

J. S. UNIVERSITY, SHIKOHABAD



# DIPLOMA

1<sup>st</sup> Semester & 2<sup>nd</sup> Semester  
(Civil Engineering)

## *SCHEME* & *SYLLABUS*

[ Effective from the session 2015-16 ]

**STUDY AND EVALUATION SCHEME FOR  
THREE YEAR DIPLOMA COURSE IN  
CIVIL ENGG.**

**SEMESTER - FIRST**

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme				
			L	T	P	D	Sessional	End Exam	Total	Duration	
<b>THEORY SUBJECT</b>											
1	DAS-11	Professional Communication	4	1	-	-	20	50	70	2.5	
2	DAS-12	Applied Mathematics-I	4	1	-	-	20	50	70	2.5	
3	DAS-13	Applied Physics-I	4	1	-	-	20	50	70	2.5	
4	DAS-14	Applied Chemistry	4	1	-	-	20	50	70	2.5	
5	DDW-11	Engineering Drawing	-	-	-	12	20	50	70	3	
<b>PRACTICA/DRAWING SUBJECTS</b>											
6	DAS-11P	Professional Communication	-	-	4		10	20	30	3	
7	DAS-14P	Applied Chemistry	-	-	4		20	40	60	3	
Games//Social and Cultural Activities + Discipline ( 15 + 10)									25		
Grand Total									465		

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

**STUDY AND EVALUATION SCHEME FOR  
THREE YEAR DIPLOMA COURSE IN  
CIVIL ENGG.**

SEMESTER - Second

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
<b>THEORY SUBJECT</b>										
1	DAS-22	Applied Mathematics-II	4	1	-	-	20	50	70	2.5
2	DAS-23	Applied Physics-II	4	1	-	-	20	50	70	2.5
3	DME-21	Applied Mechanics	4	1	-	-	20	50	70	2.5
4	DCE-21	Building Material	4	1	-	-	20	50	70	2.5
<b>PRACTICA/DRAWING SUBJECTS</b>										
5	DAS-23P	Applied Physics-II Lab	-	-		-	20	40	60	3
6	DME-21P	Applied Mechanics Lab	-	-		-	20	40	60	3
7	DWP-21P	Workshop Practice	-	-	4	-	30	60	90	3
8	DCS-21P	Computer Application For Engineering	-	-	4	-	30	60	90	3
9	DCE-21P	Building Material Lab					20	50	70	3
Games//Social and Cultural Activities + Discipline ( 15 + 10)									25	
Grand Total									675	

- NOTE:- (1) Each period will be 50 minutes duration.  
(2) Each session will be of 16 weeks.  
(3) Effective teaching will be at least 14 weeks.  
(4) Remaining periods will be utilised for revision etc.

# **DAS-11 Professional Communication**

## **1. PART I : COMMUNICATION IN ENGLISH**

1.1 Concept of communication, importance of effective communication, types of communication, formal, informal, verbal and nonverbal, spoken and written. Techniques of communication, Listening, reading, writing and speaking, Barriers in communication, Modern tools of communication- Fax, e-mail, Telephone, telegram, etc.

1.2 Technical communication Vs. General Communication : Development of comprehension and knowledge of English through the study of text material and language exercises based on the prescribed text book of English.

1.3 Development of expression through:

1.3.1 Paragraph writing, Essay writing, Proposal writing.

1.3.2 Business and personal correspondence (Letters) :Kinds of letters:- Official, demi-offical, unofficial , for reply or in reply, quotation, tender and order giving letters.Application for a job, Resume.

1.3.3 Report writing and Note making and minutes writing.

1.4 Functional Grammer : Study of sentences and parts of speech (word class), Preposition, Verb, Articles, Abbreviations.

1.5 Vocabulary Building : Homophones, One word substitution, Idioms and Phrases.

1.6 Composition on narrative, descriptive, imaginative, argumentative, discussion and factual topics.

## **2. PART II : COMMUNICATION IN HINDI**

2.1 Development of comprehension and knowledge of Hindi usage through rapid reading and language exercises based on prescribed text material developed by IRDT.

