making of dovetail joint

EX-7 Making of any one utility article such as wooden picture frame, hanger, peg, name plate, etc.

2. Painting and Polishing Shop :

EX-1 To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare french polish for wooden surface and polish the other side.

EX-2 To prepare metal surface for painting, apply primer and paint the same.

EX-3 To prepare a metal surface for spray painting, first spray primer and paint the same by spray painting gun and compressor system.

EX-4 Buffing and abrasive polishing of brass job.

EX-5 Zinc coating by electroplating method.

EX-6 To prepare any utility job.

The sequence of polishing will be as below:

i) Abrasive cutting by leather wheel. ii) Polishing with hard cotton wheel and with polishing material. iii) Buffing with cotton wheel or buff wheel.

3. Sheet Metal Working and Soldering Shop :

EX-1 Introduction & demonstration of tools used in Sheet metal working shop.

EX-2 Cutting, shearing and bending of sheet.

EX-3 To prepare a soap case by the metal sheet.

EX-4 To make a funnel with thin sheet and to solder the seam of the same.

EX-5 To make a cylinder and to solder the same.

EX-6 Preparation of different type of joints such as Lap joint-single seam, double seam. Hemp and wired joints.

EX-7 Study and sketch of various types of stakes/anvil.

EX-8 To braze small tube/conduit joints.

4. Fitting Shop :

EX-1 Introduction & demonstration of tools used in Fitting Shop.

EX-2 Hacksawing and chipping of M.S. flat.

EX-3 Filing and squaring of chipped M.S. job.

EX-4 Filing on square or rectangular M.S. piece.

EX-5 Making bolt & nut by tap and die set.

EX-6 To drill a hole in M.S. Plate and tapping the same to create threads as per need.

EX-7 Utility article-to prepare a screw driver or paper weight, double open mouth spanner for 18" hexagonal head of a bolt.

5 A. Plumbing Shop :

EX-1 Cutting and threading practice for using socket, elbow and tee etc. and to fit it on wooden practice board.

EX-2 Study of-bib cock, cistern or stop cock, wheel valve and gate valve etc.

5 B. Foundry Work

Ex-1 Study & sketch of the foundry tools.

Ex-2 Study & sketch of cupula & pit furnace.

Ex-3 To prepare the green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould)

Ex-4 Casting of non ferrous (lead or aluminium) as per exercise 3.

6. Smithy Shop :

EX-1 Study & Sketch of Tools used in smithy shop.

EX-1 To prepare square or rectangular piece by the M.S. rod.

EX-2 To braze M.S. Flats/Tipped tools on M.S. shank.

EX-3 To make a screw driver with metallic handle.

EX-4 To make a square or hexagonalhead bolt.

EX-5 To make a ring with hook for wooden doors.

EX-6 Utility article-to preapre a ceiling fan hook

7. 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 pieces by hot strip method.

EX-7 Welding practice by CO2 gas welding

8. Machine Shop

EX-1 Study & sketch of lathe machine.

Ex-2 Plain and step turning & knurling practice.

Ex-3 Study and sketch of planning/Shaping machine and to plane a Ractangle of cast iron.

9. Fastening Shop

EX-1 Practice of bolted joints

EX-2 To prepare a rivetted joint

EX-3 To make a pipe joint

EX-4 To make a threaded joint

EX-5 Practice of sleeve joint

A. BASIC OF MECHANICAL ENGINEERING

1. Basic of Thermal Engg. and Fluid Engg.

A. SOURCES OF ENERGY:

Basic ideas, conventional and nonconventional forms- Thermal, Hydel, Tidal, wind, Solar, Biomass and Nuclear and their uses.

B. FUELS & COMBUSTION:

Introduction to common fuels - solid, liquid and gases and their composition. Combustion of fuels- their higher and lower calorific values. Combustion equations for carbon, sulphur, hydrogen and their simple compounds. Calculation of minimum amount of air required for complete combustion. Combustion analysis on mass basis and on volume basis. Concept of excess air in a boiler furnace combustion. Heat carried away by flue gases. Analysis of flue gases by Orsat apparatus. Simple numerical problems Idea of specific properties of liquid fuels such as detonation, knock resistance (cetane and octane numbers), viscosity, solidification point, flash point and flame point.

2. MACHINE COMPONENTS:

Brief Idea of loading on machine components.

- (i) Pins, Cottor and Knuckle Joints.
- (ii) Keys, Key ways and spline on the shaft.
- (iii) Shafts, Collars, Cranks, Eccentrics.
- (vi) Couplings and Clutches.
- (v) Bearings- Plane, Bushed, Split-step, ball, Roller bearing, Journal bearing, Foot step bearing, thrust bearing, collar bearing and Special type bearings and their applications. Selection of ball bearing and roller bearing for given application using design data book.
- (vi) Gears : Different types of gears, gear trains and their use for transmission of motion. Determination of velocity ratio for spur gear trains; spur gear, single and double helical gears, Bevel gears, Mitre wheel, worms, Rack and Pinion. Simple and compound and epicyclic gear trains and their use. Definition of pitch and pitch circle & module.
- (vii) Springs: Compression, Tension, Helical springs, Torsion springs, Leaf and Laminated springs. Their use and material. Selection of spring by design data book, simple numerical problem

B. BASIC OF CIVIL ENGINEERING

- Classification of soil, elementary ideas of engineering properties of soil, bearing capacity of soil.
- Foundation: Definition of foundation, classification, shallow and deep foundation and their common types, load bearing, non-load bearing partition and cavity wall.
- Most common type of masonry used in civil engineering works. Different types of mortars used in masonry work, brick masonry, stone masonry, concrete block masonry, bonds used in brick masonry, english & flemish bonds

CIVIL AND MECHANICAL LAB /DMC-151

Note : Attempted any four of each sections.

A. RELATED TO FUNDAMENTALS MECHANICS

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)
8. To find the mechanical advantage, velocity ratio and efficiency of any three of the following machines:
 - (i) Simple wheel & axle
 - (ii) Differential wheel & axle
 - (iii) Differential pulley block
 - (iv) Simple Screw jack
 - (v) Simple Worm & worm wheel

B. RELATED TO FUNDAMENTAL OF MECHANICAL ENGINEERING

- A. Study and demonstration of the following
1. (a) Bio Gas Plant.
(b) Wind Mill.
(c) Solar Cooker.
(e) Voltaic Cell Type Soalr Energy Converter.
 2. Key's, Key ways and Splined shaft e.g. Jib head key, Flat key, Saddle key, Woodruff key, Feather key, Pin key, Splined shaft.
 3. Pins- Split pin, Taper cotter type split pin, Cottor pin, Foundations Bolts- Lewis rag bolt, Fish tail bolt and Square head bolt.
 4. Friction clutch and Coupling- Cone cluch, Plate cluch (Single Pair); Muff coupling, Flange coupling, Universal or Hook's joint coupling. Flexible coupling- Belt and Pin Type, Coil spring type.
Bearings- Plane, Bush, Split step bearings, Ball Roller bearings, Thrust bearings.
 5. Gears- Spur gear, Single and Double herical gears, Bevel gears.
 6. Gear Trains- Simple spur gear train, Compound gear train, Epicyclic gear train.

C. RELATED TO FUNDAMENTAL OF CIVIL ENGINEERING.

1. Identification of different types of soil stones and aggregates (visual identification).
2. Identification of timbers: teak, sal, chir, shisum, siras, deodar, kail and mango. (Visual Identification)
3. To conduct field tests of cement.
4. To study normal consistency of cement.
5. To study setting time (initial and final) of Cement.
6. To study fineness of given sample of cement.
7. To study compressive strength of bricks.
8. To study water absorption of bricks
9. To study soundness of cement.
10. To study hydraulic & fat lime.

DCS-101 Computer Fundamentals**Unit-I****Introduction to Computer**

Characteristics of Computers, What Computers can do, What computers can't do, Classification of Digital Computer Systems, Anatomy of a Digital Computer Usage of computer system in different domains like office, book publication, ticket reservation, banks etc. Components of PC – Mouse, keyboard, CPU, monitor, printers, scanners, modem, memory, sound cards, pen drives.

Unit-II**Introduction to Operating System(Windows 7)**

Working with Windows desktop, icons, taskbar, menu bar options, My Documents, My Computer, Control Panel, Recycle bin Concept of drives, folders, files Windows accessories – Notepad, WordPad, paint, clock, calendar, calculator

Unit-III

Data Representation- Representing different symbols, minimizing errors, Representing more Symbols, Generic Formula, the ASCII code, the EBCDIC code, Rules of Decimal number System and its conversion to Binary **Multimedia-** Digital images, analog to digital conversions, digital audio and digital video

Unit-IV**GUI Based Software – MS – Office 2010**

MS-Word – Opening menus, toolbars, opening and closing documents, clipboard concept MS – Excel – Working and manipulating data with excel, formulas, functions, chart and its types MS – PowerPoint – Working with PowerPoint and presentation ,Changing layout, Graphs , Auto content wizard ,Slide show, Animation effects, Normal, outline, Slide sorter, Reading view.

