



BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207.

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM
SYLLABUS (PROBIDHAN-2016)

SURVEYING TECHNOLOGY

TECHNOLOGY CODE: 678

2nd SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

SURVEYING TECHNOLOGY (678)

SECOND SEMESTER

Sl. No	Subject code	Name of the subject	T P C			MARKS				
						Theory		Practical		Total
						Cont. assess	Final exam.	Cont. assess	Final exam.	
1	65811	Social Science	3	0	3	60	90	-	-	150
2	65921	Mathmatics-2	3	3	4	60	90	50	-	200
3	65922	Physics -2	3	3	4	60	90	25	25	200
4	66611	Computer Application	0	6	2	-	-	50	50	100
5	66712	Electrical Engineering Fundamentals	3	3	4	60	90	25	25	200
6	67821	Basic Surveying	2	6	4	40	60	50	50	200
		<i>Total</i>	14	21	21	280	420	200	150	1050

SOCIAL SCIENCE

T	P	C
3	0	3

OBJECTIVE

To provide opportunity to acquire knowledge and understanding on :

- importance of civics and its relationship with other social sciences
- The relationship of an individual with other individuals in a society
- social organizations, state and government
- rule of law, public opinion and political parties
- UNO and its roles
- The basic concepts and principles of economics and human endeavor in the economic system.
- The realities of Bangladesh economy and the current problems confronting the country.
- The role of Diploma Engineers in industries.
- our motherland and its historical background
- good citizenship through practicing our socio- economic culture
- liberation war and its background
- nationalism and life style of the nation

SHORT DESCRIPTION

Civics and Social Sciences; Individual and Society; Nation and Nationality; Citizenship; state and government; Law; Constitution; Government and its organs; public Opinion; Political Party; UNO and its organs; Scope and importance of Economics; Basic concepts of Economics- Utility, Wealth, Consumption, income wages, salary, value in use and savings; Production – meaning, nature, factors and laws; Demand and Supply; market equilibrium, national income, Current economic problems of Bangladesh; Role of Diploma Engineers in the economic development of Bangladesh; Occupations and career planning; Engineering team.

Part-1 (Civics)

1. Understand the meaning and scope of civics and inter relations of social sciences.

- 1.1 Define civics and social science.
- 1.2 Explain the importance of civics in the personal and social life of an individual.
- 1.3 Describe the relationship of all social science (civics, Economics, political science, Sociology, ethics)

2. Understand the relationship of the individual with the society, Nationality and nation, Rights and duties of a citizen.

- 2.1 Define the concept (individual, society, socialization, Nation, Nationality, citizen and citizenship).
- 2.2 State the relationship among the individuals in the society.
- 2.3 Discuss the methods of acquiring citizenship and state the causes of losing citizenship
- 2.4 Describe the rights of a citizen and state the need for developing good citizenship.

3. Appreciate the relationship between the state and government, law and organs of government.

- 3.1 Meaning the state, government and law
- 3.2 Discuss the elements of state.
- 3.3 Discuss the classification of the forms of government
- 3.4 Distinguish between cabinet form of Government and presidential form of government.
- 3.5 Describe the main organs of Government (legislature, Executive and judiciary)

- 3.6 Discuss the sources of law
- 4. Understand and the classification of constitution**
 - 4.1 Define the Constitution.
 - 4.2 Explain the deferent form of Constitution
 - 4.3 Explain state the salient feature of Bangladesh constitution.
 - 4.4 Define the fundamental rights of Bangladesh constitution.
 - 4.5 Meaning of human rights.
- 5. Understand the role of UNO in maintaining world peace**
 - 5.1 Explain the major functions of UNO.
 - 5.2 State the composition and functions of General Assembly.
 - 5.3 Describe the Composition and functions of Security Council.
 - 6.4 Discuss the role of Bangladesh in the UNO.
- 6. Understand the role of Ethics values and good governance**
 - 6.1 Define the values, ethics and good governance.
 - 6.2 Discuss the role of government to establish good governance

Part-2 (Economics)

- 1. Understand the fundamental concepts of economics.**
 - 1.1 Define the Microeconomics and Macroeconomics.
 - 1.2 Discuss the definition of Economics as given by eminent economists.
 - 1.3 Describe the importance of economics for Technical Student.
 - 1.4 Define commodity, utility, value, wealth, consumption, income, savings, wages, value in use, value in exchange and salary.
 - 1.5 Differentiate between value in use and value in exchange.
 - 1.6 Explain wealth with its characteristics.
- 2. Understand the production process and the concept of the law of diminishing returns in the production process.**
 - 2.1 Discuss production mode and process
 - 2.2 Explain the nature of different factors of production.
 - 2.3 Discuss production function.
 - 2.4 Discuss the law of diminishing returns.
 - 2.5 State the application and limitations of the law of diminishing returns.
 - 2.6 Describe the law of production (increasing constant and diminishing).
- 3. Understand the concept of demand, supply and utility.**
 - 3.1 Define the term, “demand and supply”.
 - 3.2 Explain the law of demand and supply .
 - 3.3 Draw the demand and supply curve.
 - 3.4 Discuss Market equilibrium.
 - 3.5 Define the utility, total and marginal utility
 - 3.6 Illustrate the law of diminishing utility.
 - 3.7 Explain the law of diminishing marginal utility
- 4. Understand national income.**
 - 4.1 Define nation income.
 - 4.2 Explain how to measure national income.
 - 4.3 Discuss GNP, GDP and NNP.
 - 4.4 Discuss economic development and growth

5. Understand the current issues and the availability and use of natural resource in the economic development of Bangladesh

5.1 Define rural and urban economics.

5.2 Identify major problems of rural and urban economy.

5.3 Explain the migration of rural population to urban areas.

5.4 List of the Natural resource of Bangladesh and classify them according to sources of availability.

5.5 Explain the importance of the mine, forest and water resources and potential uses for sustainable development.

6. Role of a Diploma Engineer in the Development of Bangladesh Economy.

6.1 Explain the concept of the term, “Engineering team”

6.2 Identify the functions of Engineers, Diploma Engineers, craftsmen forming the engineering team.

6.3 Discuss the role of a Diploma Engineer in the overall economic development of Bangladesh.

6.4 Explain socio-economic status of a diploma Engineer.

Part-3 ((Bangladesh: History& Culture)

সংক্ষিপ্ত বিবরণী

ইতিহাস

- ইতিহাসের সংজ্ঞা।
- বাংলাদেশের আবহাওয়া ও অধিবাসী।
- বাংলায় ইংরেজ শাসন ক্ষমতালভ ও প্রতিষ্ঠা।
- ব্রিটিশ বিরোধী সশস্ত্র প্রতিরোধ আন্দোলন; সংস্কার আন্দোলন ও জাতীয়তাবাদে বিকাশ এবং বাংলার নবজাগরণ; বঙ্গভঙ্গ ও বঙ্গভঙ্গ উত্তরকালে বাংলার রাজনীতি ও দেশ বিভাগ।
- পাকিস্তান আমলে বাংলাদেশ, বঙ্গবন্ধুর নেতৃত্বে বাংলাদেশের মুক্তি সংগ্রাম ও স্বাধীনতালভ।