2.2 Development of expression through ; Letter writing in Hindi: Kinds of letters:- Official, demi-offical, unofficial , for reply or in reply, quotation, tender and order giving letters, Application for a job, Press release in Hindi, Report writing.

Note: Paper should be in two parts, part I - English and part II -Hindi.

### **REFERENCE BOOKS**

1. Bookshelf worksheet of Professional Communication, New Delhi : Bookshelf 2008
2. Functional Skills in language and literature by R. P. Singh, New Delhi : Oxford University Press.
3. Oxford English Hindi English Dictionary, New Delhi : Oxford 2008

## **DAS-11P Professional Communication Lab**

For the practice/exercise the following is suggested :-

1.A. Phonetic transcription

B. Stress and intonation :

(At least 10 word for writing and 10 word for pronunciation)

2. ASSIGNMENT : (Written Communication)

Two assignment of approximately 400 word each decided by the teacher concerned.

THE FOLLOWING MODEL IS PROPOSED :

1. a picture/photograph

2. an opening sentence or phrase

3. a newspaper/magzine clipping or report

4. factual writing which should be informative or argumentative.

(The students may refer to "Bookshelf worksheet" for technical communication)

3. Oral Conversation:

1. Short speeches/declamation : Bid farewell, Felicitate somebody, Celebrate a public event, Offer condolences

2. Debate on current problems/topics

3. MockInterview : Preparation, Unfolding of personality and Expressing ideas effectively

4. Group discussion on current topics/problems

5. Role Play/ general conversation : Making polite enquiries at Railway Station, Post Office, Banks and other Public places, Replying to such enquiries, enquiring about various goods sold in the market and discussing their prices. Complaining about service at Hotel, restaurant, Offering apologies in reply to such complaints, complain to a company about a defective product you have brought, reply to such complaints.

6. Presentation skill, Use of OHP and LCD.

7. Through drilling of model words involving different phonetic symbols (Vowels, Consonants, Diphthongs).

4. Aural : Listening to conversation/talk/reading of short passage and then writing down the relevant or main points in the specified number of words and answering the given questions The assignments/project work are to be evaluated by the internal/ external examiner. The distribution of 30 marks e.g.

10 marks for assignment (Given by subject teacher as sessional marks)

10 marks for conversation and viva-voce

10 marks for phonetic transcription

# DAS-12 APPLIED MATHEMATICS - I

## Unit -1: Algebra-I

1. Arithmetic Mean: nth term, sum ,Mean
2. Geometric Mean: nth term, sum ,Mean
3. Binomial Theorem for positive, negative and fractional index (without proof)
4. Determinants: Elementary properties of determinants of order 2 and 3, system of linear equations and solution , Cramer`s Rule

## . Unit -2: Algebra-II

1. Vector Algebra: Dot and cross product , Scalar and vector triplet product
2. Complex Numbers: Representation , Modulus and Amplitude , De-Moivre theorem application in solving algebraic equations.

## Unit -3: Trigonometry

1. Relation between sides and angles of a triangle : Statement of various formula showing Relationship between sides and angles of a triangle.
2. Inverse Circular Funtions

## Unit -4: Differential Calculus-I

1. Functions, limits, continuity , elementary methods of finding limit(right and left)
2. Differentiability, method of finding derivatives, functions of a function, Logarithmic Differentiation, Differentiation of Implicit functions.