Unit-V**Internet**

History of Internet, equipments required for Internet connection, browser (Internet Explorer, Mozilla and Firefox, Google Chrome) **Algorithms-**Introduction, Three Basic Operations, Procedures and Programs

VDU and Printers-Human-computer interface, Keyboard, Raster Scanning, Frame Buffer, Basics of Graphics, Black and White/ Color Terminals, Text based terminals, LEDs/LCDs, Inkjet Printers, Laser Printer

Learning Resources:**1. Books:**

No	Author	Title	Publisher
1	Achyut Godbole	Demystifying Computer	TMH
2	Alexis Leon	Introduction to Computers	Vikas Publishing House
3	Vikas Gupta	Comdex Computer Course Kit	Dreamtech Press
4	Steve Schwartz	Microsoft Office 2010	Pearson
5	Elaine Marmel	Microsoft Project 2010 (Bible)	Wiley India
6	Preppernau Cox	Windows 7 Step by Step	PHI

DCS-151 Computer lab

1. Demonstration of Computer peripheral devices to students
2. Moving from one window to another window Opening task bar buttons into a window. Arranging icons on the desktop and create shortcuts.
3. Creating folders and files. Copy, rename, delete files and folders. Moving folders and files from one drive to another drive.
4. Create and edit notepad document. Create and edit WordPad document. Create paint file by using different drawing tools.
- 5 Creating, editing, saving word document. Entering and formatting text. Paragraph formatting, use bullets and numbering.
6. Page formatting – page margins, page size, orientation, page break, headers and footers. Create tables, insert, and delete rows and columns.
7. Printer installation and printing document. Create and print mail merging address for envelop and letters.
8. Create, open and print worksheet with page setup and print options. Enter data and format cells. Select, insert, delete cells, rows and columns. Insert formulas, functions and named ranges in worksheet.
9. Create chart of different types in Excel.
10. Create a simple text slide using formatting, Selecting a slide layout. And insert pictures & backgrounds. Insert auto shapes, clip-arts and form group/un group objects from slides. Apply slide transitions and slide timings and animation effect for slide show
11. Perform Internet connection.
Create own e-mail id, send and receive mail with attachment. Searching information using search engine (Google, MSN, bing etc.) Do Internet chatting and understand the chat toolbar. Organize favorite websites in different browsers.

DEE-101 Fundamentals of Electrical & Electronics Engg.

LTP

400

Unit 1

Basic Terminology and their concepts: Current, EMF, potential difference (voltage), resistance, resistivity their units conductors & insulators, Insulation resistance of a cable. Effect of temperature on the resistance of conductors, temperature coefficient of resistance. Electrical power, energy and their units (SI), Heating effect of electric current and its practical examples. Relationship between electrical, mechanical and thermal SI units of work, power and energy, Electrical Safety and precautions.

Unit 2

D.C. Circuits: Kirchhoff's laws. Different types of voltage and current sources, Introduction to Thevenin, super-position, and maximum power transfer theorem.

Unit 3

A.C. Circuits: Instantaneous value, maximum (peak) value, cycle, frequency, alternate current and voltage. Equation of an alternating voltage and current and wave shape varying sinusoidally. Average and RMS value of alternating voltage and current. Concept of phase, phase difference and phasor representation of alternating voltage and current with pure resistance, inductance, capacitance.

Unit 4

Components and Diodes : Basic concepts of energy bands in materials, concept of forbidden gap, Intrinsic and extrinsic semiconductors, donors and acceptors impurities
Junction diode: p-n junction, depletion layer, v-i characteristics, diode resistance, capacitance diode ratings.

Unit 5

Breakdown diodes : breakdown mechanisms (zener and avalanche) breakdown characteristics, zener resistance, zener diode ratings
Diode Applications : rectifiers (half wave and full wave), calculation of transformer utilization factor and diode ratings.

Unit 6

Bipolar Junction Transistor

Basic construction, transistor action CB, CE and CC configurations, input/output characteristics, basics of JFET and MOSFET.

Switching theory and logic design

Number systems, conversion of bases Boolean algebra, logic gates, concept of universal gate.

Reference Books:

1. Robert L. Boylestad/ Louis Nashelsky "Electronic Devices and Circuit Theory", 9th Edition,
Pearson Education 2007

2. Devid A. Bell "Electronic Devices and Circuits", 5th Edition, OXFORD University Press 2008
3. Morris Mano "Digital Computer Design", PHI 2003
4. A Text Book of Electrical technology: B.L. Theraja, A.K. Theraja., Volume-I, S.Chand Publication.
5. Basic Electrical and Electronics Engineering: By G. Rajalakshmi, N. Srivanandham.
6. Fundamentals of Electrical and Electronics Engineering: By Smarajit Ghosh.
7. Basic Electrical and Electronics Engineering: by J.B. Gupta.

DIPLOMA IN ENGINEERING
APPLIED PHYSICS (DAS-102/202)

L T P C
6 0 0 4

(First/Second Semester)

Course Contents:

Unit-I

Vector: Scalar and vector quantities: Addition, Subtraction, And Resolution of vector-Cartesian components of vector, Scalar and vector product of two vectors.
Force and Motion: Parabolic motion, projectiles thrown horizontally and at an angle. Problems on time of flight, horizontal range and vertical height. Circular motion, angular velocity, angular acceleration and centripetal acceleration. Relationship between linear and angular velocity and acceleration. Centripetal and centrifugal forces. Gravitational force, Kepler's laws, Escape velocity, geostationary satellite.

Unit-II

Dynamics of Rigid Body (Rotational Motion): Rotational motion, Moment of inertia, Theorems (Perpendicular and Parallel axis) of moment of inertia (Statement), Radius of gyration, angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy.
Friction: Introduction, Advantage and disadvantage of friction, Static and dynamic frictional forces.
Fluid Mechanics: Surface tension, Equation of continuity ($A_1V_1=A_2V_2$), Bernoulli's theorem, streamline and Turbulent flow, Viscosity, coefficient of viscosity & its determination by Stock's method.

Unit-III

Elasticity: - Elasticity, stress and strain, Hook's law, elastic limit, Yielding point and breaking point. Modulus of elasticity: Young's modulus, bulk modulus and modulus of rigidity, Poisson ratio.
Simple Harmonic Motion: Periodic Motion, characteristics of simple harmonic motion; equation of S.H.M. and determination of velocity and acceleration. Simple pendulum. Derivation of their periodic time. Kinetic Energy and Potential Energy in S.H.M. Energy conservation in S.H.M.

Unit-IV

Application of Sound Waves: - Acoustics: Standing waves, Closed and Open organ pipes, Resonance. Echo and reverberation and reverberation time. Sabine's formula. Control of reverberation time.
Optics: Quantum nature of light, Coherence, Duality of wave and particle, Concept of Interference, Fraunhofer single-slit diffraction, Elementary concept of polarization.

Unit-V

Electrostatics: Electric Charges, Conservation law of charge, Coulomb's law-force between two point charges, superposition principle and continuous charge distribution.

Electric field, electric field due to a point charge, electric field lines, electric dipole.

Electric flux, statement of Gauss's theorem. Electric potential, potential difference, electric potential due to a point charge, equipotential surfaces.

Electrodynamics: Electromotive force, Ohm's law, Limitations of Ohm's law, Ampere's Law, faraday's law, Biot- Savart's Law.

Text Books:

1. Kumar Tyagi, Applied Physics, Navbharti Prakashan, Meerut.
2. Kushwaha P.S, Applied Physics, Bharat Bharti Publication, Meerut.
3. Jain Vibha Applied Physics, Dhanpat Rai & Company (P) Ltd., Delhi.

Reference Books:

1. Gaur R.K & Gupta S.L., Engineering Physics, Dhanpat Rai Pub., New Delhi
2. Gaur R.K. Basic Applied Physics, Dhanpat Rai Pub., New Delhi

Note: This syllabus is designed accordingly 6 lectures per week.

APPLIED PHYSICS LAB

(Course Code: DAS 152/252)

L T P C

0 0 3 2

List of Experiments

1. To find the diameter of wire using a screw gauge.
2. To find volume of solid cylinder and hollow cylinder using a vernier calipers.
3. To determine the thickness of glass strip and radius of curvature of a concave surface using a spherometer.
4. To verify the parallelogram law of forces.
5. To determine the atmospheric pressure at a place using Fortin's Barometer.
6. To determine the surface tension of a liquid by capillary rise method.
7. To determine the focal length of two lenses by nodal slide.
8. To determine the frequency of AC mains by Sonometer.

MATHEMATICS – I

First Semester

Course Code: DAS101	L	T	P	C
	4	-	-	4

Unit I

SERIES: A.P. and G.P.; n^{th} term, Sum to n terms, Arithmetic Mean. Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.

Unit II

DETERMINANTS: - Elementary properties of determinants of order 2 and 3, multiplication system of algebraic equations, Consistency of equation, Cramer's rule.

VECTOR ALGEBRA:- Dot and Cross product of two vectors, Scalar and vector triple products. Work done, Moment of a force.

Unit III

TRIGONOMETRY:- Relations between sides and angles of a triangle: Statement of various formulae showing relationship between sides and angles of a triangle. Complex numbers, Representation, Modulus and amplitude De Moivre's theorem, its application in solving algebraic equations, Modulus Function and its properties.

Unit IV

CO-ORDINATE GEOMETRY-I: Standard form of Circle, Parabola, Ellipse and Hyperbola. Tangent and normal to these curves.

Unit V

CO-ORDINATE GEOMETRY-II Straight lines, planes and spheres in 3 – dimensional space. Distance between two points in space, direction cosines and direction ratios, projections finding equation of a straight line, and shortest distance between two lines.

Different forms of planes represented by equation $lx + my + nz = c$, relation between lines and planes, sphere $x^2 + y^2 + z^2 + 2gx + 2fy + 2wz = d$.

Text Books:

1. Sharma, R D, *Applied Mathematics*.
2. Grewal B S, *Elementary Engineering Mathematics*, Khanna Publication.

Reference Books:

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

Foundation English – I

First Semester

Course Code: DAS104

L T P C
3

Unit I

Personal Grooming

Ice Breaking Games, Grooming Workshop, Self Awareness and Self Analysis, Confidence Building, Positive thinking and Motivation

Unit II

Grammar

Parts of the sentence, The sentence : Types, The Verbs, Primary Auxiliaries, Modal Auxiliaries, Subject verb agreement, Tenses: kinds, Forms and Usa

Unit III

Active Voice, Passive Voice, Parts of speech, Determiners, Clauses, Correct and Incorrect Sentences, Jumbled sentences, Direct Indirect, Story building through opening sentences & Pictures, Narration on given situations

Text Books:

1. Wren & Martin, English Grammar & Composition
2. J. C. Nesifield, English Grammar, Composition & Usage

Reference Books:

1. John Eastwood, Oxford English Grammar
2. R.P.Sinha, English Grammar & Usage
3. Amarnath Thakur, English Grammar Series

APPLIED CHEMISTRY
First/Second Semester

L T P C
5 - - 5

Course Code: DIP103/203

Course Contents:

Unit:-I

ATOMIC STRUCTURE

Basic concept of atomic structure, Matter wave concept, de Broglie wave equation, Quantum numbers, Heisenberg's Uncertainty Principle, Shapes of orbitals.

