



Scheme of Instruction

Of

Diploma in Engineering (First Year)

(Effective from the academic session 2017-2018)

(Common to all Trades)

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 2017-2018)

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	GP101	GeneralProficiency	-	-	-	-	-		-	50	50	1
		Total	18	0	7				360	490	850	25

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

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	DCE251	Engineering Drawing	0	0	2	-	-		50	50	100	2
9	GP201	General Proficiency	-	-	-	-	-		-	50	50	1
		Total	18	0	7				360	490	850	25
L-Lecture, T-Tutorial, P- Practical, CT-Cumulative Test, TA- Teacher Assessment, AT-Attendance, E-Sem- End Semester Marks												

DCS-101/201 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, bank 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, Slideshow, 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-151/251

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 envelope 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: 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 acceptor 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. Srivaranandham.
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, RFT 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 II 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 other 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 carpentry 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 Coupling 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. Practice 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-101/201

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 coplanar and non-coplanar 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 coplanar concurrent forces system.

3. Moment & couple :

Concept of Varignon's theorem. Generalised theorem of moments. Application to simple problems on levers - Bell crank lever, compound lever, steelyard, 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 coplanar 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. Definition 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, Hooke'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-151/251

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 a 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.

This 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 types of joints such as Lap joint-single seam, double seam. Hem 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 cupola & pit furnace.

Ex-3 To prepare the green mouldings 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 hexagonal head bolt. EX-5

To make a ring with hook for wood doors. EX-6

Utility article - to prepare 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 Rectangle 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, Cotter and Knuckle Joints.
- (ii) Keys, Keyways and spline on the shaft.
- (iii) Shafts, Collars, Cranks, Eccentrics.
- (iv) Couplings and Clutches.
- (v) Bearings - Plain, Bushed, Split-step, ball, Roller bearing, Journal bearing, Footstep 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

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 support of a simply supported beam carrying point load 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 Solar Energy Converter.
 2. Key's, Keyways and Splined shafts e.g. Jib head key, Flat key, Saddle key, Woodruff key, Feather key, Pin key, Splined shaft.
 3. Pins - Split pin, Taper cotter types split pin, Cotter pin, Foundations Bolts - Lewis rag bolt, Fish tail bolt and Square head bolt.
 4. Friction clutch and Coupling - Cone clutch, Plate clutch (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 helical 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, shishum, 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.

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

LTPC
4 004

(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, projectile 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

Dynamic 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 ($A_1 V_1 = A_2 V_2$), 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 period of 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: DAS152/252)

LTP C 0

0 32

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 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 of 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*, Pragati Prakashan, Meerut
3. Loney, S. L., *Trigonometry (I part)*
4. Goel, B.S., *Algebra*

APPLIED CHEMISTRY

First/Second Semester

L TP C

Course Code: DAS103/203

4 - - 4

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 BeCl_2 , NH_3 , CH_4 molecules.

(16 Lectures)

Unit:-II

ELECTRO CHEMISTRY: Arrhenius's Theory of electrolytic dissociation, Electrolytic conductance, Ostwald 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, Greenhouse 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 exchangeres in process). Disadvantage of hard water in different industries, Boiler feed water boiler scale formation, Corrosion, Caustic embrittlement, priming 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, S, Teflon. - Condensation polymer and their industrial application: Nylon 6, Nylon 6,6, Buna-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.

CHEMISTRYLAB
First/Second Semester

CourseCode:DAS153/253

L T P C

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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.

DAS201 -MATHEMATICS– II
Second Semester

Set Theory: Set, Relation, Equivalence Relation, Mapping, injective, surjective & bijective mappings.

DIFFERENTIAL CALCULUS: Function, graph of a function, limits, elementary methods of finding limits (right and left), continuity, test for continuity of a function, differentiability, derivative of simple algebraic, trigonometrical functions, exponential functions & Logarithmic functions; Rules of differentiation, Differentiation of implicit functions & hyperbolic functions, Higher order derivatives, Leibniz theorem. Applications: Rate, measure, velocity, acceleration, errors, Finding Tangents, Normal, Maxima/Minima.

Matrix: Definition, type of matrices, Algebra of matrices, properties of matrices, Determinant of a matrix, inverse of matrices by matrix method, Solution of simultaneous equations.

Integral Calculus: Methods of Integration: Integration by substitution, Partial fraction and by parts, Definite Integral and its properties, Evaluation of definite integrals.

Application of Integrals: Finding area bounded by simple curves, Length of simple curves, Volume of solids of revolution. Simpson's and Trapezoidal Rule: their simple application.

Projectwork:

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. Sharma, R D, Applied Mathematics, Dhanpat Rai Prakashan, New Delhi.
2. Luthra, H.R, Applied Mathematics –I, Dhanpat Rai Prakashan, New Delhi
3. Prasad Gorakh Differential Calculus, Pothisala Pvt.Ltd. Allahabad
4. Prasad Gorakh Integral Calculus, Pothisala Pvt.Ltd. Allahabad

Reference Books:

1. Grewal B S, Elementary Engineering Mathematics, Khanna Publication.
2. Mittal S C & Mittal, SK., Two Dimensional Coordinate, Pragati Prakashan, Meerut.
3. Sumha Dr. K. S., Applied Mathematics (I & II), Bharat Bharati Prakashan, Meerut