## Unit -5: Differential Calculus-II

1. Higher order derivatives
2. Derivatives of Special Functions (Exponential , Logarithmic , and Inverse circular functions)
3. Application : Finding Tangent, Rate Measure , Velocity and Acceleration

# DAS-13 APPLIED PHYSICS-I

## Topic Wise Distribution

S.no.	Topics	Marks Distribution
1	Unit &Dimensions	4
2	Errors & Measurement	4
3	Heat & Thermodynamics	5
4	Friction	4
5	Circular Motion	5
6	Motion of Planets & satellites	5
7	Dynamic of Rigid Body	6
8	Fluid Mechanics	6
9	Harmonic Motion	6
10	Acoustics	5
	<b>Total</b>	<b>50</b>

## Detailed Contents

### UNIT AND DIMENSION

Physical quantity and its types, Unit and its types, Definition of SI units, Dimensions of physical quantities, Dimensional formula and dimensional equation, Principle of homogeneity and its applications, Limitations of dimensional analysis

### ERRORS AND MEASUREMENTS

Errors, Accuracy and Precision, Types of errors in measurement, Combination of errors, Significant figures, Rounding off

### HEAT AND THERMODYNAMICS

Modes of heat transfer, Coefficient of thermal conductivity, Conduction through compound medium, Isothermal and Adiabatic process, Zeroth and First law of thermodynamics

### FRICTION

Introduction, Physical significance of friction, Advantage and disadvantage of friction and its role in daily life, Coefficient of static and dynamic friction and their measurement, Angle of friction, Angle of repose, Motion of a body on a inclined plane

### CIRCULAR MOTION

Uniform circular motion, Angular velocity and acceleration, Centripetal acceleration, Relation between linear and angular velocity and acceleration, Centripetal and centrifugal forces, Practical applications of centripetal forces

### MOTION OF PLANETS AND SATELLITES

Gravitational force, Acceleration due to gravity and its variation with respect to height and depth from earth, Kapler's law, Escape and orbital velocity, Time period of satellite, Geo-stationary satellite

### DYNAMIC OF RIGID BODY

Rigid body, Rotational motion, Moment of inertia, Theorems (parallel and perpendicular) of moment of inertia, Expression of M.I. of regular bodies (lamina ,disc, sphere, cylindrical), Radius of gyration, Angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy, Rolling of sphere on the slant plane

### FLUID MECHANICS

Surface tension, Capillary action and determination of surface tension from capillary rise method, Equation of continuity, Bernoulli's theorem and its application, Stream line and Turbulent flow, Viscosity, Stokes law, Reynold's number

### **HARMONIC MOTION**

Periodic function, Characteristics of SMH, Equation of SMH and determination of velocity and acceleration, Simple pendulum and derivation of its periodic time, Spring-mass system, Energy conservation of SHM, Concept of phase, Definition of free, forced, damped and undamped vibrations, Resonance and its application, Q-factor

### **ACOUSTICS**

Definition of pitch, loudness, quality and intensity of Sound waves, Echo, Reverberation and reverberation time, Sabine's formula without derivation, Acoustics of building defects and remedy



# DAS-14 APPLIED CHEMISTRY

## 1. ATOMIC STRUCTURE :

Basic concept of atomic structure, Matter wave concept, Quantum number, Haiseberg's Uncertainty Principle, Shapes of orbitals.

## 2. CHEMICAL BONDING :

Covalent bond, Ionic & Co-ordinate, Hydrogen bonding, Valence bond theory, Hybridisation, VSEPR theory, Molecular orbital theory.

## 3. CLASSIFICATION OF ELEMENTS :

Modern classification of elements (s,p,d and f block elements), Periodic properties : Ionisation potential, electronegativity, Electron affinity.

## 4. ELECTRO CHEMISTRY-I:

Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases : Bronsted, Arrhenius and Lewis theory. Concept of pH and numericals. Buffer solutions, Indicators, Solubility product, Common ion effect with their application,

## 5. ELECTRO CHEMISTRY-II:

Redox reactions, Electrode potential(Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electro chemical series and its application. Chemical and Electrochemical theory of corrosion, Galvanic Series. Prevention of corrosion by various method.

## 6. CHEMICAL KINETICS :

Law of mass action, order and molecularity of reaction. Activation energy, rate constants, 1st order reactions and 2nd order reactions.

