

APPLIED MATHEMATICS-I (B)
(DMA-201)
(Common to All Diploma Engineering Courses)

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UNIT-1

[9]

Differential Calculus-I

Function, Limit, Continuity:

Definitions of variable, constant, intervals (open, closed, semi-open). Definition of function, graph of function, range and domain, value of a function and type of functions. Elementary method for finding limits, continuity & differentiability.

Derivatives:

Definition of derivative and notation, derivative of standard function, derivative of trigonometric function. Fundamental rules for derivative (without proof), derivatives of sum or difference, scalar multiplication, product of function, quotient of function and function of function.

UNIT-2

[9]

Differential Calculus-II

Differentiation:

Logarithmic differentiation, differentiation of implicit function, differentiation of parametric equation, differentiation of a function with respect to another function. Differentiation of special functions (Hyperbolic and Inverse circular functions), higher order differentiation, Leibniz's theorem.

Application: Tangents and Normals, Maxima and Minima, Rate, Velocity and Acceleration.

UNIT-3

[9]

Integral Calculus:

Definition of Integration (anti-derivative), Integration of standard functions. Rule of integration (Integration of sum, difference and scalar multiplication).

Indefinite Integral:

Integration by substitution, Integration by parts, Integration by partial fraction, Integration of special functions (Hyperbolic and Inverse circular functions).

Definite Integral:

Definition of definite integral, properties and evaluation of definite integral.

UNIT-4**[7]****Application of Integral Calculus:**

Finding areas bounded by sample curves, length of simple curves, Volume of solids of revolution, mean value, mean square value, root mean square value of function.

UNIT-5**[6]****Numerical Integration & Error:**

Introduction, Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's $1/3^{\text{rd}}$ rule and $3/8^{\text{th}}$ rule. Concept of error for simple function.

References:

1. Applied Mathematics: Kailash Sinha, Meerut publication.
2. Applied Mathematics: P.K Gupta, Asian Publication.
3. Applied Mathematics: H.R Luthra, Bharat Bharti publication.
4. Applied Mathematics: H.K Das, C.B.S Publication.
5. Mathematics for Polytechnic: S.P Deshpande, Pune Vidyarthi Griha.

APPLIED PHYSICS (B)
(DPH-201)
[Common to All Engineering Courses]

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UNIT-I

[6]

Application of Sound Waves:

Acoustics :

Standing waves, Closed and Open organ pipes, Resonance, End correction. Definition of pitch, loudness, quality and intensity of sound waves. Echo and reverberation and reverberation time. Sabine's formula, Control of reverberation time (problems on reverberation time). Acoustics of buildings, defects and remedy.

Ultrasonics,

Generation, Magnetostriction, Piezoelectric effect, Application in new technology

UNIT-II

[8]

Quantum nature of light, Coherence (Spatial and temporal), Duality of wave and particle, Concept of Interference, Biprism, Fraunhofer single slit diffraction, grating, Resolving and dispersive power, Elementary concept of polarization.

Fibre Optics:

Critical angle, Total internal reflection, Principle of fiber optics, Optical fiber, Pulse dispersion in step-index fibers, Graded index fiber, Single mode fiber, Optical sensor

UNIT-III

D.C. Circuits:

Principle of Wheat Stone Bridge and application of this principle in measurement of resistance (Meter Bridge and Post Office Box); potentiometer, Kirchhoff's Law and their simple application. Principle of Carey-Foster's bridge.

Electric potential, potential energy, Energy of a charged capacitor. Charging and Discharging of capacitors,

Dielectrics:

Electric dipole; effect of electric field on dielectrics, polarization. Magnetic Fields & Materials: Dia, Para and Ferro-magnetism, Ferrites, Hysteresis, Hysteresis curve of a ferro magnetic materials and their uses, Basic idea of super conductivity.

UNIT-IV

[10]

Semiconductor Physics:

Classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semi conductors, Electrons and holes as charge carriers in semiconductors, Effect of temperature in conduction in semiconductors, P-type and N-type semiconductors, P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode.

Production of X-rays types of X-rays spectra:

Continuous and characteristics of X-rays, Properties & applications of X-rays.