সংস্কৃতি

সংস্কৃতি, সভ্যতার সংজ্ঞা, সংস্কৃতির প্রকরণ, ভাষা আন্দোলন উত্তর বাংলার সংস্কৃতি, স্বাধীনতা উত্তর বাংলাদেশের সংস্কৃতির বিবর্তন, বাংলাদেশের সংস্কৃতিতে প্রত্নতাত্ত্বিক নিদর্শন ও ক্ষুদ্র নৃতাত্ত্বিক গোষ্ঠীসমূহ।

সহায়ক পুস্তক

হক, মোজাম্মেল “পৌরনীতি”- হাসান বুক হাউস

প্রফেসর এমাজউদ্দিন “রাষ্ট্রবিজ্ঞান” আজিজিয়া লাইব্রেরী

আলী, মাসুম “অর্থনীতি”

চক্রবর্তী, মনতোষ- “প্রিন্সিপলস অব ইকোনোমিক্স”

মার্শাল, আলফ্রেড,- “প্রিন্সিপলস অব ইকোনোমিক্স”

রহমান, আনিসুর - “অর্থনীতি”

রহিম, চৌধুরী, মাহমুদ ও ইসলাম, “বাংলাদেশের ইতিহাস (পরিবর্তিত ও পরিমার্জিত)” ; নওরোজ কিতাবিস্তান, আগস্ট, ১৯৯৯।

কে, আলী “বাংলাদেশের ইতিহাস”; আজিজিয়া বুক ডিপো, ২০০১।

সিরাজুল ইসলাম, “বাংলাদেশের ইতিহাস-১৭০৪-১৯৭১”; ১ম, ২য় ও ৩য় খন্ড; বাংলাদেশ এশিয়াটিক সোসাইটি, ফেব্রুয়ারি ২০০০।

কো-আন্তোনভা, প্রি, কতোভস্কি, “ভারত বর্ষের ইতিহাস”; প্রগতি প্রকাশন, ১৯৮৮।

গোপাল হালদার; “সংস্কৃতির রূপান্তর”; মুক্তধারা, মে ১৯৮৪।

মোতাহের হোসেন চৌধুরী, “সংস্কৃতি কথা”; নওরোজ কিতাবিস্তান, জানুয়ারি ১৯৯৮।

গোপাল হালদার, “বাংলা সাহিত্যের রূপরেখা-১ম ও ২য় খন্ড”; মুক্তধারা।

OBJECTIVES

- To enable in solving the simultaneous equations with the help of determinant and matrix.
- To make understand the exponential series.
- To provide ability to apply the knowledge of differential calculus in solving problem like slope, gradient of a curve, velocity, acceleration, rate of flow of liquid etc.
- To enable to apply the process of integration in solving practical problems like calculation of area of a regular figure in two dimensions and volume of regular solids of different shapes.

SHORT DESCRIPTION

Algebra : Determinants, Matrix, Exponential Series.

Trigonometry : Inverse circular functions, Properties of triangle and solution of triangles.

Differential Calculus : Function and limit of a function, differentiation with the help of limit, differentiation of functions, geometrical interpretation of $\frac{dy}{dx}$, successive differentiation and Leibnitz theorem, partial differentiation.

Integral Calculus : Fundamental integrals, integration by substitutions, integration by parts, integration by partial fraction, definite integrals.

DETAIL DESCRIPTION**ALGEBRA :****1 Apply determinants to solve simultaneous equations.**

- 1.1 Expand a third order determinant.
- 1.2 Define minor and co-factors.
- 1.3 State the properties of determinants.
- 1.4 Solve the problems of determinants.
- 1.5 Apply Cramer's rule to solve the linear equation.

2 Apply the concept of matrix.

- 2.1 Define matrix, null matrix, unit matrix, square matrix. column matrix, row matrix, inverse matrix, transpose matrix, adjoint matrix, rank of a matrix, singular matrix.
- 2.2 Explain equality, addition and multiplication of matrix.
- 2.3 Find the rank of a matrix.
- 2.4 solve the problems of the following types:
 - i) Solve the given set of linear equations with the help of matrix.
 - ii) Find the transpose and adjoint matrix of a given matrix.

3 Understand exponential series.

- 3.1 Define e.
- 3.2 Prove that e is finite and lies between 2 and 3.
- 3.3 Prove that $e^x = 1 + \frac{x}{1} + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \dots$ to ∞
- 3.4 Solve problems of the followings types :
 - i) $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \dots$ to ∞

$$\text{ii) } \frac{1}{L^2} + \frac{1+2}{L^3} + \frac{1+2+3}{L^4} + \frac{1+2+3+4}{L^5} + \dots \text{ to } \infty$$

TRIGONOMETRY

4 Apply the concept of inverse circular function.

- 4.1 Explain the term inverse circular function and principal value of a trigonometrical ratio.
- 4.2 Deduce mathematically the fundamental relations of different circular functions.
- 4.3 Convert a given inverse circular function in terms of other functions.
- 4.4 Prove mathematically

$$\text{i) } \tan^{-1} x + \tan^{-1} y = \tan^{-1} \frac{x+y}{1-xy}.$$

$$\text{ii) } \tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \tan^{-1} \frac{x+y+z-xyz}{1-xy-yz-zx}$$

$$\text{iii) } \sin^{-1} x + \sin^{-1} y = \sin^{-1} \left(x\sqrt{1-y^2} + y\sqrt{1-x^2} \right)$$

$$\text{iv) } 2 \tan^{-1} x = \sin^{-1} \frac{2x}{1+x^2} = \cos^{-1} \frac{1-x^2}{1+x^2} = \tan^{-1} \frac{2x}{1-x^2}$$

4.5 Solve problems of the following types.

$$\text{a) } 2 \tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{4} = \frac{\pi}{4}$$

$$\text{b) } \cos \tan^{-1} \cot \sin^{-1} x = x.$$

c) Prove that the area of the segment cut from a circle of radius r by a chord at a distance d from the centre is given by

$$K = r^2 \cos^{-1} \frac{d}{r} - d\sqrt{r^2 - d^2}$$

5 Apply the principle of properties of triangles.

5.1 Prove the followings identities :

$$\text{i) } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R.$$

$$\text{ii) } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{iii) } a = b \cos C - c \cos B.$$

$$\text{v) } \Delta = \frac{1}{2} bc \sin A.$$

5.2 Establish the followings.

$$\text{a) } \tan \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$$

$$\text{b) } \tan \frac{B-C}{2} = \frac{b-c}{b+c} \cot \frac{A}{2}$$

$$\text{c) } \Delta = \frac{abc}{4R}$$

5.3 Solve the problems of the following types:

$$\text{i) } \text{Prove } \cos(B-C) + \cos A = \frac{bc}{2R}$$

ii) An object experiences two forces F_1 and F_2 of magnitude 9 and 13 Newtons with an angle 100° between their directions. Find the magnitude of the resultant R .