## 7. CATALYSIS :

Definition Characteristics of catalytic reactions, Catalytic promoters and poison , Autocatalysis and Negative catalysis, Theory of catalysis, Application.

## 8. SOLID STATE :

Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

## 9. FUELS :

Definition, its classification, high & low Calorific value. Determination of calorific value of solid and liquid fuels by Bomb calorimeter. Liquid fuel - Petroleum and its refining, distillate of petroleum (Kerosene oil, Diesel and Petrol), Benzol and Power alcohol. Knocking, Anti-knocking agents, Octane number and Cetane number. Cracking and its type, Gasolining from hydrogenation of coal (Bergius process and Fischer tropesch's process) Gaseous Fuel - Coal gas, Oil gas, Water gas, Producer gas, Bio gas, LPG and CNG. Numerical Problems based on topics

## 10. WATER TREATMENT :

Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Only Soda lime, Zeolite and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge

formation, Corrosion, Caustic embrittlement, primming and foarming in biolers. Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorinational, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

#### 11. COLLOIDAL STATE OF MATTER :

Concept of collidal 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, Electro phoresis and coagulation. relative stability of hydrophillic and hydrophobie colloids. Protection and protective colloids. Emulsion, Types, preparation, properties and uses. Application of colloids chemistry in different industries.

#### 12. LUBRICANTS :

Definition, classification, Necessasity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compunds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.

#### 13. HYDROCARBONS:

- A. Classification and IUPAC nomeuclature of organic compounds hamologous series (Functional Group)
- B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

#### 14. ORGANIC REACTIONS & MECHANISM:

##### 1. Fundamental auspects -

- A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion
- B. Inductive effect, Mesomeric effect, Electromeric effect.
- 2.A. Mechanism of addition reaction (Markonicove's Rule, Cyanohydrin and Peroxide effect),
- B. Mechanism of Substitution reactions; (Nucleophillic) hydrolysis of alkyle halide, electrophillic substitution halogenation, Sulphonation, Niration and friedel-Craft reaction.
- C. Mechanism of Elimination reaction - Dehydration of primary alcohol, Dehydrohalogenation of primary alkyl halide.

#### 15. POLYMERS :

- 1. Polymers and their classification. Average degree of polymerisation, Average molecular weight, Free radical polymerisation (Mechanisms)
- 2. Thermosetting and Thermoplastic resen -
  - A. Addition polymers and their industrial application-Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon.
  - B. Condensation polymer and their industrial application : Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Decron, Polyurethanes.
- 3. General concept of Bio polymers, Biodegradable polymers and inorganic polymers (Silicon).

#### 16. SYNETHETIC MATERIALS :

- A. Introduction - Fats and Oils
- B. Saponification of fats and oils , Manufacturing of soap.
- C. Synthetic detergents, types of detergents and its manufacturing.

#### 3. EXPLOSIVES: TNT, RDX, Dynamite.

##### 4. Paint and Varnish

## DAS-14P LIST OF PRACTICALS

1. To analyse inorganic mixture for two acid and basic radicals from following radicals:

A. Basic Radicals :  $\text{NH}_4^+$ ,  $\text{Pb}^{++}$ ,  $\text{Cu}^{++}$ ,  $\text{Bi}^{+++}$ ,  $\text{Cd}^{++}$ ,  $\text{As}^{+++}$ ,  $\text{Sb}^{+++}$ ,  $\text{Sn}^{++}$ ,  $\text{Al}^{+++}$ ,  $\text{Fe}^{+++}$ ,  $\text{Cr}^{+++}$ ,  $\text{Mn}^{++}$ ,  $\text{Zn}^{++}$ ,  $\text{Co}^{++}$ ,  $\text{Ni}^{++}$ ,  $\text{Ba}^{++}$ ,  $\text{Sr}^{++}$ ,  $\text{Ca}^{++}$ ,  $\text{Mg}^{++}$

B. Acid Radicals :  $\text{CO}_3^{--}$ ,  $\text{S}^{--}$ ,  $\text{SO}_3^{--}$ ,  $\text{CH}_3\text{COO}^-$ ,  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{SO}_4^{--}$

2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.