Nuclear Physics:

Radioactivity, Nuclear stability, Radioactive emission, radiation hazards, Nuclear fission and fusion, Nuclear reactors and their application, Mass-energy relation, Atomic mass unit, Mass defect and binding energy.

UNIT-V**[8]****Lasers and its Applications:**

Absorption and Emission of energy by atom, Spontaneous and Stimulated Emission, Population inversion. Main components of laser and types of laser, Ruby Laser, He-Ne laser and their applications.

Non-conventional energy resources.

Wind energy: Introduction, scope and significance, measurement of wind velocity by anemometer, general principle of wind mill, Indian wind energy programme.

Solar energy: Solar radiation and potentiality of solar radiation in India, unit of solar radiation.

Bio fuel and Gobar gas plants

Uses of solar energy: Solar Cooker, solar water heater, solar photo-voltaic cells, solar energy collector, Modern applications in technology.

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References:

1. Nootan Physics: Kumar & Mittal :
2. Applied Physics :P.K. Gupta :
3. Pradeep Fundamental : Gogia & Gomber.
4. Applied Physics: P.S.Kushwaha, Bharat Bharti Publication.

DCH-201	Applied Chemistry (B)				
Pre-requisite	Co-Requisite	L	T	P	C
None	None	03	01	00	--
Objective	To know the basic concept of Chemistry and their Applications in Engineering				
UNIT I	Fuels:				07
<p>Definition, its classification, high and low calorific value. Determination of calorific value of solid and liquid fuels by Bomb calorimeter.</p> <p>Liquid fuel- Petroleum and its refining, distillates of petroleum (Kerosene oil, Diesel and Petrol), Benzol and power alcohol. Knocking, Anti-knocking agents, Octane number and Cetane number.</p> <p>Cracking and its type, Gasoline from hydrogenation of coal (Bergius process and Fischer Tropsch's process)</p> <p>Gaseous Fuel- Coal gas, Oil gas, Water gas, Producer gas, Biogas, LPG and CNG.</p> <p>Numerical problems based on topics.</p>					
UNIT II	Colloidal State of Matter and Lubricants:				08
<p>Concept of colloidal and its types, different system of colloids, dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electro dialysis. Properties of colloidal solution with special reference to absorption, Brownian movement, Tyndal effect, Electrophoresis and Coagulation. Relative stability of hydrophilic and hydrophobic colloids. Protection and protective colloids. Emulsion, types, preparation, properties and uses. Application of colloids chemistry in different industries.</p> <p>Definition, classification, necessity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, importance of additive compounds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.</p>					
UNIT III	Hydrocarbons:				08

	<p>A. Classification and IUPAC nomenclature of organic compounds homologous series (Functional Groups).</p> <p>B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.</p>	
UNIT IV	Organic Reactions and Mechanism:	08
<p>Fundamental aspects-</p> <p>A. Electrophiles and nucleophiles, Reaction intermediates, Free radicals, Carbocation, Carbanion.</p> <p>B. Inductive effect, Mesomeric effect, Electromeric effect.</p> <p>Mechanism-</p> <p>A. Mechanism of addition reaction (Markonicove's Rule, Cyanohydrin and Peroxide effect).</p> <p>B. Mechanism of substitution reactions; (Nucleophilic) hydrolysis of alkyl halide, electrophilic substitution halogenations, Sulphonation, Nitration and Friedel- Craft reaction.</p> <p>C. Mechanism of Elimination reaction- Dehydration of primary alcohol, Dehydrohalogenation of primary alkyl halide.</p>		
UNIT V	Polymers and Synthetic Materials:	09
<p>Polymers-</p> <p>Polymers and their classification. Average degree of polymerization, Average molecular weight, Free radical polymerisation (Mechanism).</p> <p>Thermosetting and thermoplastic</p> <p>A. Addition polymers and their industrial applications- Polythene, Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon.</p> <p>B. Condensation polymers and their industrial applications- Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Dacron, Polyurethanes.</p> <p>General concept of Bio polymers, Biodegradable polymers and Inorganic polymers (Silicon).</p> <p>Synthetic Materials-</p> <p>A. Introduction- Fats and Oils</p>		