DIFFERENTIAL CALCULUS

6 Understand the concept of functions.

- 6.1 Define constant, variable, function, domain, range
- 6.2 Solve problems related to functions.

7 Understand the concept of limits.

- 7.1 Define limit and continuity of a function.
- 7.2 Distinguish between $\lim_{x \rightarrow a} f(x)$ and $f(a)$.

7.3 Establish (i) $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$

(ii) $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$

8 Understand differential co-efficient and differentiation.

- 8.1 Define differential co-efficient in the form of

$$\frac{dy}{dx} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

- 8.2 Find the differential co-efficient of algebraic and trigonometrical functions from first principle.

9 Apply the concept of differentiation.

- 9.1 State the formulae for differentiation:

- (i) sum or difference
- (ii) product
- (iii) quotient
- (iv) function of function
- (v) logarithmic function

- 9.2 Find the differential co-efficient using the sum or difference formula, product formula and quotient formula.

- 9.3 Find the differential co-efficient function of function and logarithmic function.

10 Apply the concept of geometrical meaning of $\frac{dy}{dx}$

- 10.1 Interpret $\frac{dy}{dx}$ geometrically.

- 10.2 Explain $\frac{dy}{dx}$ under different conditions

- 10.3 Solve the problems of the type:

A circular plate of metal expands by heat so that its radius increases at the rate of 0.01 cm per second. At what rate is the area increasing when the radius is 700 cm ?

11 Use Leibnitz's theorem to solve the problems of successive differentiation.

- 11.1 Find 2nd, 3rd and 4th derivatives of a function and hence find n-th derivatives.
- 11.2 Express Leibnitz's theorem
- 11.3 Solve the problems of successive differentiation and Leibnitz's theorem.

12 Understand partial differentiation.

- 12.1 Define partial derivatives.
- 12.2 State formula for total differential.
- 12.3 State formulae for partial differentiation of implicit function and homogenous function.
- 12.4 State Euler's theorem on homogeneous function.
- 12.5 Solve the problems of partial derivatives.

INTEGRAL CALCULUS

13 Apply fundamental indefinite integrals in solving problems.

- 13.1 Explain the concept of integration and constant of integration.
- 13.2 State fundamental and standard integrals.

- 13.3 Write down formulae for:
 (i) Integration of algebraic sum.
 (ii) Integration of the product of a constant and a function.
- 13.4 Integrate by method of substitution, integrate by parts and by partial fractions.
- 13.5 Solve problems of indefinite integration.

14 Apply the concept of definite integrals.

- 14.1 Explain definite integration.
- 14.2 Interpret geometrically the meaning of $\int_a^b f(x) dx$
- 14.3 Solve problems of the following types:
- (i) $\int_0^{\pi/2} \cos^2 x dx.$ (ii) $\int_0^1 \frac{(\sin^{-1} x)^2}{\sqrt{1-x^2}} dx$

P* =Practical continuous assessment

SL No	Author	Reference	
		Title	Publication
01	S. P Deshpande	Mathematics for Polytechnic Students	Pune Vidyarthi Graha Prakashan
02	H. K. Das	Mathematics for Polytechnic Students(Volume I)	S.Chand Prakashan
03	Shri Shantinakaran	Engg.Maths Vol I & II	S.Chand & Comp
04	Dr. B M Ekramul Haque	Higher Mathematics	Akshar Patra Prakashani
05	Md. Abu Yousuf	Differential & Integral Calculus	Mamun Brothers

OBJECTIVES

- To develop a foundation in scientific principles and processes for the understanding and application of technology.
- To develop an understanding of fundamental scientific concepts through investigation and experimentation.
- To provide a common base for further studies in technology and science.
- To develop the basic knowledge of modern physics.

SHORT DESCRIPTION

Thermometry and Heat Capacity; Expansion of materials (effect of heat); Heat transfer; Humidity; Nature of heat and Thermodynamics; Photometry; Reflection of light; Refraction of light; Electron , photon and Radio activity; Theory of Relativity.

DETAIL DESCRIPTION**THEORY****1. THERMOMETRY AND HEAT CAPACITY**

- 1.1 Define heat and temperature.
- 1.2 Mention the units of measurement of heat and temperature.
- 1.3 Distinguish between heat and temperature.
- 1.4 Identify the range of the Celsius scale determined by the boiling point and melting point of water
- 1.5 State the construction and graduation of a mercury thermometer.
- 1.6 Define specific heat capacity, thermal capacity and water equivalent with their units.
- 1.7 Prove the total heat gained by an object is equal to the sum of the heat lost by all the surrounding objects.
- 1.8 Explain the principle of calorimetry.
- 1.9 Define various kinds of specific latent heat.
- 1.10 Determine the latent heat of fusion of ice and latent heat of vaporization of water.
- 1.11 Determine the specific heat of a solid by calorimeter.

2. EFFECT OF HEAT ON DIMENSION OF MATERIALS

- 2.1 Show that different materials change in size at different amounts with the same heat source.
- 2.2 Explain the meaning of differential expansion in bimetallic strip, thermostats, compensated pendulum etc.
- 2.3 Explain the methods of overcoming problems caused by the expansion of materials in buildings, machinery, railway lines and bridges.
- 2.4 Mention the units co-efficient of linear, superficial and cubical expansion of solids.
- 2.5 Define the co-efficient of linear, superficial and cubical expansion of solids.
- 2.6 Relation between the co-efficient of linear, superficial and cubical expansion of solids.

- 2.7 Define real and apparent expansion of liquid.
- 2.8 Relation between the real and apparent expansion of liquid.

3. HEAT TRANSFER

- 3.1 Identify the phenomena of heat transferring from hot bodies to cold bodies.
- 3.2 Explain the methods of heat transfer by conduction, convection and radiation with examples of each type of transfer.
- 3.3 Define thermal conductivity (K) and Co-efficient of thermal conductivity.
- 3.4 Find the unit and dimension of Co-efficient of thermal conductivity.
- 3.5 List the factors which determine the quantity of heat (Q) flowing through a material.
- 3.6 Show that the quantity of heat flowing through a material can be found from

$$Q = \frac{KA (\theta_H - \theta_C)t}{d}$$
- 3.7 State Stefan-Boltzman Law and wien's law.
- 3.8 State Newton's law of cooling.
- 3.9 Explain Green house effect.

