



***BANGLADESH TECHNICAL EDUCATION BOARD***  
Agargoan, Dhaka-1207.

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

# **GRAPHICS TECHNOLOGY**

TECHNOLOGY CODE: 696

3rd SEMESTER

DIPLOMA IN ENGINEERING  
PROBIDHAN-2016

**GRAPHICS TECHNOLOGY (696)**

**3<sup>rd</sup> SEMESTER**

Sl. No	Subject Code	Name of the subject	T	P	C	Marks				Total
						Theory		Practical		
						Cont. assess	Final exam	Cont. assess	Final exam	
1	69531	Image Preparation-I	2	3	3	40	60	25	25	150
2	69532	Basic Design & Drawing	1	3	2	20	30	25	25	100
3	66621	Database Application	0	6	2	0	0	50	50	100
4	65931	Mathematics-3	3	3	4	60	90	50	0	200
5	65922	Physics-2	3	3	4	60	90	25	25	200
6	65722	Communicative English	1	3	2	20	30	50	0	100
7	69533	Graphics Materials	2	3	3	40	60	25	25	150
<b>Total</b>			<b>12</b>	<b>24</b>	<b>20</b>	<b>240</b>	<b>360</b>	<b>250</b>	<b>150</b>	<b>1000</b>

T	P	C
2	3	3

**AIMS**

- To be able to develop Knowledge, skill and attitude of photoengraving plate preparation
- To be able to develop knowledge and skill on various types of etching.
- To be able to develop skill and knowledge in photopolymer plate preparation.
- To be able to develop skill and knowledge in offset plate preparation

**SHORT DESCRIPTION**

Negative preparation, mechanics of photoengraving, mechanics of photoengraving, photopolymer plate, raw materials and equipment use in lithographic plate preparation, the plate surface chemistry, lithographic plate, auto plate preparation, the image carrier of Gravure Printing, Image carrier of Screen Printing

**1. Understand photopolymer plate.**

- 1.1 Describe the photopolymer plate.
- 1.2 Describe types of photopolymer plate.
- 1.3 Describe drying and post exposing process.
- 1.4 Describe the care of photopolymer plate.

**2 Understand raw materials and equipment use in offset plate preparation**

- 2.1 Mention the name of raw materials used to prepare offset plate
- 2.2 Mention the name of equipment's used to prepare offset plate.
- 2.3 Mention the name of raw materials used to grain the plate
- 2.4 Describe storing process of raw materials .

**3. Understand the plate surface chemistry**

- 3.1 Define plate surface chemistry
- 3.2 Define oleophilic and hydrophilic area of offset plate
- 3.3 Explain surface treatment of lithographic plate
- 3.4 Describe the necessity of Gumming on to the plate before and after printing

**4. Understand lithographic plate.**

- 4.1 Define lithographic plate.
- 4.2 Describe types of lithographic plate.
- 4.3 Describe photomechanical principle.
- 4.4 Describe metal used in lithographic plate

**5. Understand lithographic plate production.**

- 5.1 Describe the method of plate graining.
- 5.2 Describe the preparing method of coating solution.
- 5.3 Describe the preparing method of surface plate.
- 5.4 Describe the preparing method of deep etch plate.
- 5.5 Explain the use of multi metal plate

## **6. Understand the operation of auto plate preparation.**

- 6.1 Define exposier and processor
- 6.2 Mention the functions of various parts of auto plate exposier and processor
- 6.3 Describe the operating procedure of auto plate exposier
- 6.4 Describe the operating procedure of auto plate processor
- 6.5 Define principle of CTP
- 6.6. Define Computer to Plate
- 6.7 Describe operation method of CTP
- 6.8 Describe imaging with UV Light

## **7. Understand the image carrier of Gravure Printing**

- 7.1 Define the basic Cylinder of Gravure Printing
- 7.2 Discuss the various materials use in gravure cylinder making
- 7.3 Discuss the function of cupper, Chrome use in gravure cylinder
- 7.4 Discusses the electroplating (Cupper) of gravure cylinder
- 7.5 Discuss the etching method of gravure cylinder
- 7.6 Describe the tools and equipment use in cylinder etching.