CHEMICAL BONDING:- Overview of basic concept, Ionic, Co-valent and Co-ordination Bond, Molecular Orbital Theory and its applications to Homo and Hetero diatomic molecules, Hydrogen bonding and its applications, Valence Bond Theory, Hybridisation and Geometrical shape of BeCl₂, NH₃, CH₄ molecules.

(16 Lectures)

Unit:- II

ELECTRO CHEMISTRY: Arrhenius's Theory of electrolytic dissociation, Electrolytic conductance, Oswald dilution law. Concept of Acid and bases: Bronsted, Arrhenius's and Lewis theory. Concept of pH and its measurement by pH meter. Buffer solutions, Indicators, Solubility product, Redox reactions, Electrode potential (Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). Standard electrode potential, Electro chemical series and its application.

(11 Lectures)

Unit:- III

ENVIRONMENTAL POLLUTION AND ITS CONTROL: Concept and various types of environmental pollution with special reference to air pollution and water pollution. General measures to control environmental pollution. depletion of Ozone layer, Green house effect, Acid rain, Smog formation, Chemical and photochemical reaction, Various species in atmosphere.

(9 Lectures)

Unit:- IV

WATER TREATMENT: Concept of hard and soft water, Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Zeolite and Ion exchange resin process). Disadvantage of hard water in different industries, Boiler feed water boiler scale formation, Corrosion, Caustic embrittlement, primming and foaming. Characteristics imparted by various impurities or contaminants such as colour, odour, taste and sediments and their analysis.

CORROSION: Concept of metallic corrosion, Types of corrosion and factors affecting the corrosion rate, Chemical and electrochemical theory of corrosion, Oxide film formation and its characteristics, tarnishing fogging and rusting, Prevention of corrosion by various methods.

(15 Lectures)

Unit:- V

POLYMERS:

1. Introduction to basic terms used in polymer chemistry and technology. Monomers, Average degree of polymerisation, Average molecular weight. 2. Characteristics of Polymers and their classification- Addition polymers and their industrial application – Polystyrene, PVC, PAN, Buna-S, Teflon. - Condensation polymer and their industrial application: Nylon 6, Nylon 6, 6, Bakelite.

(8 Lectures)

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.

Text Books:

1. Singh S.K., *“Fundamentals of engineering chemistry”*, New Age International (P) Ltd., New Delhi, 2003.
2. Mehta V.P., Polytechnic Chemistry, Arun Publisher, Meerut.
3. Chandra S., Text Book of Chemistry for Polytechnic, Nav Bharat Prakashan, Meerut.
4. Singh N.B., Das S.S. and Singh K., *“Engineering chemistry” Universities Press (India), (P) Ltd.*, New Delhi, 2012.

Reference Books:

1. Gaidher S.R. & Adasul B G, Basic Chemistry for Polytechnic, S.Chand Pub., Delhi.
2. Alla Appa Rao, Polytechnic Chemistry, New Age International Pub., Delhi.
3. Sharma S.D., Polytechnic Chemistry, Dhanpat Rai Pub., Delhi.

CHEMISTRY LAB
First/Second Semester

Course Code: DIP152/25

L T P C

2 - - 3 2

LIST OF PRACTICAL

1. To determine the alkalinity of a given water sample.
2. To determine the total hardness of water sample in terms of CaCO_3 by EDTA titration method using EBT indicator.
3. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.
4. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution using potassium ferricyanide $[\text{K}_3\text{Fe}(\text{CN})_6]$ as external indicator.

Foundation English – I
Professional Communication Lab

First Semester

Course Code: DAS154

L	T	P	C
	-	2	

Unit I

Speaking Skills

Conversation and Dialogues, Situation (visit to a bank, booking a railway ticket, visit to a doctor, introduction over a social evening, leave during an emergency etc.), Invitation to an Occasion, Disagreement on a topic, Correct pronunciations, Conversation etiquettes on a social evening-Do's and Don't's

Scheme of Instruction & Syllabi
of
Diploma Mechanical Engineering
(Automobile Engineering/Production Engineering)

(THREE YEAR DIPLOMA)

II and III Year

(Effective Session 2014-2015)

Invertis Institute of Engineering & Technology
INVERTIS UNIVERSITY
Invertis Village, Bareilly-Lucknow NH-24, Bareilly

STUDY AND EVALUATION SCHEME
Diploma in Mechanical Engineering
(Automobile Engineering/ Production Engineering)
(Effective from session 2014-2015)
YEAR II, SEMESTER III

S. No.	Course Code	SUBJECT	PERIODS			EVALUATION SCHEME					TOTAL	Credit
						SESSIONAL EXAM.				E-SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	DME301	Fluid Mechanics	3	1	0	20	10	10	40	60	100	4
2	DME302	Material Science and Engineering	3	1	0	20	10	10	40	60	100	4
3	DME303	Manufacturing Process 1	3	1	0	20	10	10	40	60	100	4
4	DME304	Strength of Material	3	1	0	20	10	10	40	60	100	4
*5	DME305 /DME306	Foundry , Forming and Welding Processes/ Automobile Engine	3	1	0	20	10	10	40	60	100	4
PRACTICAL/TRAINING/PROJECT												
6	DME351	Fluid Mechanics Lab	0	0	4	-	-	-	50	50	100	2
7	DME352	Material Science and engineering Lab	0	0	4	-	-	-	50	50	100	2
8	DME353	Machine Drawing -I	0	0	4	-	-	-	50	50	100	2
*9	DME355/ DME356	Foundry , Forming and Welding Processes lab/ automobile Engine Lab	0	0	4	-	-	-	50	50	100	2
10	GP301	Discipline & General Proficiency	-	-	-	-	-	-	100	-	100	1
		TOTAL	15	5	16	100	50	50	500	500	1000	29

L-Lecture, T- Tutorial , P- Practical , CT – Cumulative Test ,TA –Teacher Assessment , AT – Attendance , E-Sem – End Semester Marks

Note -*5 DME 305 Foundry, Forming and welding Processes for Mechanical Production / DME 306 Automobile Engine For Mechanical Automobile Engineering

Note -*9 DME 355 Foundry, Forming and welding Processes for Mechanical Production lab / DME 356 Automobile Engine lab For Mechanical Automobile Engineering

STUDY AND EVALUATION SCHEME
Diploma in Mechanical Engineering
(Automobile Engineering /Production Engineering)
(Effective from session 2014-2015)
YEAR II, SEMESTER IV

No.	Course Code	SUBJECT	PERIODS			EVALUATION SCHEME					TOTAL	Credit
						SESSIONAL EXAM.				E-SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	DME401	Thermal engineering	3	1	0	20	10	10	40	60	100	4
2	DME402	Measurement and Metrology	3	1	0	20	10	10	40	60	100	4
3	DME403	Machine Design	3	1	0	20	10	10	40	60	100	4
4	DME404	Manufacturing Process - II	3	1	0	20	10	10	40	60	100	4
5	*DME405 /DME406	Modern Manufacturing Process/ Automobile technology -I	3	1	0	20	10	10	40	60	100	4
PRACTICAL/TRAINING/PROJECT												
6	DME451	Thermal engineering lab	0	0	4	-	-	-	50	50	100	2
7	DME452	Measurement and Metrology Lab	0	0	4	-	-	-	50	50	100	2
8	DME453	Machine Drawing -II	0	0	4	-	-	-	50	50	100	2
9	DME455/ DME456	Modern Manufacturing Process lab/ Automobile Technology lab	0	0	4	-	-	-	50	50	100	2
10	GP401	Discipline & General Proficiency	-	-	-	-	-	-	100	-	100	1
		TOTAL	15	5	16	100	50	50	500	500	1000	29

L-Lecture, **T**- Tutorial , **P**- Practical , **CT** – Cumulative Test ,**TA** –Teacher Assessment , **AT** – Attendance , **E-Sem** – End Semester Marks

Note -*5 DME 405 Modern Manufacturing Process for Mechanical Production / DME 406 Automobile Technology-I For Mechanical Automobile Engineering

Note -*9 DME 455 Modern Manufacturing Process lab / DME 456 Automobile Technology lab For Mechanical Automobile Engineering

STUDY AND EVALUATION SCHEME
Diploma in Mechanical Engineering
(Automobile Engineering/ Production Engineering)
(Effective from session 2014-15)
YEAR III, SEMESTER V

No.	Course Code	SUBJECT	PERIODS			EVALUATION SCHEME					TOTAL	Credit
			L	T	P	SESSIONAL EXAM.				E-SEM.		
						CT	TA	AT	TOTAL			
THEORY												
1	DME501	Theory of Machines	3	1	0	20	10	10	40	60	100	4
2	DME502	Heat Transfer	3	1	0	20	10	10	40	60	100	4
3	DME503	Manufacturing Materials	3	1	0	20	10	10	40	60	100	4
4	DME504	Fluid Machinery	3	1	0	20	10	10	40	60	100	4
5	*DME505 /DME506	Machine Tools and Metal Cutting/ Automobile Technology -II	3	1	0	20	10	10	40	60	100	4
PRACTICAL/TRAINING/PROJECT												
6	DME552	Heat transfer Lab	0	0	4	-	-	-	50	50	100	2
7	DME553	Industrial Training Viva Voice	0	0	2	-	-	-	100	-	100	2
8	DME554	Fluid Machinery Lab	0	0	4	-	-	-	50	50	100	2
9	DME555/ DME556	Machine Tools and Metal Cutting Lab/ Automobile Technology lab-II	0	0	4	-	-	-	50	50	100	2
10	GP501	Discipline & General Proficiency	-	-	-	-	-	-	100	-	100	1
		TOTAL	15	5	14	100	50	50	550	450	1000	29

L-Lecture, **T**- Tutorial , **P**- Practical , **CT** – Cumulative Test ,**TA** –Teacher Assessment , **AT** – Attendance , **E-Sem** – End Semester Marks