3. To determine the total hardness of water sample in terms of  $\text{CaCO}_3$  by EDTA titration method using Eriochroma black-T indicator.

4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalein as indicator.

5. To determine the Chloride content in supplied water sample by using Mohr's methods.

6. Determination of temporary hardness of water sample by OHener's method.

## DDW-11 ENGINEERING DRAWING

1. Drawing, instruments and their uses.

1.1 Introduction to various drawing, instruments.

1.2 Correct use and care of Instruments.

1.3 Sizes of drawing sheets and their layouts.

2. (a) Lettering Techniques 1 Sheet

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

(b) Introduction to Scales 2 Sheet

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

3. Conventional Presentation: 2 Sheet

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

4. (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. 2 Sheet

5 (a) Orthographic Projections of Simple Geometrical Solids 3 Sheet

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

6. Section of Solids 2 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

7. Isometric Projection. 1 Sheet

Isometric scale Isometric projection of solids.

8. Free hand sketching 1 Sheet

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

9. Development of Surfaces 2 Sheet

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

10. ORTHOGRAPHIC PROJECTION OF MACHINE PARTS: 3 Sheet

Nut and Bolt, Locking device, Bush Bearing

11. PRACTICE ON AUTO CAD : 2 Sheet

Concept of AutoCAD, Tool bars in AutoCAD, Coordinate System, Snap, Grid and Ortho mode. Drawing Command - Point, Line, Arc, Circle, Ellipse. Editing Commands - Scale, Erase, Copy, Stretch, Lengthen and Explode. Dimensioning and Placing text in drawing area. Sectioning and hatching. Inquiry for different parameters of drawing.

NOTE :

A. 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

B. Practice on AutoCAD latest software is to be done in AutoCAD lab of Mechanical Engineering Department of the Institute.

# **DAS-22- Mathematics - II**

## **Unit -1: Integral Calculus-I**

Methods of finding indefinite integral

1. Integration by substitution
2. Integration by parts
3. Integration by partial fraction
4. Integration of special functions

## **Unit-2: Integral Calculus-II**

1. Definite integral: definition and properties, Evaluation of integrals
2. Applications of definite integrals: Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution,
3. Numerical Integration: Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8 th rule

## **Unit-3: Coordinate Geometry-I**

1. Circle : Equation of circle in standard form, centre –radius form , diameter form and two intercept form.
2. Standard form of curves and their simple properties:
  - Parabola
  - Ellipse
  - Hyperbola

## **Unit-4: Coordinate Geometry-II**

1. Distance between two points in space , direction cosines and direction ratios, Finding equation of a straight line and shortest distance between two lines.
2. Sphere

## DAS-23 Applied Physics-II

1. Optics  
Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Destructive), Diffraction and Polarization (Concept Only), Law of Malus and Polaroids.
2. Introduction To Fibre Optics :  
Critical angle, Total internal reflection, Principle of fibre optics, Optical fibre, Pulse dispersion in step-index fibres, Graded index fibre, Single mode fibre, Optical sensor.
3. Lasers and its Applications  
Absorption and Emission of energy by atom, Spontaneous and Stimulated Emission, Population inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.
4. Electrostatics :  
Coulomb's Law, Electric field, Electric potential, Potential energy, Capacitor, Energy of a charged capacitor, Effect of dielectric on capacitors.
5. D.C. Circuits  
Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.
6. Magnetic Materials and Their Properties:  
Dia, Para and Ferro-magnetism, Ferrites, Magnetic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.
7. Semiconductor Physics  
Concept of Energy bands in solids, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semiconductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.
8. Junction Diode and Transistor :  
Majority and Minority charge carriers, P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.
9. Introduction To Digital Electronics :  
Concept of binary numbers, Interconversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT, OR).
10. Non-conventional energy sources:
  - (a) Wind energy : Introduction, scope and significance, measurement of wind velocity by anemometer, general principle of wind mill.
  - (b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