## **8. Understand the Image carrier of Screen Printing**

- 8.1 Define the image Carrier of Screen Printing
- 8.2 List the Raw Materials use in screen printing stencil making
- 8.3 List the tools and equipment's use in stencil making
- 8.4 Discuss the various types of Stencil making (Direct & Indirect)
- 8.5 Discuss the correction method of stencil or correction the pinhole of stencil

**Practical –**

- 1.** Identify different types of raw materials and equipment used in various image preparation
- 2.** Identify different types equipment use in offset plat, gravure and stencil preparation
- 3.** Prepare a photopolymer plate.
- 4.** Expose a plate by auto exposer
- 5.** Develop a offset plate by auto processor
- 6.** Prepare a offset plate by CtP
- 7.** Conventional etching method of gravure cylinder
- 8.** Make a stencil for visiting card and T-shirt

## **BASIC Design & Drawing (69532)**

<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>3</b>	<b>2</b>

### **AIMS**

- To be able to acquire knowledge on Drawing instruments and materials.
- To be able to understand Lettering Numbering and Alphabet of Line.
- To be able to understand the Principles of Conventional and modern Layout
- To be able to understand the Drawing Media and Techniques
- To be able to understand Product Design and Carton Drawing

### **SHORT DESCRIPTION**

Instruments and materials, Lettering Numbering and Alphabet of Line, Principles of Conventional Layout, Understand Principles of Modern Layout, Drawing Media and Techniques, Color, the Product Design and Carton Drawing

### **DETAIL DESCRIPTIN: (THEORY)**

#### **1. Drawing instruments and materials.**

- 1.1 Identify the different types of drawing instruments
- 1.2 Use different types of drafting equipment's
- 1.3 Identify the standard sizes of drawing board & sheet
- 1.4 Draw the boarder lines title box in drawing sheets following standards rule.
- 1.5 Draw horizontal, vertical and inclined lines with the help of set squares, Parallel bar
- 1.6 Draw 15 degree, 75 Degree, 105 degree and 120 degree angels with the help of set squares
- 1.7 Use Lettering guide, Template, Scale Pantograph and French curve.

#### **2. Understand the Lettering Numbering and Alphabet of Line.**

- 2.1 Draw freehand single stroke vertical letters from A to Z (upper and lower case) and number 0 to 9
- 2.2 Draw block letters (Gothic) using 5;4 proportions and height in Given Graph Pad.
- 2.3 Draw title strip with proper placement using suitable size of letters and measurements.
- 2.4 Identify different line in drawing.
- 2.5 Use center line, hidden line, phantom line, break line, dimension line, extension line, section line adn cutting plane line.
- 2.6 Describe word and line spacing and Type Harmony.
- 2.7 Discuss the uses of Type in Graphic Design.

#### **3. Describe the Principles of Conventional Layout**

- 3.1 Introduction to Printing Layout
- 3.2 Discuss the Principle of Layout
- 3.3 Discuss the Types of Balance
- 3.4 Discuss the Tone Hormone
- 3.5 Discuss the Types of Border
- 3.6 Directing Eye Movement in Layout

#### **4. Understand Principles of Modern Layout.**

- 4.1 Introduction to Modern Layout.
- 4.2 Movement in Modern Layout.
- 4.3 Discuss the Ornamentation in Modern Layout.
- 4.4 Discuss Oblique Axis.
- 4.5 Basic Modern Letterhead Arrangements.

#### **5. Understand Drawing Media and Techniques**

- 5.1 Discuss Pencil Techniques.
- 5.2 Discuss the Wash Drawing for making Layout.
- 5.3 Discuss the Airbrush Technique.
- 5.4 Discuss the use of soft and hard Pastel Technique.
- 5.5 Describe the freehand use of pen and ink.

## **6. Understand the Color.**

- 6.1 Introduction to Color.
- 6.2 Describe the Principle of Color
- 6.3 Describe the Additive Color
- 6.4 Describe the Subtractive Color
- 6.5 Describe color versus Black and White.
- 6.6 Describe the Psychology of color

## **7. Understand the Product Design and Carton Drawing**

- 7.1 Introduction to Product Design.
- 7.2 Discuss how to draw a Product Layout.
- 7.3 Describe parts of a Carton.
- 7.4 Understand the Different type of Carton.
- 7.5 Describe the needs of Carton Design.

## **PRACTICAL**

1. Practice with drawing instruments for basic drawing technique.
2. Draw various type of Bangla and English font with pencil and pen
3. Draw various types of Conventional Layout
4. Draw various types of Modern Layout
5. Practice Free hand drawing with Pencil Media
6. Practice Free hand drawing with Wash Media.
7. Practice secondary color mixing
8. Make a layout and design with pen and ink.
9. Make a Newspaper Page Layout
10. Make a free hand Cover Design.

## **REFERENCE BOOKS:**

1. Printing Layout and Design
2. Illustration today  
robert ross
3. commercial art techniques  
s.ralph maurello

## 1. Design Database Table

### 1.1. Follow OSH practices

- 1.1.1. Safe work practices are observed according to IT workplace guideline.
- 1.1.2. OSH hazards and incidents are reported to appropriate personnel according to Workplace procedures.
- 1.1.3. Safe workplace environment are assured.