Note -* DME 505 Machine Tools and Metal Cutting for Production Engineering/ DME -556 Automobile Technology -II for automobile engineering

Note -* DME 555 Machine Tools and Metal Cutting lab for Production Engineering/ DME -556 Automobile Technology Lab-II for automobile engineering

STUDY AND EVALUATION SCHEME
Diploma in Mechanical Engineering
(Automobile Engineering/Production Engineering)
(Effective from session 2014-2015)
YEAR III, SEMESTER VI

No.	Course Code	SUBJECT	PERIODS			EVALUATION SCHEME					TOTAL	Credit
						SESSIONAL EXAM.				E-SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	DAS604	Environment and Ecology	2	0	0	10	5	5	20	30	50	2
2	DME601	CAD/ CAM and CNC machines	3	1	0	20	10	10	40	60	100	4
3	DME602	Refrigeration and air conditioning	3	1	0	20	10	10	40	60	100	4
*4	DME603 /DME604	Production Management /Automobile Maintenance	3	1	0	20	10	10	40	60	100	4
PRACTICAL/TRAINING/PROJECT												
6	DME651	CAD/ CAM Lab	0	0	4	-	-	-	50	50	100	2
7	DME652	Refrigeration and air conditioning Lab	0	0	4	-	-	-	50	50	100	2
8	DME653	Project	0	0	8	-	-	-	150	200	350	10
9	GP501	Discipline & General Proficiency	-	-	-	-	-	-	100	-	100	1
		TOTAL	11	3	16	70	35	35	490	510	1000	29

L-Lecture, T- Tutorial , P- Practical , CT – Cumulative Test ,TA –Teacher Assessment , AT – Attendance , E-Sem – End Semester Marks

Note- *4DME-603Production Management for Production engineering / DME 604 Automobile Maintenance For Automobile Engineering

DME 301 FLUID MECHANICS

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Unit 1

Fluid Mechanics & Fluid Properties: Concept of fluid, fluid mechanics, properties of fluid i.e. viscosity, specific weight, specific volume, specific gravity

Static Pressure: Pascal's law, concept of static pressure, intensity of pressure and pressure head

Unit 2

Measurement of pressure: Concept of atmospheric pressure, gauge pressure, absolute pressure, vacuum, Measurement of pressure, Gauges: Piezometer, simple manometer, differential manometer.

Unit 3

Flow of fluids: Types of flow, laminar and turbulent, rate of discharge, law of continuity, energy of fluid - potential, pressure and kinetic, Bernoulli's theorem and its applications, discharge measurement by venturimeter and orifices, Pitot tube and Pitot static tube.

Unit 4

Dimensional Analysis: Dimensional analysis, important dimensionless numbers and their significance, geometric, kinematics and dynamic similarity, model studies

Unit 5

Laminar and Turbulent Flow: Equation of motion for laminar flow through pipes, Stokes' law, transition from laminar to turbulent flow, types of turbulent flow, isotropic, minor losses, pipe in series and parallel, power transmission through a pipe, siphon.

Recommended Books:

Title	Author(s)	Publisher
Fluid Mechanics & Hydraulic Machines	R.K.Bansal	Laxmi Publications
Reference		
Hydraulics & Fluid Mechanics Hydraulic Machines	Modi & Seth	Standard Publishers
Fluid Mechanics & Hydraulic Machines	R.K Rajput	S.Chand & Company
Fluid Mechanics & Fluid Machinery	D. S. Kumar	S.K Kataria & Sons
Hydraulics & Hydraulic Machines	Jagadish Lal	Metropolitan
Fluid Mechanics	A.K Jain	Khanna Publishers
Theory & problems of	K Subramanya	Tata McGrawHill

DME 302 Material Science and Engineering

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Unit 1

INTRODUCTION: Introduction to engineering materials, classification, various properties like thermal, chemical, electrical, mechanical properties, selection criteria.

FERROUS MATERIALS: Classification, ores, 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

Unit 2

STEELS AND ALLOY STEEL: different manufacturing methods; open hearth, Bessemer, electric arc. Availability, properties and usage of steels, specification as per BIS and equivalent standards, effect of various alloying element like Cr, Ni, Co, V, Mo, Si, Mn, S on mechanical properties of steel, use of alloy steels; high speed steel, stainless steel, spring steel, silicon steel.

Unit 3

METALLURGY: Crystalline nature of solids, Structure of atom, types of solids, space lattice arrangement of atoms in BCC, FCC and HCP crystals, Plastic deformation of metals, Mechanism of slipping and twinning, hot and cold working of metals and their effect on mechanical properties.

Unit 4

PHASE DIAGRAMS: Phases in metal system, solid solution, Hume-Rothery rules, solidification of pure metals and alloys, phase rule, equilibrium diagram, Iron-carbon equilibrium diagram, Effect of carbon on properties of steel.

Unit 5

HEAT TREATMENT PROCESSES: Principle of heat treatment of steels, TTT curves, Annealing, Normalizing, Hardening, Case hardening, tempering, Austempering, Martempering, Flame hardening, Induction hardening, Carburizing, Nitriding, cyaniding of steels, Precipitation hardening with reference to Copper and Aluminum.

Recommended Books

Title	Author(s)	Publisher
Text Materials and metallurgy	OP Khanna	Dhanpat rai
Reference Mechanical metallurgy	Dieter	McGraw Hill
Manufacturing processes	V. Raghvan	Prentice Hall
Introduction to physical metallurgy	Sidney H Avner	Tata McGraw-Hill

DME 303 MANUFACTURING PROCESSES-I

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Unit-1

Foundry: Introduction to casting, advantages & limitations. Introduction to moulding processes. Sand moulding- materials, properties of moulding sand, sand moulding procedure, Pattern- types & materials, Pattern allowances, core prints, cores, Elementary & brief description of various melting furnaces.

Unit-2

Welding: Welding processes - classification of welding processes. Gas welding, tools & equipment, types of flames, filler rods, flux. Arc welding, procedures, equipment, application, type of electrodes, specification of electrode, selection of electrode, flux, welding parameters & equipments. Introduction to SMAW, GTAW, GMAW & submerged arc Welding. Introduction to Resistance welding, Spot, Seam, Projection & Percussion, Pressure, friction welding. Introduction to Soldering and Brazing.

Unit-3

Turning, Shaping & Planning: Principle, description & functions of lathe, specifications, work holding devices, tools & operations. Working principle of shaper, planer and slotter, Specification of shaper, planer and slotting machine Quick return mechanism, types of tools Speed and feed used in above processes. Commonly used cutting tool materials.

Unit-4

Milling & Drilling : Milling; principle, types of milling machines, specifications of milling machine, Introduction to indexing, Multipoint cutting tool, Types of milling cutters. Principles, Classification of drilling machine, Different operations on drilling machine, Speed and feed in drilling

Unit-5

Boring: Principle of boring, classification of boring machine Specification of boring machine, boring tools, boring bars & boring heads, alignment of bores & its importance.

Recommended Books

Title	Author(s)	Publisher
Text		
Workshop Technology Vol. I & II	Hazra Chowdhry	Media Promotors

References

Manufacturing materials & process	Lindberg	Prentice Hall
Manufacturing processes	Begeman	John Wiley
Workshop Technology	S.K. Garg	Laxmi

DME 304 STRENGTH OF MATERIAL

Maximum Internal Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Unit 1

Introduction with Subject, Review of stress and strain, Types of Stresses-Strain, Elastic Limit, Hooke's Law, Ultimate Stress, Working Stress, stress strain curve for Mild Steel Factor of safety Stresses in Composite Members Elastic constants and their relationship, Lateral strain, Poisson's ratio, volumetric strain, bulk modulus Shear stress- shear strain, modulus of rigidity Problem connecting lateral and linear deformation.

Unit 2

Thermal stress and Strain:

Introduction, Determination of Thermal stress and Strain, Temperature Stress in Bars of Varying section Temperature Stress in Composite Bars.

Unit-3

Torsion:

Theory of torsion and assumptions, derivation of torsion formula, polar modulus, torsional rigidity Polar moment of Inertia, solid and hollow shafts, power transmitted by shafts, combined bending and torsion.

Unit-4

Bending Stress:

Theory of Pure Bending and assumptions, Moments of Inertia, Bending Stresses, Stress Concentrations in Bending, Combined Bending and Direct Stress,

Unit-5

Springs:

Types of springs, uses closely coiled helical spring subjected to axial load, shear stress, deflection, stiffness, strain energy stored for closely coiled helical spring, Simple problem.

Books and References:

1. Strength of Materials by R.K.Rajput
2. Strength of Materials – Dr. Sadhu Singh
3. Strength of Materials by R.S.Khurmi
4. Strength of Materials By S.S.Bhavikatti
5. Strength of Materials by S.Ramamrutham & R.Narayanan

DME 305- FOUNDRY, FORMING AND WELDING PROCESSES

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Unit -1

Foundry: Pattern Making, Types of patterns, Pattern materials, Pattern allowances, Colouring of patterns, introduction to cores, Core materials and types of cores, Moulding, Introduction to moulding, Types of moulding sand and their properties, Sand mixing and mould preparation, Moulding defects, Melting and pouring, Types of melting furnaces (pit, lifting, cupola) used Closing and pouring of mould 1 4 Special Casting Methods, Introduction to die casting, investment, and centrifugal casting

Unit-2

Welding, Soldering and Brazing: Gas Welding, Brief description of gas welding ,as welding foos and, equipment, Different types of flame, Selection of filler rods, flux and torch, Electric Arc Welding, Introduction to arc welding with procedures, applications, Types of arc, Types of electrode used, Specifications of electrodes, Selection of electrode, flux. Current and equipment Resistance Welding, spot welding, Seam welding, Projection welding, Percussion welding, Principle of soldering and brazing, Types of solders and soldering fluxes and their uses, Brazing process, Description of brazing tools and equipment, Brazing filler alloys and fluxes, Advantages, limitations and applications of soldering and brazing.