	<p>B. Saponification of fats and oils, Manufacturing of soap</p> <p>C. Synthetic detergents, types of detergents and its manufacturing.</p> <p>Explosives: TNT, RDX and Dynamite</p> <p>Paint and Varnish.</p>	
<p>Reference books:</p>	<p>6. Applied Chemistry: R. S. Katiyar and J. P. Chaudhary</p> <p>7. Applied Chemistry: Rakesh Kapoor</p> <p>8. Principles of general and inorganic chemistry: O. P. Tandon</p> <p>9. Engineering Chemistry: S. Chandra</p> <p>10. Applied Chemistry: M. Gupta</p>	

ENGINEERING DRAWING (DED -101/201)

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UNIT-I

Drawing, instruments and their uses:

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

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.

Introduction to Scales: 1 Sheet

Necessity and use, R F

Types of scales used in general engineering drawing.

Plane, diagonal and chord scales.

UNIT-II

Conventional Presentation: 1 Sheet

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

Principles of Projection:

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

Dimensioning Techniques:

Projections of points, lines and planes. 2 Sheet

Orthographic Projections of Simple 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. Orthographic views of simple composite solids from their isometric views. Exercises on missing surfaces and views.

UNIT-III

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

Isometric Projection: 1 Sheet

Isometric scale

Isometric projection of solids.

UNIT-IV

Free hand sketching: 1 Sheet

Use of squared paper

Orthographic views of simple solids Isometric views of simple job like

Carpentry joints

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).

UNIT-V

Assembly and Disassembly Drawings: 2 Sheet

Plummer block

Footstep bearings

Couplings etc.

Riveted & Welded Joints

Screw and form of screw thread

Orthographic Projection of Machine Parts:

1 Sheet

Nut and Bolt, Locking device, Wall bracket

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)
(Printouts of figures)

References:

1. Engineering Drawing: ND Bhatt
2. Engineering Drawing : R.K. Dhawan
3. Engineering Drawing: B.K.Goel.

APPLIED MECHANICS-(B)

(DAM-201)

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UNIT-I

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 systems of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel. 8

UNIT-II

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. 10

UNIT-III

Beams :

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 graphically and analytically. 10

UNIT-IV

Trusses :

Calculation of reaction at the support of 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) 6

UNIT-V

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. 6

References:

1. Applied Mechanics & Strength of Material: R.S. Khurmi,S.Chand Publication
2. Applied Mechanics: Hemendra Dutt Gupta, Navbharat Publication

ELEMENTS OF MECHANICAL ENGINEERING (DME-201)

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UNIT-I

Thermal Engg.

Sources of Energy :

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

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 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 7

UNIT-II

Machine Components:

Brief Idea of loading on machine components. Pins, Cottor and Knuckle Joints. Keys, Key ways and spline on the shaft. Shafts, Collars, Cranks, Eccentrics. Couplings and Clutches.

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. 7

UNIT-III

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.

Springs:

Compression, Tension, Helical springs, Torsion springs, Leaf and Laminated springs. Their use and material. Selection of spring by design data book, simple numerical 9

UNIT-IV

Transmission of Motion By Belts, Ropes & Pulleys :

Chain:

Open and cross belt drive, determination of velocity ratio. Effect of thickness and slip on the velocity ratio (Concept only, No mathematical treatment), Method of prevention of slip.

Determination of velocity ratio in compound belt drive, use of stepped pulley. Classification and uses of ropes in transmission operation. Chains and their classifications, their application in power transmission, their comparison with other drive systems

Mechanisms:

Definition of link, Frame and mechanism. Difference between machine and mechanism, kinematic pairs, lower and higher pairs. Velocity diagram for four bar mechanism, slider crank mechanism, quick return mechanism. Introduction to Cam and its use. 12

UNIT-V

Lubrication:

Different lubrication system for lubricating the components of machines.

Principle of working of wet sump and dry sump system of lubrication.

(Explain with simple line diagram). Selection of lubricant based on different application

(Requirement with the help of manufacturer catalogue).