4. HUMIDITY

- 4.1 Define Standard Temperature and Pressure.
- 4.2 Define Humidity, Absolute Humidity, Relative Humidity and Dewpoint.
- 4.3 Relation between vapour pressure and air pressure.
- 4.4 Determine Humidity by wet and dry bulb hygrometer.
- 4.5 Explain few phenomena related to hygrometry.

5. NATURE OF HEAT AND THERMODYNAMICS

- 5.1 Describe the caloric theory and kinetic theory of heat.
- 5.2 Explain the mechanical equivalent of heat.
- 5.3 State and Explain the first law of thermodynamics .
- 5.4 Explain Isothermal and adiabatic change.
- 5.5 Explain Specific heat of a gas, Molar specific heat or molar heat capacity.
- 5.6 Relate between pressure and volume of a gas in adiabatic Change i, e; $PV^\gamma = \text{const.}$
- 5.7 State and Explain Reversible process and irreversible process.
- 5.8 State & explain 2nd law of thermodynamics
- 5.9 Entropy: Definition, unit and significant.
- 5.10 Explain Change of entropy in a reversible and irreversible process.
- 5.11 Give an example of increase of entropy in irreversible process.

6. PHOTOMETRY

- 6.1 Define light, medium (transparent, translucent, opaque), luminous & non-luminous bodies, parallel, convergent & divergent of rays.
- 6.2 Show the travel of light in straight line.
- 6.3 Define photometry, luminous intensity, luminous flux, brightness and illuminating power.
- 6.4 Mention relation between luminous intensity & illuminating power.

- 6.5 Explain inverse square law of light.
- 6.6 Describe the practical uses of light waves in engineering.

7. REFLECTION OF LIGHT

- 7.1 Define mirror (plane & spherical), image (real & virtual) and magnification of images.
- 7.2 Describe the reflection of light.
- 7.3 State the laws of reflection of light.
- 7.4 Express the verification of laws of reflection.
- 7.5 Define pole, principal axis, center of curvature, radius of curvature, principal focus in case of concave & convex mirrors.
- 7.6 Find the relation between focal length & radius of curvature of a concave & convex mirror.
- 7.7 Express the general equation of concave and convex mirror.

8. REFRACTION OF LIGHT

- 8.1 Define refraction of light Give examples of refraction of light
- 8.2 State the laws of refraction and Express the verification of laws of refraction
- 8.3 Define absolute and relative refractive index and Relate absolute and relative refractive index
- 8.4 Explain the meaning of total internal reflection and critical angle and Relate total internal reflection and critical angle.
- 8.5 Give examples of total internal reflection.
- 8.6 Describe refraction of light through a prism.
- 8.7 Express the deduction of the relation between refractive index, minimum deviation and angle of the prism.
- 8.8 Define lens and mention the kinds of lens.
- 8.9 Identify and List uses of lens.
- 8.10 Express the deduction of the general equation of lens (Concave & convex).

9. ELECTRON, PHOTON AND RADIO-ACTIVITY

- 9.1 Describe Electrical conductivity of gases.
- 9.2 Describe Discharge tube.
- 9.3 Cathode ray : Definition and its properties
- 9.4 X-ray : Definition, properties & uses
- 9.5 Discuss Photo electric effect .
- 9.6 Derive Einstein's photo electric equation
- 9.7 Define and explain radio-activity.
- 9.8 Describe radio-active decay law.
- 9.9 Define half-life and mean-life of radio-active atoms.
- 9.10 Define nuclear fission and fusion.

10. THEORY OF RELATIVITY

- 10.1 Define Space, time and Mass.
- 10.2 Define rest mass.
- 10.3 Express the theory of relativity.

- 10.4 Explain special theory of relativity and its fundamental postulate.
- 10.5 Mention different Kinds of theory of relativity.
- 10.6 The Relativity of Length - Length contraction.
- 10.7 The Relativity of Time – Time dilation.
- 10.8 Deduce Einstein's mass -energy relation

PRACTICAL

1. Compare the operation of common thermometers.
2. Determine the co-efficient of linear expansion of a solid by Pullinger's apparatus.
3. Measure the specific heat capacity of various substances.(Brass, steel).
4. Determine the latent heat of fusion of ice.
5. Determine the water equivalent by calorimeter.
6. Compare the luminous intensity of two different light sources.
7. Verify the laws of reflection.
8. Find out the focal length of a concave mirror.
9. Determine the refractive index of a glass Slab.
10. Determine the angle of Minimum deviation and refractive index of a glass prism by using I-D graph.

REFERENCE BOOKS:

- | | |
|---|-----------------------------------|
| 1. Higher Secondary Physics – Second Part | - by Dr. Shahjahan Tapan |
| 2. A Text Book of Heat and Thermodynamics | - by N Subrahmanyam and Brij Lal |
| 3. A Text Book of Optics | - by N Subrahmanyam and Brij Lal |
| 4. Higher Secondary Physics -Second Part | - by Prof. Golam Hossain Pramanik |
| 5. Higher Secondary Physics -Second Part | - by Ishak Nurfungnabi |
| 6. Thermodynamics | - by K K Ramalingam |

OBJECTIVES

-

SHORT DESCRIPTION

DETAIL DESCRIPTION

1. Operate a personal Computer

1.1 Start up a Computer

- 1.1.1 **Peripherals** are checked and connected with system unit
- 1.1.2 Power cords / adapter are connected properly with computer and power outlets socket
- 1.1.3 Computer is switched on gently.
- 1.1.4 PC **desktop / GUI settings** are arranged and customized as per requirement.

1.2 Operate Computer

- 1.2.1 Files and folders are created.
- 1.2.2 Files and folders are **manipulated** as per requirement.
- 1.2.3 Properties of files and folders are viewed and searched.
- 1.2.4 Control panel settings are practiced.
- 1.2.5 **Memory devices** are formatted as per requirement.

1.3 Shutdown computer

- 1.3.1 unsaved file and folders are closed
- 1.3.2 Open software is closed and hardware devices are switched off.
- 1.3.3 Computer is switched off gently.
- 1.3.4 Power at the respective power outlets is switched off.

2. Type text and documents in English and Bangla.

2.1 Install the Typing Tutor software

- 2.1.1 Required **Hardware** and **software** are ready to use.
- 2.1.2 Typing tutor software are collected and selected
- 2.1.3 English Typing tutor software is installed.
- 2.1.4 Specialized Bangla Typing tutor software is installed.

2.2 Practice text typing in English and Bangla

- 2.2.1 Typing tutor software is started.
- 2.2.2 English Home key drilling are practiced systematically
- 2.2.3 Intermediate level typing speed(25 cps) are achieved.
- 2.2.4 Specialized Bangla Typing tutor / software are installed.
- 2.2.5 Bangla Home key typing are practiced systematically
- 2.2.6 Text documents are typed repeatedly for increasing typing speed.