Unit-3

Advanced Welding: Working principle, process details, equipment details, limitations and applications of the following welding processes; Thermit welding, MIG welding, TIG welding, Atomic hydrogen welding, Electron beam welding, and Laser beam welding.

Unit-4

Forming: Forming, General idea of stress and plastic deformation, Hot working and cold working. Details and applications of lolloping processes: Die stamping, Drawing, Spinning, Rolling, Extruding, Forging, Tube drawing .

Unit-5

Presses and Press Tools : Types of presses, their applications, Types of dies, Types of die sets, Punches, Pads, Die clearance, Stripper plates, Stops, Pilots, MO Stock layout.

Recommended Books

Title	Author(s)	Publisher
Text Foundry, Forming and Welding	P.N. Rao	Tata McGraw Hill
References Foundry Technology	KP Sinha, D B Goel	Roorkee Publishing
A Text Book of Welding Technology	OP Khanna	Dhanpat Rai and Sons
Welding Engineering	PL Aggarwal and T Mag	Khanna Publishers,

DME 306 AUTOMOBILE ENGINES

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Unit-1

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 different engines used in Indian vehicles.

Unit-2

I. C. engine: Multi cylinder 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 multi cylinder engine for automobiles use, firing order, arrangement of cylinders. Valve positions and design of combustion chamber cylinder head and gasket, Wankle rotary engine. Idea of super charging, its advantages phenomenon of knocking or detonation, its cause and effect on engine. Octane number and octane number

Unit-3

Fuel supply and ignition system:

Petrol engine: Construction and working of two stroke and four stroke petrol engine. Fuel supply circuit components (fuel tank to engine), their function. Exhaust pipe and silencer. Construction and working of mechanical and electrical fuel pumps, carburetor, its function. Simple carburetor, its limitations. Modified carburetor-Zenith, Carter, 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 multi cylinder 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.

Unit-4

Lubrication system of automobile engines: Principle of lubrication on multi cylinder 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.

Unit-5

Diesel engine: Construction and working of two stroke and four stroke 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. Turbulence in filters wet and dry types. Inlet and exhaust main folds arrangement. Exhaust pipe and silencer.

DME 351 FLUID MECHANICS LAB

Maximum Sessional Marks: 50
Maximum End Term Examination Marks: 50
L T P 0 0 2

LIST OF EXPERIMENTS

A. Demonstration of the following for study & sketch.

1. Piezometer tube, Mechanical flow meter, Manometers, Pressure gauge.
2. Centrifugal and Reciprocating pumps.

B. Performance Experiments:-

3. Measurement of discharge over notches and its verification.
4. To verify Bernoulli's theorem.
5. To determine coefficient of discharge of a Venturimeter.
6. To determine coefficient of contraction, coefficient of velocity and coefficient of discharge for a given orifice.

C. To study performance:-

To study the performance of a

7. Centrifugal Pump
8. Reciprocating Pump.
9. To measure the velocity of water flow in a open channel by a current meter

DME -352 MATERIAL SCIENCE AND ENGINEERING LAB

Maximum Sessional Marks: 50
Maximum End Term Examination Marks: 50
L T P 0 0 2

LIST OF EXPERIMENTS

1. To conduct hardness test and determine the hardness of the mild steel specimen
2. To conduct the tensile test and determine the tensile strength of the mild steel
3. To conduct the torsion test and determine the shear stress of the given specimen
4. To conduct the toughness test
5. To conduct the creep test
6. To study the ferrous and non ferrous material
7. To study the micro and macro structure for ferrous material
8. To conduct the spring test of the closed and open coil helical springs
9. To conduct the compressive test on UTM
10. To study the mechanical properties of the material.

DME -353 MACHINES DRAWING -1 LAB

Maximum Sessional Marks: 50
Maximum End Term Examination Marks: 50
L T P 0 0 2

LIST OF EXPERIMENTS

1. Conventions of lines and dimension system
2. Orthographic projections of solids (first angle)
3. Isometric projections and oblique projections
4. Screw threads and screw fastening

5. Riveted joints and welded joints
6. Wooden joints
7. Theory of conventional tolerance and geometrical tolerance
8. Machining symbols and surface texture
9. Key and cotters and knuckle joint
10. Shaft coupling pulleys, bearings –brackets

DME -355 FOUNDRY FORMING AND WELDING PROCESSES LAB

Maximum Sessional Marks: 50
Maximum End Term Examination Marks: 50
L T P 0 0 2

LIST OF EXPERIMENTS

- 1 1. Preparation of dovetail joint using carpentry tools.
- 2 To prepare a funnel with thin sheet and to solder the seam of the same.
- 3 Cutting and threading practice for elbow joint in fitting shop.
- 4 Study and sketch of cupola and pit furnace.
- 5 To prepare the green moulding sand and to prepare moulds (double piece pattern sweep mould).
- 6 T joint welding using after preparation of edge using electric arc welding.
- 7 Welding of plastic pieces using hot strip method.
- 8 Study of welding and cutting of work pieces using gas welding.
- 9 Study and preparation of square work piece using mild steel rod.
- 10 To prepare hexagonal headed bolt and nut.

DME -356 AUTOMOBILE ENGINELAB

Maximum Sessional Marks: 50
Maximum End Term Examination Marks: 50
L T P 0 0 2

LIST OF EXPERIMENTS

1. To study the I.C engine and classifications of engines
2. To study the cycle of the petrol engine
3. To study the cycle of the diesel engine
4. To study the engine components
5. Assembling and disassembling of the two stroke diesel engine
6. To study the fuels of I C engine and air fuel ratio.
7. To study the carburetor
8. To study the cooling system of I.C. engines
9. To study Governing system of the engines
10. To study the engine performance parameters IHP, BHP etc

DME-401 THERMAL ENGINEERING

Maximum Sessional Marks: 40
Maximum End Term Examination Marks: 60
L T P 3 1 0

Unit I

Introduction: Boyle's Law, Charles's Law, characteristics gas equation, universal gas constant Properties; intrinsic and extrinsic, system; open, closed and isolated.

Unit II

Laws of thermodynamics: Thermodynamic equilibrium, Zeroth law of thermodynamics, first law of thermodynamics, concepts of enthalpy, internal energy, specific heat, work and heat, concept of entropy, clausius and Kelvin plank statement of second law of thermodynamics, Equivalence of Kelvin plank and clausius statements. Throttling and free expansion, non-flow work done under isothermal, polytropic, adiabatic, isobaric, isochoric processes, simple problems steady flow energy and its applications.

Unit III

Formation of Steam and Steam Boilers: Steam formation, wet steam, dry steam and saturated steam, dryness fraction, superheated steam; degree of superheat, latent heat of vaporization, Enthalpy of steam, entropy; entropy increase during evaporation, temperature entropy diagram mollier diagram (H-S diagram) Steam generator, Classifications, comparison of fire tube and water tube boilers, construction and features of Lancashire boiler, locomotive and Babcock and Wilcox Boilers, Introduction to modern boilers. Rankine cycle.

Unit IV

I.C Engine and Cycles : Types, classification, CI and SI engines, Mechanical constructional details of two stroke petrol engine and diesel engine, four stroke petrol and diesel engines, valve timing diagrams, Carnot cycle, Otto Cycle, diesel and dual cycle, derivation of efficiency and comparison of these cycles.

Unit V

Performance of IC engines: Brake, indicated, frictional powers, brake mean effective pressure, indicated map, engine efficiencies, air standard, brake, indicated, mechanical, volumetric, scavenging, efficiency, characteristics of power, fuel consumption with engine speed, calculation of powers, efficiency and SFC for two and four stroke engine. LCV, HCV

Recommended Books

Title	Author(s)	Publisher
Text Thermal Engg	R.K.Rajput	Laxmi publication
Reference Heat and Thermodynamics	PL Ballany;	Khanna Publisher
Thermal Science	Domkundwar	S.Chand Publishers
Heat Engineering	Kumar and Vasandani	S.Chand Publications

DME-402 MEASUREMENT AND METROLOGY**Maximum Sessional Marks: 40****Maximum End Term Examination Marks: 60****L T P 4 1 0****Unit I**

Introduction: Metrology and its objectives, need of inspection, physical measurement, precision and accuracy, accuracy and cost, trace-ability, selection of instruments, sources of errors, calibration, sensitivity, and readability, classification of methods of **measurements**.

Unit II

Standards of measurements: Introduction, standards and line standard, yard, meter, end standards, end bars, transfer from line standard to end standards..

Unit III

Linear measurements: Introduction, non-precision measurements, steel rule, calipers, outside inside, surface plate, angle plate, V-block, straight edges, combination set, precision linear measurements, vernier instruments, micrometer, depth and height gauge, thread micrometer, caliper, slip gauges and their uses.

Unit IV

Limits, fits and tolerances: Introduction, tolerances, concept of interchangeability, limits of sizes, Indian standard tolerance zone shaft, hole, basic shaft, basic hole, clearance, interference, commonly used fits, Taylor's principle, "Go" and "No Go" gauges, plug gauges, ring gauges, snap gauges, limit gauges, gauges for tapers, Measurements of work properties, Straightness, flatness, squareness, parallelism, circularity, surface finish, their tests and measurements

Unit V

Comparators: Introduction, mechanical and electrical comparator, their uses, advantages and disadvantages.

Metrology of screw thread: Introduction, screw terminology, pitch errors in screw threads, aggressive pitch error, measurement of elements of screw threads, major diameter, minor diameter, thread micrometer, two wire method, three wire method.

Recommended Books:

Title	Author(s)	Publisher
Text Metrology	Mahajan	Dhanpat Rai
Reference ENGINEERING METROLOGY METROLOGY ENGINEERS	FOR JFW and ACASSELL	TECHINICAL AND SCIENTIFIC TECHANICAL BOOK
ENGINEERING METROLOGY	Jain RK	KHANNA PUBLISHERS.

DME-403 MACHINE DESIGN

Maximum Internal Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Note: Design data handbook is allowed in examination.