## DAS-23P Applied Physics-II Lab

Note: Any 5 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.
2. Determination of 'g' by plotting a graph  $T^2$  versus  $l$  and using the formula  $g=4\pi^2/\text{Slope of the graph line}$
3. Determine the force constant of combination of springs in case of 1. Series 2. Parallel.
4. To verify the series and parallel combination of Resistances with the help of meter bridge.
5. To determine the velocity of sound with the help of resonance tube.
6. Determination of viscosity coefficient of a lubricant by Stoke's law.
7. Determination of  $E_1/E_2$  of cells by potentiometer.
8. Determination of specific resistance by Carey Foster bridge.
9. Determination of resistivity by P.O.Box.
10. Verification of Kirchhoff's Law.
11. To draw Characteristics of p-n Junction diode.



# DME-21 Applied Mechanics

## 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.A. 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.

B. 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.

## 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. Friction:

Types of friction: static, 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.

## 5. 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.

## 6. Centre of Gravity:

Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphere and sphere, composite bodies and bodies with portion removed.

## 7. Moment of Inertia:

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus.

## 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.

## **DME-21P Applied Mechanics Lab**

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
  - (vi) System of Pulleys (any type).
9. To find out center of gravity of regular lamina.
10. To find out center of gravity of irregular lamina

# DCE-21 Building Material

## CONTENTS:

### 1. Building Stones:

Classification of rocks: Geological and physical classification; Common rock forming minerals; Testing of stones for specific gravity, water absorption, durability, weathering, hardness by Moh's scale, identification of rocks. Quarrying: Terminology used in quarrying; basic principles involved, methods of quarrying. Blasting: where used, principles of blasting, line of least resistance, drilling of holes (manually and mechanically), charging, tamping, firing, fuses and detonators, safety precautions, common explosives only names, their uses and storage. Wedging: where used, tools required and operation of wedging. Stone crushing: process & equipment used, crushers, grinding mills like hammer mill, ball mill & screens. Availability, characteristics and uses of the following stones: Granite, sandstone, limestone, dolomite, slate, basalt, trap, quartzite and marble. Availability of different stones in state.

### 2. Bricks and Clay Products:

Raw materials for brick manufacture, properties of good brickmaking earth, field testing of brick clay. Manufacture of bricks: Preparation of clay-manually/mechanically. Moulding: hand moulding and machine moulding. Drying of bricks. Burning of bricks. Clamps. Types of kilns, details of Bull's trench kiln and Hoffman's Kiln, process of burning, size of standard bricks. IS Classification of bricks as per IS: 1077 and testing of common building bricks as per IS: 3495 recommendations. Compressive strength, water absorption, efflorescence test; refractory bricks: composition, properties and uses. Building tiles: types wall, ceiling, roofing and flooring tiles, their properties, and uses. Other clay products: earthenware and stoneware, their properties and uses.

### 3. Lime

Natural sources of lime. Definitions of quick lime, fat lime, hydraulic lime, hydrated lime, lump lime, calcination, slaking, manufacture of lime. Process of setting and hardening action of lime. Field tests of lime as per IS 1624. Pozzolonic materials. Types, properties and uses.

### 4. Cement

Natural and artificial cement, raw materials, manufacture of ordinary portland cement, flow diagrams for dry and wet process. setting and hardening of cement, types of cement, properties of cement, tests of cement as per IS.

### 5. Timber and wood based Products:

Classification of trees. Cross-section of an exogenous tree and explanation of terms. Identification of different types of timber: teak, chir, shisham, sal, mango, deodar, kail etc. Market forms of converted timber as per IS. Seasoning of timber: purpose, types of seasoning. air seasoning, water seasoning, kiln seasoning, chemical seasoning, Solar seasoning kiln. Defects in timber. Decay in timber. Preservation of timber and methods of treatment. Properties of good timber. Common structural timbers in India, their availability, and uses. Plywood, veneers; manufacture of plywood, uses of plywood. Other wood based product their brief description, manufacture and uses. Laminated boards: block boards, fibre boards, resistant board, hardboard, plastic coated finishes, water and fire resistant plywood, PVC boards.