2.3 Type documents

- 2.3.1 **Word processor** is started.
- 2.3.2 Text document are typed.
- 2.3.3 Intermediate level typing speed (30 cps) in English and (20 cps) in Bangla are achieved.

3. Operate Word Processing Application

3.1 Create documents:

- 3.1.1 Word-processing application are opened.
- 3.1.2 **Documents** are created.
- 3.1.3 Data are added according to information requirements.
- 3.1.4 Document templates Used as required.
- 3.1.5 Formatting tools are used when creating the document.
- 3.1.6 Documents are Saved to directory.

3.2 Customize basic settings to meet page layout conventions:

- 3.2.1 Adjust page layout to meet information requirements
- 3.2.2 Open and view different toolbars
- 3.2.3 Change **font format** to suit the purpose of the document
- 3.2.4 Change alignment and line spacing according to document information requirements
- 3.2.5 Modify margins to suit the purpose of the document
- 3.2.6 Open and switch between several documents

3.3 Format documents

- 3.3.1 Use formatting features and styles as required.
- 3.3.2 Highlight and copy text from another area in the document or from another active document
- 3.3.3 Insert headers and footers to incorporate necessary data
- 3.3.4 Save document in another **file format**
- 3.3.5 Save and close document to **a storage device.**

3.4 Create tables:

- 3.4.1 Insert standard table into document
- 3.4.2 Change cells to meet information requirements
- 3.4.3 Insert and delete columns and rows as necessary
- 3.4.4 Use formatting tools according to style requirements

3.5 Add images:

- 3.5.1 Insert appropriate **images** into document and customize as necessary
- 3.5.2 Position and resize images to meet document formatting needs

3.6 Print information and Shutdown computer:

- 3.6.1 *Printer* is connected with computer and power outlet properly.
- 3.6.2 Power is switched on at both the power outlet and printer.
- 3.6.3 Printer is installed and added.
- 3.6.4 Correct printer settings are selected and document is printed.
- 3.6.5 Print from the printer spool is viewed or cancelled and
- 3.6.6 Unsaved data is saved as per requirements.
- 3.6.7 Open software is closed and computer hardware devices are shut downed.
- 3.6.8 Power at the respective power outlets is switched off.

4. Operate Spreadsheet application

4.1 Create spreadsheets

- 4.1.1 Open spreadsheet application,
- 4.1.2 create spreadsheet files and enter numbers, text and symbols into cells according to information requirements
- 4.1.3 Enter **simple formulas and functions** using cell referencing where required
- 4.1.4 Correct formulas when error messages occur
- 4.1.5 Use a range of common tools during spreadsheet development
- 4.1.6 Edit columns and rows within the spreadsheet
- 4.1.7 Use the auto-fill function to increment data where required
- 4.1.8 Save spreadsheet to directory or folder

4.2 Customize basic settings:

- 4.2.1 Adjust page layout to meet user requirements or special needs

- 4.2.2 Open and view different toolbars
- 4.2.3 Change font settings so that they are appropriate for the purpose of the document
- 4.2.4 Change **alignment** options and line spacing according to spreadsheet **formatting features**
- 4.2.5 **Format** cell to display different styles as required
- 4.2.6 Modify margin sizes to suit the purpose of the spreadsheets
- 4.2.7 View multiple spreadsheets concurrently

4.3 Format spreadsheet:

- 4.3.1 Use formatting features as required
- 4.3.2 Copy selected formatting features from another cell in the spreadsheet or from another active spreadsheet
- 4.3.3 Use **formatting tools** as required within the spreadsheet
- 4.3.4 Align information in a selected cell as required
- 4.3.5 Insert headers and footers using formatting features
- 4.3.6 Save spreadsheet in another format
- 4.3.7 Save and close spreadsheet to **storage device**

4.4 Incorporate object and chart in spreadsheet:

- 4.4.1 Import an object into an active spreadsheet
- 4.4.2 Manipulate imported **object** by using formatting features
- 4.4.3 Create a chart using selected data in the spreadsheet
- 4.4.4 Display selected data in a different chart
- 4.4.5 Modify chart using formatting features

4.5 Create worksheets and charts

- 4.5.1 Worksheets are created as per requirement
- 4.5.2 Data are *entered*
- 4.5.3 **Functions** are used for calculating and editing logical operation
- 4.5.4 **Sheets** are formatted as per requirement.
- 4.5.5 **Charts** are created.
- 4.5.6 Charts/ Sheets are previewed.

4.6 Print spreadsheet:

- 4.6.1 Preview spreadsheet in print preview mode
- 4.6.2 Select basic printer options
- 4.6.3 Print spreadsheet or selected part of spreadsheet
- 4.6.4 Submit the spreadsheet to **appropriate person** for approval or feedback

5. Operate Presentation Package:

5.1 Create presentations:

- 5.1.1 Open a presentation package application and create a simple design for a presentation according to organizational requirements
- 5.1.2 Open a blank presentation and add text and graphics
- 5.1.3 Apply existing styles within a presentation
- 5.1.4 Use presentation template and slides to create a presentation
- 5.1.5 Use various **illustrations** and **effects** in presentation
- 5.1.6 Save presentation to correct directory

5.2 Customize basic settings:

- 5.2.1 Adjust display to meet user requirements
- 5.2.2 Open and view different **toolbars** to view options
- 5.2.3 Ensure **font settings** are appropriate for the purpose of the presentation
- 5.2.4 View multiple slides at once

5.3 Format presentation:

- 5.3.1 Use and incorporate organizational charts, bulleted lists and modify as required

- 5.3.2 Add **objects** and manipulate to meet presentation purposes
- 5.3.3 Import **objects** and modify for presentation purposes
- 5.3.4 Modify slide layout, including text and colors to meet presentation requirements
- 5.3.5 Use **formatting tools** as required within the presentation
- 5.3.6 Duplicate slides within and/or across a presentation
- 5.3.7 Reorder the sequence of slides and/or delete slides for presentation purposes
- 5.3.8 Save presentation in another **format**
- 5.3.9 Save and close presentation to disk

5.4 Add slide show effects:

- 5.4.1 Incorporate preset animation and multimedia effects into presentation as required to enhance the presentation
- 5.4.2 Add slide transition effects to presentation to ensure smooth progression through the presentation
- 5.4.3 Test presentation for overall impact
- 5.4.4 Use onscreen navigation tools to start and stop slide show or move between different slides as required

5.5 Print presentation and notes:

- 5.5.1 Select appropriate print format for presentation
- 5.5.2 Select preferred slide orientation
- 5.5.3 Add notes and slide numbers
- 5.5.4 Preview slides and spell check before presentation
- 5.5.5 Print the selected slides and submit presentation to appropriate person for feedback