Unit I

Introduction to Design: Design philosophy, Basic concept of design in general, Concept of machine design and their types, Factors to be considered in machine design. Important mechanical properties of materials, Properties and applications of common engineering materials .Indian Standards designation of carbon & alloy steels

UNIT II

Fundamentals of machine design: Simple stresses in machine elements; tensile stresses, compressive and shear stresses. Design of members subjected to combined bending, torsion and axial loading, Factor of safety.

Unit III

Design for Strength: Types of loading on machine elements, Concept of yielding and fracture Different theories of failure, cyclic stresses, Stress concentration and Stress concentration factors for various machine parts, Notch sensitivity, Fatigue Failure, Endurance Limit

Design of Riveted Joints: Basic types of riveted joints, Different important design parameters of a riveted joint, Uses of riveted joints. Basic failure mechanisms of riveted joints, Concepts of design of a riveted joint. Caulking and Fullering, Efficiency of riveted joint, Design of lap and butt joints, Procedure for designing riveted joint under eccentric loading

Unit IV

Mechanical Springs: Mechanical Springs, Helical Springs-Stress Equation, Helical Spring-Deflection Equation, Spring Materials, End connections for compression and tension helical springs, Design against Static Load, Design against Fluctuating Load, Helical Torsion Springs

Unit V

Shafts, Keys and Coupling: Transmission Shafting, failure in shafts, Materials for shaft, Stresses in shafts. Design of shafts subjected to twisting moment, bending moment and combined twisting and bending moments, Design for Torsional Rigidity.

Keys, Design of Square and Flat Keys, splines, Couplings, Design of rigid and flexible couplings

Books and References:

1. **Machine Design-Sharma and Agrawal, S.K. Katara & Sons**
2. **Design of Machine Elements-V.B. Bhandari, Tata McGraw Hill Co**
3. **Mechanical Engineering Design – Joseph E. Shigely, McGraw Hill Publications**
4. **Machine Design by Khurmi & Gupta**

DME-404 MANUFACTURING PROCESSES - II

Maximum Sessional Marks: 40
Maximum End Term Examination Marks: 60
L T P 4 1 0

Unit I

Metal Forming: Metal forming Processes. Die Stamping, Drawing, Spinning and Tube drawing. Rolling, extruding and forging.

Press Working: Types of presses, press working operations; shearing, blanking, piercing, coining, swaging, embossing and upsetting. Types of dies, punches, punch holders & strip Layout.

Unit II

Grinding: Types of grinding machines. Shapes of grinding wheels. Various elements of grinding wheel. Codification and selection of grinding wheel. Balancing of wheel. Wheel dressing, loading and truing.

Metal Finishing and Coating: Purpose of super finishing, surface roughness. Introduction of Honing, Lapping Polishing, Buffing and super-finishing. Metal Spraying. Metal Coating; galvanizing, electro-plating and anodizing.

Unit III

Powder Metallurgy: Principle. Methods of making powder from metal. Processes involved; Compacting, Sintering and finishing operations. Advantages and Disadvantages of powder metallurgy.

Unit IV

Jigs and Fixtures: Considerations in Jigs and Fixtures design. Main elements of jigs and fixture, Principle of location, locating and clamping devices, jig bushes.

Unit V

Non-Conventional Machining: Concept of non-conventional machining. Principle and Working of EDM, wire cut EDM. Introduction to other non-conventional machining methods; ECM, LBM and explosive forming.

Recommended Books:

Title	Author(s)	Publisher
Text Production Technology	R.K. Jain	Khanna Publishers.
Reference Workshop Technology	Hazara Chaoudhary	East-West Publications.
Manufacturing Processes	Bageman	John Wiley Publications.
Manufacturing Materials & Processes	Lindberg	Prentice Hall of India

DME-405 MODERN MANUFACTURING PROCESSES

Maximum Sessional Marks: 40
Maximum End Term Examination Marks: 60
L T P 3 1 0

Unit I

Gear Cutting and Finishing Processes: Gear tooth elements, Gear milling, Introduction to gear shaping, Working principle of gear shaping machine Gear shaping cutters, Working principle of gear hobbing machine Introduction to gear finishing operations.

Unit II

Unconventional Machining Processes: Principles of working, advantages, limitations and applications of the following processes, Electro die & charge machining, Wire cut EDM, Electric chemical machining, Chemical machining, Ultrasonic machining, Laser beam machining, Plasma arc machining.

Unit III

Processing of Plastic and Rubber, Powder Metallurgy: Industrial uses of plastics and rubber; Situation where for Machining and forming plastics, Potential and limitations in the use of plastics and rubber, Introduction to powder metallurgy.

Unit IV

Surface finishing & roughness: Purpose of finishing surfaces, Surface roughness, Honing process; its applications, Description of hones, Brief idea of honing machines, Lapping process; its application.

Unit V

Description of lapping compounds and tools Brief idea of lapping ,machines, Super finishing process; its applications, Use of super finishing attachment on centre lathe Polishing, Buffing, Metal coating processes – types, Metal spraying, Galvanizing, Electro-plating, Anodizing.

Recommended Books

Title	Author(s)	Publisher
Text Production Technology	PCSharma	S Chand
Reference Production Technology	RK Jain	S. Chand
Manufacturing Technology	M. Adithan and A.B. Gupta	New Age International

DME- 406 AUTOMOBILE TECHNOLOGY –I

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

UNIT-I

Auto transmission system:

Clutch: Function of clutch in an auto mobile, Construction detail of single plate and multi plate friction clutches, Centrifugal and semi centrifugal clutch. Construction and working of fluid flywheel.

UNIT-II

Gear box: Its function, Assembly detail and working of sliding Mesh, constant mesh, Synchromesh and epicyclic gear boxes. Simple concept of over drive, over running clutch, transfer case and torque converter.

Propeller shaft: Its function, Universal joint and slip joint, Hotchkiss drive and Torque tube drive.

Final drives: Concept of tail pinion, Crown wheel, Differential type rear axle.

UNIT-III

Wheels and tyres: Sizes of tyres used in Indian vehicles, over inflation, under inflation and their effect. Causes of tyre wear, Tyre retreading, idea of Toe in, Toe out, Camber, Caster, King pin inclination. Advantages of tube less tyres, over tyres with tubes. Wheel alignment and balancing, Tyre rotation, Difference between radial and cross ply.

Steering system: Its function, Principle of steering. Ackerman and Devis steering gears, Steering gear types, Worm and nut, Worm and wheel, Worm and roller, Rack and pinion type. Concept of steering system commonly used in Indian Vehicles. Concept of steering locking assembly, introduction to power steering.

UNIT-IV

Braking system: Construction details and working of mechanical, Hydraulic and Vacuum brakes, disc brake, air brake, Introduction to power brake. Details of master cylinder, Wheel cylinders, 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. Shock absorbers, torsion bar suspension and stabilizers. Mac pherson system.

UNIT-V

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.

DME -451 THERMAL ENGINEERING LAB

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

L T P 0 0 2

LIST OF EXPERIMENTS

1. To study and sketch locomotive Boiler
2. To study Bomb calorimeter
3. To study and sketch Bab Cox and Vill Cox Boiler
4. To study Lankashire Boiler
5. To study steam engine with boiler
6. To study cut section steam engine model
7. To study impulse turbine model
8. To study reaction turbine model

DME- 452 MEASUREMENTS AND METROLOGY LABS

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

L T P 0 0 2

LIST OF EXPERIMENTS

1. To study vernier caliper
2. To study micro meter
3. To study tachometer
4. To study pressure measurement apparatus
5. To study temperature measurement apparatus
6. To study slip gauges
7. To study dial gauge
8. To study strain gauge
9. To study Bevel Protector
10. To study Sine bar

DME- 453 MACHINES DRAWING-II LAB

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

LIST OF EXPERIMENTS

1. To construction drawing of the toothed gears
2. To construction drawing of the cams
3. Assembly drawing knuckle joint
4. Assembly drawing of the connecting rod
5. Assembly drawing of the screw jack
6. Assembly drawing of the plummer block
7. Assembly drawing of the valves and cocks
8. Assembly drawing of the any shaft coupling

DME- 455 MODERN MANUFACTURING PROCESS LAB

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

L T P 0 0 2

1. Modern welding practice
 - a. Arc Welding
 - b. Spot Welding
 - c. Soldering and brazing
2. Modern machining Practice
 - a. Threading, Boring, Knurling
3. Pattern Making Practice
 - a. Solid Pattern
4. Sheet Bending, Pipe bending, angle Bending Practice
5. Modern Drilling Practice

DME- 456 AUTOMOBILE TECHNOLOGY LAB

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

L T P 0 0 2

1. To study single cylinder four stroke petrol engine
2. To determine specific fuel consumption
3. To determine break horse power
4. To determine brake thermal efficiency
5. To study and experiment on Gear box
6. To study and experiment on steering system

DME-501 THEORY OF MACHINES

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Unit I

Simple mechanism: Link, kinematic Pair, Kinematic chain, structure, mechanism, machine, inversion, simple example of mechanism with lower pairs four bar chains, slider crank chains, double slider crank chain example of mechanism with higher pairs.

Unit II

Velocity and acceleration in mechanism: Velocity diagrams of four bars and single slider crank mechanism by relative velocity method and instantaneous center method. Acceleration diagram of four bar chain and reciprocating engine mechanism.

Unit III

Dynamics of reciprocating parts: Analytical method for velocity and acceleration of piston, piston effort, crank pin effort, turning moment diagram, fluctuation of energy and speed, energy of a flywheel, calculation of weight of flywheel.

Friction and lubrication: Friction of collars and pivots, friction clutches; plate clutch, conical clutch and Centrifugal clutch, friction in journal bearings, film lubrication, rolling friction, ball and roller bearings, prony brake, rope brake and froude's hydraulic dynamometer.

Unit IV

Transmission of power: Flat and V-belt drives, velocity ratio of belt drives, slip in belt, creep in belt, length of open and cross belt drives, power transmitted by a belt, ratio of driving tension, centrifugal tension. Condition for the transmission of maximum power. Initial tension in belt. Chain drives-type of chain drives roller chain and inverted tooth chain. Gear drives; types of gear wheels. Proportions of gear tooth, gear trains-simple gear trains, compound gear trains; reverted gear train and simple epicyclic gear train (velocity ratio by tabular method)

Unit V

Cams: Cam –follower's mechanism, different types of cams and followers, displacement diagrams of SI simple harmonic motion, uniform velocity motion, uniform acceleration and retardation motion, cycloidal motion.