### 6. Paints

Various types of paints. Constituents of oil paints, their functions and properties. Cement paints, their properties and uses, Varnish and polish: types, properties and uses. Lacquers and enamels: their properties and uses. Trade names of different products.

### 7. Insulating Materials

Properties, uses and requirements of heat and sound insulating materials. Properties and uses of: cork, rockwool, glass wool, concrete, aluminium foil, asbestos sheets for ceiling, commercial names of different insulating materials.

### 8. Glass

Types of glasses and their properties: Sheet glass, plate glass, frosted glass, wired glass, fibre glass bullet resisting glass, coloured glass and glass wool Commercial sizes, forms and their uses.

### 9. Plastics

Methods of moulding and types, properties and uses of plastics. Important commercial product, uses of plastic in Civil Engineering: plastic pipes, taps, valves, plastic coated paper, polythene sheets, thermocole, bakelite, PVC, rexine and linoleum.

### 10. Water proofing materials.

List of water proofing materials, suitable for use in D.P.C., Basement floor and walls, Toilet, Kitchen, Roof Terraces, Water tanks, etc. Properties & commercial trade names.

### 11. Exposure to non conventional & waste by product

Fly ash, Stone Cladding and other finishing materials.

## **DCE-21P Building Material Lab**

1. Identification of different types of 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 determine normal consistency of cement.
5. To determine setting time (initial and final) of cement.
6. To determine fineness of given sample of cement.
7. To determine compressive strength of bricks.
8. To determine water absorption of bricks
9. To determine soundness of cement.
10. To identify hydraulic & fat lime.

## **DWP-21P WORKSHOP PRACTICE**

### **1. Carpentry Shop :**

EX-1 Introduction & demonstration of tools used in carpentry shop and different types of joints, types of wood, seasoning and preservation of wood

EX-2 Planing and sawing practice

EX-3 Making of lap joint

EX-4 Making of mortise and tenon joint

EX-5 Making of any one utility article such as wooden picture frame, hanger, peg, name plate, etc.

### **2. Painting and Polishing Shop:**

EX-1 Introduction of paints, varnishes, Reason for surface preparation, Advantage of painting, other method of surface coating i.e. electroplating etc.

EX-2 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-3 To prepare metal surface for painting, apply primer and paint the same.

EX-4 To prepare a metal surface for spray painting, first spray primer and paint the same by spray painting gun and compressor system.

\* 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 and Soldering Shop :**

EX-1 Introduction and Types of sheets, measuring of sheets

EX-2 Study and sketch of various types of stakes/anvil.

EX-3 Introduction & demonstration of tools used in Sheet metal working shop.

EX-4 Cutting, shearing and bending of sheet.

EX-5 To prepare a soap case by the metal sheet.

EX-6 To make a funnel with thin sheet and to solder the seam of the same.

EX-7 To make a cylinder and to solder the same.

EX-8 Preparation of different type of joints such as Lap joint-single seam, double seam. Hemp and wired joints.

EX-9 To braze small tube/conduit joints.

### **4. Fitting Shop, Plumbing Shop & Fastening Shop:**

EX-1 Study of materials, limits, fits and tolerances.

EX-2 Introduction & demonstration of tools used in Fitting Shop.

EX-3 Hacksawing and chipping of M.S. flat. Filing and squaring of chipped M.S. job. Filing on square or rectangular M.S. piece.

EX-4 Making bolt & nut by tap and die set and make its joints

EX-5 To drill a hole in M.S. Plate and tapping the same to create threads as per need.

EX-6 Utility article-to prepare double open mouth spanner for 18" hexagonal head of a bolt.