6. Access Information using Internet and electronic mail

- 6.1 Access resources from internet
 - 6.1.1 Appropriate internet **browsers** are selected and installed
 - 6.1.2 Internet browser is opened and web address / URL is written/selected in /from address bar to access **information**.
 - 6.1.3 **Search engines** are used to access information
 - 6.1.4 Video / Information are Shared /downloaded / uploaded from / to web site/**social media**.
 - 6.1.5 **Web based resources** are used.
 - 6.1.6 Netiquette' (or web etiquette) principles are searched and followed
- 6.2 Use and manage Electronic mail
 - 6.2.1 **Email services** are identified and selected to create a new email address
 - 6.2.2 Email account is created
 - 6.2.3 Document is prepared, attached and sent to different types of recipient.
 - 6.2.4 Email is read, forwarded, replied and deleted as per requirement.
 - 6.2.5 Custom email folders are created and **manipulated**
 - 6.2.6 Email message is printed

OBJECTIVES

- To familiarize the basic electrical quantities & laws and to apply them in solving problems of electrical circuits.
- To acquaint with electro-magnetism, electro-magnetic induction.
- To develop skill in electrical wiring.
- To familiarize with DC generator, AC generator, AC motor, DC Motor & Transformers.
- To appreciate the safety measures to be taken for electrical wiring.

SHORT DESCRIPTION

Electric current; Voltage & Resistance; Conductors and insulators; Ohm's law; Kirchhoff's Law; Joule's law; Faraday's law; Basic electrical circuits; Power and energy; Electro-magnetic induction; House wiring; Controlling devices; Protective devices; Earthing; DC Motor, AC Motor, DC Generator; AC Generator; Transformer & Electricity Act/Rule.

DETAIL DESCRIPTION**Theory :****1 Understand electricity and its nature.**

- 1.1 State the meaning of electricity.
- 1.2 Describe the structure of atom.
- 1.3 Define current, voltage and resistance with unit.

2 Understand conductor semiconductor & insulator.

- 2.1 Define conductor, semiconductor and insulator.
- 2.2 Describe the conductor, semiconductor and insulator.
- 2.3 List at least 5 conductors, 5 semiconductor and 5 insulators.
- 2.4 Describe the factors upon which the resistance of a conductor depends.
- 2.5 State laws of resistance.
- 2.6 Prove the relation $R = \rho L/A$
- 2.7 Explain the meaning of resistivity and unit of resistivity.
- 2.8 Solve problems relating to laws of resistance.

3 Understand Ohm's Law

- 3.1 State Ohm's law.
- 3.2 Deduce the relation between energy current, voltage and resistance.
- 3.3 Solve problems relating to Ohm's law.

4 Understand Kirchhoff's Law

- 4.1 State Kirchhoff's current law.
- 4.2 Explain the Kirchhoff's current law.
- 4.3 Sate Kirchhoff's Voltage law.
- 4.4 Explain the Kirchhoff's Voltage law.
- 4.5 Solve problem by Kirchhoff's Law

5 Understand electric circuit.

- 5.1 Define electric circuit.
- 5.2 Name the different types of electric circuits.
- 5.3 Define series circuit, parallel circuit and mixed circuit.
- 5.4 Describe the characteristic of series circuit and parallel circuit.
- 5.5 Calculate the equivalent resistance of series circuit and parallel circuit.

- 5.6 Solve problems relating to DC series circuit, parallel circuit and mixed circuit.
- 5.7 Define inductor, capacitor, inductive reactance & capacitive reactance.
- 5.8 Write the formula of inductive reactance, capacitive reactance & impedance.
- 6 Apply the concept of electrical power and energy.**
 - 6.1 Define electrical power and energy.
 - 6.2 State the unit of electrical power and energy.
 - 6.3 Show the relation between electrical power and energy.
 - 6.4 Name the instruments for measuring of electrical power and energy.
 - 6.5 Draw the connection diagram of wattmeter and energy meter in an electrical circuit.
 - 6.6 Solve problems relating to electrical power and energy Calculation.
- 7 Understand the principles of Joule's law.**
 - 7.1 Explain Joule's law regarding the development of heat in electrical circuit.
 - 7.2 Describe meaning of "J".
 - 7.3 Solve problems relating to Joule's law.
- 8 Understand the Faraday's laws of Electro-magnetic Inductions**
 - 8.1 Define Electro-magnetic Inductions.
 - 8.2 Explain Faraday's laws of Electro-magnetic Induction.
 - 8.3 Solve problems on Electro-magnetic Induction.
- 9 Understand the uses of wires and cables.**
 - 9.1 Define electrical wires and cables.
 - 9.2 Distinguish between wires and cables.
 - 9.3 Uses of wires and cables.
- 10 Understand the different methods of house wiring.**
 - 10.1 State the meaning of wiring.
 - 10.2 List the types of wiring.
 - 10.3 State the types of wiring used in:
 - a) Residential building.
 - b) Workshop
 - c) Cinema hall/Auditorium
 - d) Temporary shed
 - 10.4 List the name of fittings used in different types of electrical wiring.
- 11 Understand the controlling and protective devices & uses of them.**
 - 11.1 Define controlling device.
 - 11.2 List the different types of controlling devices.
 - 11.3 Define protective devices.
 - 11.4 List the different types of protective devices.
 - 11.5 Uses of different types of fuses used in house wiring.
 - 11.6 Uses of different types of circuit breaker in house wiring.
- 12 Understand the necessity of earthing.**
 - 12.1 Define earthing.
 - 12.2 Describe the necessity of earthing.
 - 12.3 List of different types of earthing.
- 13 Understand the principle of operation of transformer.**
 - 13.1 Define transformer.
 - 13.2 Describe the working principle of transformer.
 - 13.3 Write the equation relating to voltage, current & turns of primary & secondary winding of transformer.

- 13.4 List the different losses of transformer.
- 13.5 Define transformation ratio (voltage, current and turns).
- 13.6 Solve problems on transformation ratio.

14 Concept of the principle of Electrical Machines

- 14.1 Define electrical machine.
- 14.2 list of different types of electrical machines.
- 14.3 Define generator.
- 14.4 List of different types of generator.
- 14.5 Uses of generator.
- 14.6 Define motor.
- 14.6 List of different types of motor.
- 14.7 Uses of motor.

Practical:

1 Identify and use electrical measuring instruments.

- 1.1 Identify Voltmeters, Ammeters, Clip-on meter, Frequency meter, Wattmeter, Energy meter and AVO meter.
- 1.2 Select & read the scale of given meters.
- 1.3 Connect correctly voltmeter, ammeter, watt meter and energy meter to a given circuit.