### 1.2. Plan database table design

- 1.2.1. Pencil, pen, eraser and paper are collected to design the database as per client's requirement.
- 1.2.2. Object of the database are identified as per client's specification.
- 1.2.3. Entities, attributes and relationship are determined
- 1.2.4. Attribute name, data type and description /validation are defined in tabular form.

### 1.3. Incorporate basic design principles

- 1.3.1. Database application is selected as per requirement
- 1.3.2. Database application is opened
- 1.3.3. Database objects are selected as per plan requirement
- 1.3.4. Design tools are selected as per requirement
- 1.3.5. Design tools are used
- 1.3.6. Database objects are used.

### 1.4. Develop a table with fields and attributes

- 1.4.1. Field name are created according to the design plan
- 1.4.2. Data types of a fields are selected
- 1.4.3. Field's properties are set
- 1.4.4. Field descriptions are written as requirement
- 1.4.5. Primary key is determined and set
- 1.4.6. Index is established
- 1.4.7. Additional attribute is set as required
- 1.4.8. Table structure, field name and field properties are edited
- 1.4.9. Table structure is saved

### 1.5. Create a relationship between the tables

- 1.5.1. Common field in each table with same data type is ensured
- 1.5.2. Primary key and foreign key are assigned
- 1.5.3. Closing of all table are observed
- 1.5.4. Manipulation of relationship are performed
- 1.5.5. Database Tables are saved.

### 1.6. Shut down the computer and clean workplace

- 1.6.1. Database is closed
- 1.6.2. Computer is shut down according to Standard Operating Procedure(SOP)
- 1.6.3. Clean the workplace as per company rules

## 2. Create forms

### 2.1. Follow OSH practices

- 2.1.1. Safe work practices are observed according to IT workplace guideline.
- 2.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.
- 2.1.3. Safe workplace environment are assured.



## 2.2. Create form using wizard

- 2.2.1. Form object is selected from the object list
- 2.2.2. Create menu is selected from the ribbon
- 2.2.3. More forms tool is selected from the ribbon
- 2.2.4. Table is selected from the form wizard dialog box
- 2.2.5. Fields are selected from the available fields list
- 2.2.6. The procedure is finished by clicking the finish button Form is saved

## 2.3. Insert command buttons on the form using wizard

- 2.3.1. Previously created form is opened in design view
- 2.3.2. Design tab is selected from menu bar
- 2.3.3. Use control wizard is activated from the design ribbon
- 2.3.4. Command Button tool is drag & dropped in the form from the design ribbon
- 2.3.5. Appropriate category is selected from the category list
- 2.3.6. Appropriate action is selected from the action list
- 2.3.7. Button insertion is finished by clicking the finish button of the wizard

## 2.4. Create form manually

- 2.4.1. Form object is selected from the object list
- 2.4.2. Create menu is selected from the ribbon
- 2.4.3. Form design tool is selected from the ribbon
- 2.4.4. Add existing fields tool is selected under design ribbon
- 2.4.5. Table is selected from the available table list
- 2.4.6. Fields are drag & dropped in the form from the available fields list
- 2.4.7. Form is viewed in form view
- 2.4.8. Form is saved

## 2.5. Insert command buttons manually

- 2.5.1. Previously created form is opened in design view
- 2.5.2. Design tab is selected from menu bar
- 2.5.3. Command Button tool is drag & dropped in the form from the design ribbon
- 2.5.4. Property sheet is viewed by double clicking the button
- 2.5.5. Macros are Built by clicking the appropriate event under the event tab
- 2.5.6. Records and command buttons are Navigated
- 2.5.7. Form is saved

## 2.6. Manipulate the records using command buttons

- 2.6.1. Database is opened properly
- 2.6.2. Previously created form is opened in form view
- 2.6.3. Records are added by clicking Add new record button
- 2.6.4. Records are deleted by clicking Delete record button
- 2.6.5. Records are modified

# 3. Retrieve database information

## 3.1. Follow OSH practices

- 3.1.1. Safe work practices are observed according to IT workplace guideline.
- 3.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.
- 3.1.3. Safe workplace environment are assured.