Recommended Books:

Title	Author(s)	Publisher
Text R K Bansal	Theory of Machines	Laxmi
Reference S.S.Rattan	Theory of Machines	TMH.
Jagdish Lal	Theory of Machines	Standard.
Beven	Theory of Machines	TMH
Ballaney P L	Theory of Machines &mechanism	Khanna

DME-502 HEAT TRANSFER

Sessional Marks: 40
End Term Examination Marks: 60
L T P 3 1 0

UNIT-I

Modes of Heat Transfer: Conduction, convection and radiation

Conduction: Fourier's Law, Thermal resistance, thermal conductivity of materials, one-dimension steady state heat conduction through composite walls, cylinders, spheres.

UNIT-II

Insulation and insulating materials, critical thickness of insulation, physical properties of insulating materials. Concept of unsteady state heat transfer.

UNIT-III

Convection: Concept of heat transfer coefficient, Free and forced convection, Significance of dimensionless groups such as Reynolds number, Prandtl's number, Nusselt's Number, Stanton number and Grashof number. Empirical correlations for free and forced convection. Heat transfer with phase change.

UNIT-IV

Radiation: Laws of radiation, Black body, Grey body, angle factor, view factor. Exchange of radiant heat between black bodies, grey bodies. Radiation from gas and vapour, Radiant exchange between gray surfaces, Radiant flux, Radiation intensity.

UNIT-V

Heat Exchange Equipments: General discussion about various types of heat exchangers, evaporators, condensers and furnaces.

Recommended Books:

Text Books:

Heat & Mass Transfer by D.S. Kumar, S.K. Kataria & Sons

Reference Books:

1. Process Heat Transfer by Kern, McGraw Hill Pub.
2. Heat Transfer by McAdams, McGraw Hill Pub.
3. Principles of Heat Transfer by Kreith, Harper & Row Publications.
4. UNIT Operations of Chemical Engineering by McCabe & Smith, McGraw Hill Pub.
5. Heat Transfer by Chapman, Macmillan Publications

DME- 503 MANUFACTURING MATERIALS

Maximum Sessional Marks: 40
Maximum End Term Examination Marks: 60
L T P 3 1 0

UNIT I

General: Introduction and classification of manufacturing materials, Thermal, chemical, electrical, mechanical properties of steels, cast iron, aluminum and its alloys, Selection criteria of material

UNIT II

Ferrous Materials: 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, Steels and alloy steels, Classification of steel, Different manufacturing methods of steels, Availability, properties and usage of steels, Specifications as per BIS and equivalent standards, Effect of various alloying element like Cr, Ni, Co, V, W, Mo, Si, Mn, S on mechanical properties of steels, Use of alloy steels – stainless steel, spring steel, silicon steel Cutting tool material (HSS, Carbide, Ceramics, Cast alloys, Diamond).

UNIT III

Non ferrous material: Important ores and properties of aluminum, copper, zinc, tin, lead, Properties and uses of al alloys, copper alloys, bearing material, solders

Engineering plastics and fiber: Important sources of plastics, Classification – thermoplastic and thermosetting, various trade names of engineering plastics, Fiber and their classification: Inorganic and organic fibers, Usage of fiber.

UNIT IV

Insulating materials: Various heat insulating materials like asbestos, glass wool, thermocole, cork, PUF, china clay, their usage, Various electrical insulating materials like china clay, leather, bakelite, ebonite, glass wool, rubber, felt and their use

Testing of metals and alloys: Identification tests: appearance, sound, spark, hardness tests

UNIT V

Fundamental of heat treatment: Purpose of heat treatment, Iron – carbon equilibrium diagram, Time Temperature Transformation” curve in steels and its importance, Various heat treatment processes – hardening, tempering, annealing, normalizing, case hardening (elementary idea), composites

Recommended Books:

Title	Author(s)	Publisher
Material science Text	RK Rajput,	SK Kataria and sons, Ludhiana
Material science Reference	and Raghavan	Prentice Hall of India, Delhi
Material science engineering	and Srivastava	New age international (P) Ltd.

DME-504 FLUID MACHINERY

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

UNIT I

Impact of jet: Impact of jet, Impulse momentum principle, Force exerted on fixed and moving flat plate and curved vanes under different orientation of jet.

UNIT II

Hydraulic turbines: Classification of turbines, Impulse & Reaction turbines;

UNIT III

Constructional details, working principle, Power, efficiency of Pelton wheel, Francis and Kaplan turbines.

UNIT IV

Pumps: Classification of pumps, working principle, Discharge, work done and power requirement of reciprocating & Centrifugal pump, Effect of air vessels, Cavitations

UNIT V

Hydraulic Machines: Working principles, description and application of hydraulic accumulator, hydraulic intensifier, hydraulic lift, hydraulic jack, hydraulic ram, hydraulic press, hydraulic crane.

Recommended Books:

Title	Author(s)	Publisher
Text		
Fluid Mechanics & Hydraulic Machines	R.K.Bansal	Laxmi Publications
Reference		
Hydraulics & Fluid Mechanics Hydraulic Machines	Modi & Seth	Standard Publishers
Fluid Mechanics & Hydraulic Machines	R.K Rajput	S.Chand & Company
Fluid Mechanics & Fluid Machinery	D. S. Kumar	S.K Kataria & Sons
Hydraulics & Hydraulic Machines	Jagadish Lal	Metropolitan
Fluid Mechanics	A.K Jain	Khanna Publishers
Theory & problems of Fluid Mechanics	K Subramanya	Tata McGrawHill

DME-505 MACHINE TOOLS AND METAL CUTTING

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

UNIT I

Introduction to Machining: Basic Concepts: machining, mechanics of chip formation. Application of coolants, cutting forces during machining, mach inability and tool life.

UNIT II

Turning: Principle; lathe, description, function, specifications, work holding tools, cutting tools. Operations - plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, cutting fluid-its purpose and types, lathe accessories (steady rest, taper turning attachment, tool post grinder), types of lathes, brief description of capstan and turret lathes.

UNIT III

Drilling: Principle, classification description, operations of drilling machines reaming, counter boring, counter sinking, hole milling, tapping, types of drills and their features, drill holding devices.

Boring: Principles, classification, description & specification of boring machine, tools, alignment of bores and its importance.

Shaping, Planing and Slotting: Working principle of shaper, planer and slotter, quick return mechanism, tools & specifications

UNIT IV

Milling: Introduction, types, constructional features, specifications of knee type milling machine, milling operations, milling cutters types, cutting speed and feeds, indexing simple, job handling devices, introduction to machining centre

Grinding: Types and working of cylindrical, surface, centre less grinding. Tool and cutter grinder, various elements of grinding wheel abrasive, grade, structure, bond, codification of grinding wheel, selection of grinding wheel, dressing.

UNIT V

Broaching: Introduction, types of broaching machines, types of broaches and their use.

Jigs and Fixtures: Importance and use of jigs and fixtures, principles of location, locating devices, purpose of clamping elements, types of clamping elements, types of drilling jigs, turning, milling and welding fixtures, fixture design consideration (elementary).

Recommended Books:

Title	Author(s)	Publisher
Text		
Elements of workshop Technology	SK Chaudhry and Hajra	Asia Publishing House.
Reference		
Workshop Technology	M. Adithan and AB Gupta	Dhanpat Rai and Sons
Workshop Technology	Chapman	CBS
Production Engineering	PC Sharma	S Chand and Company

DME-506 AUTOMOBILE TECHNOLOGY-II

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

UNIT-1

DYNAMO AND ALTERNATOR: Introduction to Dynamo and its details, Regulators-Voltage, current and compensated types. Cut out Construction working and their adjustment. Alternators-Construction and working, charging of battery from alternator. Use of batter, dynamo/ alternator in an automobile.

UNIT-II

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. Starter Switch-Manual, over running, solenoid and vacuum switches. Turbo charging and inter-cooling.

UNIT-III

AUTOMOBILE WIRING & LIGHTING SYSTEM: Earth return and insulated return systems-6 volts, 12 volts and 24 volts systems, Positive and negative earthing, Fuse in circuit, Automobile cables-Specifications and colour code. Diagram of typical wiring systems. Principle of auto illumination, Lighting requirement-Head lamp mounting and construction, sealed beam lamp, Asymmetrical head lights, dip and full beam type bulb, auxiliary type lights. Polarized head light, Flesher unit, Warning lights and panel lights. Fore head lamp systems. Other lamps-Pass lamps, Fog lamp, reversing lamps. Switching of lamps. Parking brake, Direction indicators. Electric horns, Revolution counter, Speedometer, Fuel gauge, Pressure gauge, Temperature gauge, Wind screen wipers, stereo system and speaker, introduction to remote sensing devices. Microprocessor control of automobile.

UNIT-IV

VEHICLE AIRCONDITIONING: 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, check valve, fan assembly and air conditioners relay,
H.V.A.C.