2 Show skill in verification of Ohm's Law.

- 2.1 Sketch the circuit diagram for the verification of Ohm's Law.
- 2.2 List tools, equipment and material required for the experiment.
- 2.3 Prepare the circuit according to the circuit diagram using proper equipment.
- 2.4 Check all connections before the circuit is energized.
- 2.5 Verify the law by collecting relevant data.

3 Show skill in verification of Kirchhoff's Law.

- 3.1 Sketch the circuit diagram for the verification of Kirchhoff's Law.
- 3.2 List tools, equipment and material required for the experiment.
- 3.3 Prepare the circuit according to the circuit diagram using proper equipment.
- 3.4 Check all connections before the circuit is energized.
- 3.5 Verify the laws by collecting relevant data.

4 Verify the characteristics of series and parallel circuits.

- 4.1 Draw the working circuit diagram.
- 4.2 List tools, equipment and materials required for the experiment.
- 4.3 Prepare the circuit according to the circuit diagram using proper equipment.
- 4.4 Check all connections before the circuit is energized.
- 4.5 Record data and verify that in a series circuit total voltage and resistance is equal to the summation of individual voltage and resistance respectively but total current is equal to the individual current.
- 4.6 Record data and verify that for a parallel circuit supply voltage is equal to the branch voltage, supply current is equal to summation of branch currents.

5 Show skill in measuring the power of an electric circuit.

- 5.1 Sketch the necessary circuit diagram of an electrical circuit with electrical load, ammeter, voltmeter and wattmeter.
- 5.2 Prepare the circuit according to the circuit diagram using ammeter, voltmeter and wattmeter.
- 5.3 Record the power, measured by the wattmeter and verify the reading with that of calculated from ammeter and voltmeter.

- 5.4 Compare the measured data with that of calculated and rated power.
- 6 Show skill in measuring the energy consumed in an electrical circuit.**
- 6.1 Sketch the necessary diagram of an electric circuit wattmeter, energy meter and electrical load.
- 6.2 Prepare the circuit according to the circuit diagram user wattmeter and energy meter.
- 6.3 Record the energy measured by the energy meter and verify with that of calculated from wattmeter for a fixed time.
- 7 Show skill in uses of hand tools, wires and cables.**
- 7.1 List the hand tools used in electrical wiring.
- 7.2 Identify the hand tools used in electrical wiring.
- 7.3 Draw neat sketches of hand tools used in electrical wiring.
- 7.4 Identify different types of wires and cables.
- 7.5 Measure the diameter of the identified wire and cables using standard wire gauge.
- 8 Show skill in preparing wiring circuit of two lamps controlled from two points separately.**
- 8.1 Sketch a working circuit of two lamps controlled from two points separately.
- 8.2 Make the wiring circuit using required materials and equipment a wiring board.
- 8.3 Test the connection of circuit by providing proper supply.
- 9 Show skill in preparing wiring circuit of one lamp controlled from two points.**
- 9.1 Sketch a working diagram of one lamp controlled by two SPD tumbler Switches.
- 9.2 Complete the wiring circuit using required materials and equipment on wiring board.
- 9.3 Test the connection of circuit by providing proper supply.
- 10 Show skill in preparing wiring circuit of one bell with two indicating lamp controlled from two points.**
- 10.1 Sketch a working diagram of one bell with two indicating lamps controlled by two push button switch.
- 13.2 Make the wiring circuit using required materials and equipment in wiring board.
- 13.3 Test the connection of circuit by providing proper supply.
- 11 Show skill in preparing wiring circuit of a fluorescent tube light.**
- 11.1 Sketch a working diagram of a fluorescent tube light circuit.
- 11.2 Make the connection of a fluorescent tube light circuit using required materials and equipment.
- 11.3 Test the connection of the circuit by providing supply.
- 12 Find the transformation ratio of a transformer.**
- 12.1 Develop a circuit to perform the experiment.
- 12.2 Select required equipment and materials.
- 12.3 Connect the components according to the circuit diagram.
- 12.4 Check the connections.
- 12.5 Record the primary (E_p) and secondary (E_s) voltages.
- 12.6 Calculate the transformation ratio using the relation
- $$\frac{E_s}{E_p} = \frac{N_s}{N_p} = K$$
- 12.7 Note down the observations.
- 13 Start a 1-phase capacitor type motor/ceiling fan with regulator.**
- 13.1 Select the equipment and tools required for the experiment.
- 13.2 Sketch a working diagram.
- 13.3 Identify the two sets of coils.
- 13.4 Connect the capacitor with the proper set of coil.

- 13.5 Connect power supply to the fan motor.
- 13.6 Test the rotation of the motor opposite direction by changing the capacitor connection.
- 13.7 Note down the observations.

REFERENCE BOOKS

- 1 A text book of Electrical Technology -B. L. Theraja
- 2 Basic Electricity -Charles W Ryan
- 3 Basic Electrical theory and Practice -E. B. Babler
- 4 Electrical Machine -Siskind

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BASIC SURVEYING

T P C
2 6 4

AIMS

To provide the student with the opportunity to acquire knowledge and skill to:

- Work with chain, plane table and Compass.
- Record surveyed data and plotting map.
- locate unknown points.
- calculate the area using instruments

SHORT DESCRIPTION

Introduction to surveying, Chain surveying, Plane Table surveying, compass surveying.

DETAIL DESCRIPTION

Theory:

INTRODUCTION TO SURVEYING

1 Aspects of surveying.

- 1.1 Explain the meaning of surveying.
- 1.2 Mention the principle of surveying.
- 1.3 State the purpose of surveying.
- 1.4 Mention field work & office work.
- 1.5 Mention the different types of survey instruments.
- 1.6 Describe the care & adjustment required in surveying.
- 1.7 Describe the classification of surveying based on shape of earth, nature of field, object of surveying and instruments employed.
- 1.8 Differentiate plane survey and geodetic survey.

CHAIN SURVEYING

2 Basic principle of chain surveying & main instrument used in chain surveying.

- 2.1 Define the purpose of chain surveying.
- 2.2 Explain the scope of chain surveying.
- 2.3 Describe the principle of chain surveying.
- 2.4 Define the terms chain line, base line, tie line, check line and station points.
- 2.5 Explain ill-conditioned and well-conditioned triangle.
- 2.6 Describe the equipment and accessories used in chain surveying.
- 2.7 Identify Gunter's chain, Engineer's chain, meter chain, ranging rod, cross staff, offset rod, plumb bob, arrows, tapes optical square, acor-comb and whites.
- 2.8 State the uses of linen, metallic, steel and invar tape.
- 2.9 Describe the uses of arrows, ranging rod, offset rod, cross-staff, prism square, box sextant and clinometers.

3 Features of chain survey & optical square.

- 3.1 Explain the process of angle measurement by chain.
- 3.2 Determine the position of a base line.
- 3.3 State the process of base line measurement.
- 3.4 Mention the care and precaution of base line measurement.
- 3.5 Describe the working principles of optical square.
- 3.6 Mention the uses of optical square.
- 3.7 State the meaning of the terms offsets, rectangular offset and oblique offset.
- 3.8 State the methods of measuring offset by offset rod and tape and optical square.