EX-7 Cutting and threading practice for using socket, elbow and tee etc. and to fit it on wooden practice board.

EX-8 Study of bib cock, cistern or stop cock, wheel valve and gate valve etc.

EX-9 Practice of bolted joints

EX-10 To prepare a rivetted joint

EX-11 To make a pipe joint

EX-12 To make a threaded joint

EX-13 Practice of sleeve joint

### **5. Foundry Work**

EX-1 Study of metal and non metals

EX-2 Study & sketch of the foundry tools.

EX-3 Study & sketch of cupola & pit furnace.

EX-4 To prepare the green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould)

EX-5 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-2 To prepare square or rectangular piece by the M.S. rod.

EX-3 To make a ring with hook for wooden doors.

EX-4 Utility article-to prepare a ceiling fan hook.

#### 7. Welding Shop :

EX-1 Introduction to welding, classification of welding, types of weld joints.

EX-2 Welding practice-gas and electric.

EX-3 Welding for lap joint after preparing the edge.

EX-4 Welding of Butt joint after preparation of the edge.

EX-5 'T' joint welding after preparation of edge.

EX-6 Spot welding, by spot welding machine.

#### 8. Machine Shop

EX-1 Study & sketch of lathe machine.

EX-1 Study & sketch of grinders, milling M/c, Drilling M/c and CNC Machines

Ex-2 Plain and step turning & knurling practice.

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

# DCS-21P COMPUTER APPLICATION FOR ENGINEERING LAB

## 1. Introduction to Computer:

Block Diagram of Computer, Types Of Computer Central Processing unit (Control unit, A.L.U.) & memory Unit. Types of Input and Output devices and memories. Visual Display Unit, Keyboard, Floppy disk drive, Hard disk drive, CD-ROM Drive, Magnetic & Tape Drive Number system( Conversion) Binary, Octal, Hexa decimal number system, Conversion from Decimal to Other System and vice-versa Bit, Byte and Word.

## 2. INTRODUCTION TO OPERATING SYSTEMS (MS-DOS/MS-WINDOWS:)

What is operating system, its significance, Commands of DOS, Features/Application of window.

## 3. MS WORD:

File : Open, Close, Save, Save as, Search, Send to, Print Preview, Print and Page Setup Edit : Cut, Copy, Paste, Office Clipboard, Select All, Find, replace, Goto, etc. View : Normal/Web Layout/Print Layout; Tool Bars; Header/Footer; Zoom, etc. Insert: Break, Page Number, Date & Time, Symbol, Comment, Reference, etc. Format: Font, Paragraph, Bullets & Numbering, Borders & Shading, Column, Change case, Back ground, etc. Tools : Spelling & Grammer, Language, Word Count, Letters & Mailing, Options, Customize, etc. Table : Draw, Insert, Delete, Select, Auto Format, AutoFit, Convert, Sort, Formula, etc.

## 4. MS EXCEL:

Introduction, Use of Tools/Icons for preparing simple applications.

## 5. MS POWER POINT :

Introduction, Use of Tools/Icons for preparing simple presentation on Power Point.

## 6. MS ACCESS :

Introduction, Use of Tools/Icons for preparing simple applications.

## 7. Introduction to Internet:

What is Network, How to send & receive messages, Use of Search Engines, Surfing different web sites. Creating Mail ID, Use of Briefcase, Sending./replying emails.

## 8. Concept of Programming :

Flowcharting, Algorithm techniques, etc.

## List Of Practicals

1. Practice on utility commands in DOS.
2. Composing, Correcting, Formatting and Article (Letter/Essay/ Report) on MS Word and taking its print out.
3. Creating, editing, modifying tables in MS ACCESS.
4. Creating labels, report, generation of simple forms in MS ACCESS.
5. Creating simple spread sheet, using in built functions in MS EXCELL.
6. Creating simple presentation on Power Point.
7. Creating mail ID, Checking mail box, sending/replying emails.
8. Surfing web sites, using search engines.