DCH-151/251	Applied Chemistry Lab				
Pre-requisite None	Co-Requisite None	L 00	T 00	P 02	C ----
Objective	To develop the practical knowledge for qualitative analysis of salts and determination of hardness, chloride contents, dissolved oxygen in water				
	ANY TEN EXPERIMENTS				
Experiment 1-5	<p>To analyze inorganic mixture for two acid and basic radicals from following radicals</p> <p>A. Basic Radicals :</p> <p>NH_4^+, Pb^{++}, Cu^{++}, Bi^{+++}, Cd^{++}, As^{+++}, Sb^{+++}, Sn^{++}, Al^{+++}, Fe^{+++}, Cr^{+++}, Mn^{++}, Zn^{++}, Co^{++} Ni^{++}, Ba^{++}, Sr^{++}, Ca^{++}, Mg^{++}</p> <p>B. Acid Radicals :</p> <p>CO_3^{--}, S^-, SO_3^{--}, CH_3COO^-, NO_2^-, NO_3^-, Cl^-, Br^-, I^-, SO_4^-</p>				10
Experiment 6	To determine the total hardness of water sample in terms of CaCO_3 by EDTA titration method using E Br indicator.				02
Experiment 7	Determination of temporary hardness of water sample by O-hener's method.				02
Experiment 8	To determine the Chloride content in supplied water sample by using Mohr's methods.				02
Experiment 9	Determination of Dissolved oxygen (DO) in given water sample.				02
Experiment 10	To determine the strength of given HCl solution by NaOH solution using pH meter				02
Experiment 11	To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.				02

**ELEMENTS OF MECHANICAL ENGINEERING LAB
(DME-251)**

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Any 10 practicals

1. Study and demonstration of the following
 - (a) Bio Gas Plant.
 - (b) Wind Mill.
 - (c) Solar Cooker.
 - (e) Voltaic Cell Type Solar 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.
5. Bearings- Plane, Bush, Split step bearings, Ball Roller bearings, Thrust bearings.
6. Gears- Spur gear, Single and Double herical gears, Bevel gears.
7. Gear Trains- Simple spur gear train, Compound gear train, Epicyclic gear train.
8. Compressor and Tension helical springs.
9. Slider Crank Mechanism.

Performance Practicals:

10. Determine the angle covered in forward and return stroke of Quick Return Mechanism of available shaper in machine shop.
11. Estimate the amount of ash and moisture in given sample of coal or coke
12. Determination of velocity ratio of a spur gear train.
13. Velocity diagram of a four bar chain mechanism.
14. Performance evaluation of solar cooker.

Computer Application Lab

(DCS-151/251)

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1. Introduction of computer types, generation, Application, characteristic & Memory.
2. Introduction and practice of Ms-Office package (Ms-Word, Ms- Excel, and Ms- Power point & Ms-Access).
3. Introduction & Practice of Internet and e-mail.
4. Programming of 'C' history of character set, variables, and keywords, token data types input and output function.
5. Introduction of Decision control statement- if, if- else, nester if statement and switch case.
6. Programming practice of if, if – else, nested if statement and switch case.
7. Loops- while loop, do- while loop, for loop, break and continuous statements.
8. Programming practice of while loop do- while loop, for loop, break and continuous statements.
9. Array Declaration, initialization of one and two dimensional array.
10. Programming practice on array.

Reference:

1. Computer fundamental- Sinha & Sinha
2. Computer Basics & 'C'- V. Rajaraman
3. Office 2007 - Ruthosky, Seguim, Ruthosky
4. Programming in ANSI- E Balagurusamy

Basic Computer Aided Design Lab

(DCAD-251)

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List of Experiments:-

1. To study of Auto CAD software.
2. Study And Sketch of drafting setting.
3. Study and sketch of Dimensional setting.
4. To draw geometrical figure using drawing commands.
5. To modify a geometrical figure using editing comment.
6. To draw orthographic view of a geometrical figure.
7. To draw isometric view of a geometrical figure.
8. To draw top front and side view of an isometric figure.
9. To draw sectional view of a solid object.
10. To do practical on page set up & scaling of drawing.