UNIT-V

STUDY OF SPECIFICATION FOR DIFFERENT UNITS: Clutch, Gear Box, Propeller Shaft, Final Drive, Wheel and tyre manufactured in India

DME 552 HEAT TRANSFER LAB

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

L T P 0 0 2

LIST OF EXPERIMENTS

1. To study heat transfer through wall.
2. To study heat transfer through natural convection
3. To study heat transfer through radiation
4. To study double pipe heat exchanger
5. To study heat transfer coefficient
6. To study application of heat transfer
7. To study heat transfer through forced convection

8. To study shell and tube heat exchanger

DME 554 FLUID MACHINERY LAB

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

L T P 0 0 2

1. Impact of Jet experiment.
2. Turbine experiment on Pelton wheel.
3. Turbine experiment on Francis turbine.
4. To study of the Kaplan turbine.
5. Experiment on Reciprocating pump.
6. Experiment on centrifugal pump.
7. Experiment on Hydraulic Jack/Press
8. Experiment on Hydraulic Brake
9. Experiment on Hydraulic Ram
10. Study through detailed visit of any water pumping station/plant
11. Experiment on Compressor

DME 555 MACHINE TOOLS AND METAL CUTTING LAB

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

L T P 0 0 2

LIST OF EXPERIMENTS

1. To study and sketch the single point cutting tools.
2. To study and sketch the multi point cutting tools.
3. To study the cutting materials
4. To study the cutting angles of the twist drill
5. To study the cutting angles of the single point Lathe machine tool
6. To study cutting angles of the hot chisel, cold chisel, rip saw , punch

DME 556 AUTOMOBILE TECHNOLOGY LAB

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

LIST OF EXPERIMENTS

1. To study single cylinder four stroke diesel engine.
2. To determine specific fuel consumption
3. To determine break horse power for diesel engine
4. To determine brake thermal efficiency
5. To determine volumetric efficiency for diesel engine
6. to study and experiment on automobile breaking system
7. To study and experiment on fuel supply system carburetor .

DAS604-ENVIRONMENT AND ECOLOGY

L T P
2 - -

Unit-I

Introduction to Environmental Science - Definition and scope and need for public awareness
Ecosystems ,Concept, structure and functions, restoration of damaged ecosystems
Biodiversity – Definition, description at national and global level, threats and conservation

Unit-II

Natural Resources - Renewable and non-renewable and their equitable use for sustainability,
Material cycles – carbon, nitrogen and sulphur cycle. Conventional and Non-conventional
Energy Sources – fossil fuel-based, hydroelectric, wind, -nuclear and solar energy, biomass,
biodiesel, hydrogen as an alternative fuel.

Unit-III

Transportation and industrial growth Social Issues Related to Environment–Sustainable
development, resettlement and rehabilitation Environmental ethics.

Unit-IV

Environmental Changes and Human Health Environmental Pollution–Definition, causes and
effects, control measures for water, air, soil, noise, thermal pollution,

Textbook:

Environmental Studies, J Krishna wamy , R J Ranjit Daniels, Wiley India.

Reference Books:

- 1.Environmental Science, Bernard J. Nebel, Richard T. Right, 9780132854467, Prentice Hall Professional 1993.
- 2.Environment and Ecology, R K Khandal, 978-81-265-4277-2, Wiley India.
- 3.Environmental Science, 8th Ed ISV, Botkin and Keller, 9788126534142,Wiley India.
- 4.Environmental Studies, R Rajagopalan, 978-0195673937, Oxford University Press
- 5.Textbook of Environmental Science and Technology, M.Anjireddy, BS Publications

DME-601 CAD/CAM AND CNC MACHINES

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Unit I

Introduction: Computer applications in manufacturing-introductory concepts of control and support applications. Basic design process and application of computer at different stages in the design process.

Unit II

Basic concepts of NC, CNC, DNC and adaptive control, advantages of CNC machines, application of NC in industry.

Unit III

CNC machines: Components of CNC system, machine control UNIT, machine tool, different types of NC control systems and their applications, classification of NC control system, Special constructional requirements of CNC machines, machine bed, slide ways, bolt, screw and nut assembly, lubrication and cooling system, spindle, spindle motors and axis drive motors, automatic tool changes, multiple pallets, swarf, removal mechanism, safety provisions.

Unit IV

Part programming: Part programming and basic concepts of part programming, NC words, part programming formats, simple programming for rotational and pneumatic components, part programming using canned cycles, sub routines and do loops, tool off-sets, cutter radius compensation and wear compensations.

Unit V

Sensors and feedback mechanisms: Sensors, relays, cut outs and feedback mechanism used in CNC machines, Common problems in mechanical, electrical, electronic and PC components of CNC machines, diagnosis of common problems and remedies, use of on-line fault diagnosis tools in CNC Machine.

Recommended Books:

Title	Author(s)	Publisher
Text CNC Machines	Pabla BS and Adithan	New Age Publishers
Reference CAD/CAM Mechatronics	Grover and Zimmers HMT	Prentice Hall of India

DME-602 REFRIGERATION & AIR CONDITION

Maximum Sessional Marks: 40

Maximum End Term Examination Marks: 60

UNIT I

Carnot cycle, simple vapor compression cycle, vapor absorption cycle, Meaning, refrigeration methods, UNITs of refrigeration, heat pump, coefficient of performance, rating of refrigeration machines, Important properties of refrigeration, properties and applications of commonly used refrigerants such as R-11, R-12, R-22, NH₃, other refrigerants like R-134, R-512.

UNIT II

Compressors: types, reciprocating compressor, constructional details, general maintenance, fault diagnosis and trouble shooting, rotary compressor, centrifugal compressor (elementary knowledge of constructional details only).

UNIT III

Condensers: types of condensers, mechanical details, and general maintenance fault diagnosis and trouble shooting.

UNIT IV

Capillary tube, matching of compressor and capillary tube, thermostatic expansion valve, automatic expansion valve, float valve, high pressure valve, general maintenance and fault diagnosis, Types, constructional details, general maintenance, Tools, installation, operation, execution and dehydration, removing the air, dehydration testing for leaks, charging the system, charging through suction valve, charging through discharge valve, adding oil.

UNIT V

Various terms, dry and wet bulb, saturation, dew point, adiabatic saturation temperatures, relative humidity, absolute humidity, humidity ratio, sensible heating and cooling, Description of room air conditioning, central air conditioning, round the year air conditioning system, common fault diagnosis and remedies in window, split package and central air conditioning system.

Recommended Books:

Title	Author(s)	Publisher
Text RAC maintenance		TTTI, Chandigarh
Reference Refrigeration and air conditioning A Course in Refrigeration and Air Conditioning	PL Ballaney Arora Domkundwar	Khanna Publisher and Dhanpat Rai

DME-603 PRODUCTION MANAGEMENT**Maximum Sessional Marks: 40****Maximum End Term Examination Marks: 60****L T P 3 1 0****UNIT I**

Introduction: Types of production, necessity of production planning and control, Process Planning, procedures of process planning, process planning sheet, uses of process sheet Importance of forecasting, techniques for forecasting.

UNIT II

Production Control: Routing purpose, route sheet, loading and scheduling purpose, types of schedules, and techniques of scheduling. Dispatching purpose and function follow up purpose and functions.

UNIT III

Materials Management: Introduction, Need and aims of materials management, material procurement, make or buy decision, sources of material, purchase, procedures.

UNIT IV

Store keeping- principles of storage, location and layout of stores, methods of storing, store procedures, physical verification of stores, inventory control-importance and function, various stock levels, EOQ, physical control of inventory, inventory control techniques.

UNIT V

Value Engineering Concept of value engineering and value analysis.

PERT/CPM: Introduction to PERT/CPM practice on drawing simple network.

Recommended Books:

Title	Author(s)	Publisher
Text		
Production Management	AP Verma	SK Kataria
Reference		
Production, Planning, control and industrial management	KC Jain and NL Aggarwal	Khanna Publishers
Management of Systems	RN Nauhria and R Parkash	Wheeler Publishers

DME-604 AUTOMOBILE MAINTENANCE

Sessional Marks: 40

Maximum End Term Examination Marks: 60

L T P 3 1 0

Unit I

Engine maintenance & repairing: Maintenance, Maintenance schedule, Routine Maintenance schedule for petrol engine and diesel engine, lubricating chart, cleaning and adjustment, preventive maintenance, trouble shooting for faults in engines.

Overhauling of engines, Adjusting the engine timing, Maintenance and adjustment of carburettor and fuel injection pump. Checking the valve clearance and adjustment, valve grinding and lapping, engine tuning, detection and rectification of faults use compression gauge and vacuum gauge, general methods of predelivery inspection of vehicle.

Unit II

Repairing processes Cylinder reboring and relieving, Removal of liners and fitting, inspection; Repair and fitting of valve and valve guides, checking the connecting rod for bending and

connecting rod alignment, inspection of crank shaft for joviality and regrinding, Phasing and calibration of fuel injection pump, nozzle testing, cleaning and grinding.

Unit III

Repair and maintenance of radiator 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.

Unit IV

Chassis repair and maintenance Grease and greasing points requiring greasing, specifications of greases to be used for different parts, repair of tires and tubes, greasing of wheel bearing, rotating schedule for front and rear tires, bleeding of brakes, pedal play adjustment in clutch and brakes, adjustment, change of brake lining, testing of brakes, disassemble greasing and recambering of leaf spring.

Unit V

Automobile pollution & control: Source and control of automobile air pollution, causes of automobile pollution and their remedies monitoring and analysis of auto exhaust mission, legislative action, judicial response, Introduction to energy conservation.

DME 651-CAD/ CAM Lab

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

L T P 0 0 2

**Instructions: Total TEN Experiments are to be carried out.
FIVE Experiments each from CAD and CAM.**

CAD Experiments

1. Line Drawing or Circle Drawing experiment: Writing and validation of computer program.
2. Geometric Transformation experiment for translation: Writing and validation of computer program.
3. Geometric Transformation experiment for rotation: Writing and validation of computer program.
4. Geometric Transformation experiment for scaling: Writing and validation of computer program.
5. Understanding and use of any 3-D Modelling Software commands.

CAM Experiments

6. To study the characteristic features of CNC machine
7. Part Programming (in word address format) experiment for turning operation (including operations such as grooving and threading) and running on CNC machine
3. Part Programming (in word address format or ATP) experiment for drilling operation (point to point) and running on CNC machine
8. Part Programming (in word address format or ATP) experiment for milling operation (contouring) and running on CNC machine

9. Experiment on Robot and programs
10. Experiment on difference between ordinary and NC machine, study or retrofitting

DME 652-Refrigeration and Air conditioning Lab

Maximum Sessional Marks: 50

Maximum End Term Examination Marks: 50

L T P 0 0 2

- 1 To study air conditioning test rig**
- 2. To study refrigeration test rig**
- 3. To find out COP of air conditioning unit**
- 4. To find out COP of refrigeration unit**