4 Aspects of conducting chain surveying.

- 4.1 Explain the term reconnaissance surveying.
- 4.2 State the procedure of conducting chain surveying.
- 4.3 Describe the procedure of selecting station points.
- 4.4 Describe the ranging of a survey line.
- 4.5 Distinguish between direct and indirect ranging.
- 4.6 State the procedure of measuring liner distances with the help of chain and tape.

5. Booking procedure in field book & Aspects of chaining across obstacles.

- 5.1 Define the term field book.
- 5.2 Distinguish between single line and double line field book.
- 5.3 Describe the procedure of booking data in a single line field book.
- 5.4 Describe the procedure of booking data in a double line field book.
- 5.5 Describe the procedure of setting out perpendicular by chain and tape when the point is inaccessible.
- 5.6 Describe the procedure of chaining across obstacles when the chaining is free and vision obstructed.
- 5.7 Describe the procedure of chaining across obstacles when both chaining and vision are obstructed.

6. Errors in chaining.

- 6.1 State the errors in chaining.
- 6.2 Mention the causes for which a chain may be too long or too short.
- 6.3 Calculate the correct distance and correct area when the chaining was too-long or too-short.
- 6.4 Explain the cumulative and compensating errors in chaining.
- 6.5 List different types of errors & mistakes.
- 6.6 List the name of necessary correction to be applied to the measured length of a line in order to obtain its true length in chaining.
- 6.7 Explain the formulae for correction of tapes for absolute length, variation of temperature, variations of pull, sag and slope.
- 6.8 Compute correct length of a line after necessary correction due to variation of temperature, variation of pull, sag and slope.

7. Preparation of map in chain survey.

- 7.1 List the instruments and materials required for plotting a survey map.
- 7.2 Select suitable scale for plotting map.
- 7.3 Describe the procedure of plotting survey conventional symbols used in plotting maps.
- 7.4 Draw survey conventional symbols used in plotting map.

8. Different methods of computing areas.

- 8.1 Describe different methods of computing areas within regular and irregular perimeters.
- 8.2 Calculate areas within regular and irregular perimeters.
- 8.3 Compute the area along boundary by mid-ordinate rule, average ordinates rule, Trapezoidal rule, Simpson's rule.
- 8.4 Describe the procedure of computation of area from a map with the help of planimeter.
- 8.5 Calculate area of a map with the help of planimeter & area-comb.
- 8.6 Describe the procedure of computing area of a map by dividing the map into triangles, squares, trapezoids (parallel lines)
- 8.7 Mention the procedure of computation of area from a given map with the help of map measurer.

PLANE TABLE SURVEYING

9. Basic concept of plane table surveying.

- 9.1 State the purpose of plane table surveying.
- 9.2 State the scope of plane table surveying.
- 9.3 Identify the instruments and accessories used for plane table surveying.
- 9.4 Explain the functions of different instruments and accessories used in plane table survey.
- 9.5 Describe the procedure of setting up plane table.
- 9.6 Explain orientation by magnetic needle and back sighting.
- 9.7 Describe the methods of plane table survey.
- 9.8 Explain the radiation, intersection, traversing and resection methods.

10. Two points problems, errors and precaution in plane table survey.

- 10.1 Describe two points problem.
- 10.2 State the procedure of locating instrument station on the map by solving two points problem.
- 10.3 Define three points problem.
- 10.4 Describe the procedure of locating instrument station by solving three-point problem.
- 10.5 Describe the advantage and disadvantage of plane table survey.
- 10.6 List the errors in plane table survey.
- 10.7 State the precautions to be taken in plane table survey.

COMPASS SURVEYING

11.0 Basic terms used in compass surveying.

- 11.1 Describe the purpose and scope of compass surveying.
- 11.2 List the instrument and accessories required for compass survey.
- 11.3 Define terms- meridian, true meridian, magnetic meridian, arbitrary meridian, bearing, true bearing, magnetic bearing, arbitrary bearing, magnetic declination, dip of the needle, deflected angle, exterior angle, interior angle.
- 11.4 State the method to determine the direction of meridian by sun's shadow.
- 11.5 State the method to determine the direction of magnetic meridian by compass needle.

12.0 Conversion of bearing.

- 12.1 Explain fore bearing and back bearing.
- 12.2 Compute back bearing from fore bearing and fore bearing from back bearing.
- 12.3 Explain whole circle bearing and reduced bearing and necessity of converting them.
- 12.4 Convert whole circle bearing to reduced bearing and reduced bearing to whole circle bearing.

13.0 Procedure of compass surveying.

- 13.1 Describe prismatic, surveyors and trough compass.
- 13.2 Differentiate prismatic and surveyors compass.
- 13.3 State the uses of different compass.
- 13.4 Describe the procedure of compass survey.
- 13.5 Describe local attraction.
- 13.6 Detect local attraction and correct the observed bearings.

CADASTRAL SURVEY

14.0 Basic concept of cadastral survey.

- 14.1 Define cadastral survey.
- 14.2 Define the purpose of cadastral survey.
- 14.3 List the equipment and accessories used in cadastral survey.
- 14.4 Define the terms Quadrilaterals, intersections, shikmi, chanda, check line, field khaka, revenue survey, revisional settlement.
- 14.5 State the stages of cadastral survey.
- 14.6 Explain the procedure of preparing a cadastral survey map.
- 14.7 Describes the rules for numbering the plots.
- 14.8 Describe the procedure for demarcation of boundary lines of property.

Practical:

- 1. Identify the different instruments and accessories used in chain survey.
- 2. Test and adjust chain.
- 3. Measuring length of a line by chain and tape.
- 4. Set perpendiculars with the help of chain and tape.
- 5. Set parallel lines with chain & tape.
- 6. Set perpendiculars with the help of optical square.
- 7. Measure distance across obstacles.
- 8. Prepare a chain survey map.
- 9. Identify the different instruments and accessories used in plane table survey.
- 10. Conduct plane table survey in an area.
- 11. Measure magnetic bearing by prismatic and surveyors compass.
- 12. Measure the area of a plot from mouza map.

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- 1 Surveying and Leveling-T. P. Kanatker
- 2 Surveying-Dr. B. C. Punmia.
- 3 Surveying-Norman Thomas
- 4 Surveying-Aziz & Shahjahan
- 5 Plane & Geodetic Survey-D.Clark
- 6. Text Book of Surveying-S.K.Husain. M.S.Nagraj
- 7. Surveying & Levelling-N.N.Basak
- 8. Surveying & leveling-S.S.Bhavikatti
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- 10. Surveying (Volume I & II)-S.K.Duggal
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