## 3.2. Create simple query and retrieve required information

- 3.2.1. Existing database and location are accessed
- 3.2.2. Query is created by Query Wizard
- 3.2.3. Field are selected from existing table
- 3.2.4. Data are sorted using simple query
- 3.2.5. Parameter is used
- 3.2.6. Criteria is used for query
- 3.2.7. Query is run and saved

### 3.3. Create append query

- 3.3.1. Existing database and location are accessed as required
- 3.3.2. Query object is selected
- 3.3.3. Design view is opened of the query
- 3.3.4. Table(s) are added in the query
- 3.3.5. Fields are selected as per requirement
- 3.3.6. Append are performed as per required table.
- 3.3.7. Query is run and saved

### 3.4. Create delete query

- 3.4.1. Existing database and location are accessed as required
- 3.4.2. Query object is selected
- 3.4.3. Design view is opened of the query
- 3.4.4. Table(s) are added in the query
- 3.4.5. Fields are selected as per requirement
- 3.4.6. Deletion is performed as per requirement.
- 3.4.7. Query is run and saved

### 3.5. Perform Filter Operations

- 3.5.1. Filter are applied to table and forms
- 3.5.2. Filter are removed from table and forms

### 3.6. Sort Records

- 3.6.1. Data sorted in a table, form and query output in ascending/descending numerical /alphabetical order as required.
- 3.6.2. Report Based on table and query are created and saved as required

### 3.7. Shut down the computer and clean workplace

- 3.7.1. Database is closed
- 3.7.2. Computer is shut down according to Standard Operating Procedure(SOP)
- 3.7.3. Clean the workplace as per company rules

## 4. Generate database Reports

### 4.1. Follow OSH practices

- 4.1.1. Safe work practices are observed according to IT workplace guideline.
- 4.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.
- 4.1.3. Safe workplace environment are assured.

### 4.2. Create reports

- 4.2.1. Reports format are planed and determined
- 4.2.2. Report based on a table and query are created and saved as required.
- 4.2.3. The arrangement of data fields and headings within a report layout are changed as required.
- 4.2.4. Data under a specific heading (field) in a report are grouped in ascending/descending order as required.
- 4.2.5. Specific fields in a grouped report are presented by sum, minimum, maximum, average, count at appropriate break points.

### 4.3. Modify reports to include or exclude additional requirements

- 4.3.1. Text in headers, footers in a report are added or modified as necessary.
- 4.3.2. Report is deleted correctly.
- 4.3.3. Report is saved and closed correctly.

### 4.4. Sort Records

- 4.4.1. Data sorted in a table, form and query output in ascending/ descending numerical /alphabetical order as required.
- 4.4.2. Report Based on table and query are created and saved as required

### 4.5. Distribute and print reports in a suitable format

- 4.5.1. Table, forms, reports are previewed to ensure that errors are detected and corrected.
- 4.5.2. Report orientation, paper size changed as required
- 4.5.3. The results of query printed as required
- 4.5.4. Specific pages in a report or a complete report printed as required

#### 4.6. Export data in various Formats

- 4.6.1. Report is exported as PDF or XPS.
- 4.6.2. Report is exported as word Document.
- 4.6.3. Report is exported as HTML Document.

### 5. Test and use database

#### 5.1. Follow OSH practices

- 5.1.1. Safe work practices are observed according to IT workplace guideline.
- 5.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.
- 5.1.3. Safe workplace environment are assured.

#### 5.2. Plan to test the correctness of the database

- 5.2.1. Possible errors are listed
- 5.2.2. Testing sequence is planed

#### 5.3. Verify the feature of the database

- 5.3.1. Database is opened
- 5.3.2. Tables, forms and reports are opened
- 5.3.3. Features of the tables, forms and report are shown
- 5.3.4. Format of the text are modified if required
- 5.3.5. Alignment of the tables, forms and reports are changed as per client's requirements.

#### 5.4. Navigate the buttons and forms

- 5.4.1. Forms are opened
- 5.4.2. Buttons of the forms are identified
- 5.4.3. Functions of the buttons are tested to verify the usability for every events.

#### 5.5. Perform data entry operation

- 5.5.1. Forms are identified for data entry
- 5.5.2. Data is organized
- 5.5.3. Forms are opened for data entry
- 5.5.4. Data is entered in the concern field
- 5.5.5. Error is detected if any and corrected by modification if required.
- 5.5.6. All forms are filled up and checked for malfunctions
- 5.5.7. Malfunctions are corrected if required.

#### 5.6. View and print reports

- 5.6.1. Table, forms, reports are previewed to ensure that errors are detected and corrected.
- 5.6.2. Report orientation, paper size changed as required
- 5.6.3. The results of query are printed as required
- 5.6.4. Specific pages in a report or a complete report is printed as required

## AIMS

- To enable to calculate the areas of regular polygons, hexagons, octagon, hydraulic mean depth (HMD) of a channel, area occupied by water of circular culvert. Excavation work.
- To provide the ability to calculate volume of regular solids like pyramid frustum of pyramid, prismoid, wedge and area of curved surfaces.
- To enable to use the knowledge of gradient of a straight line in finding speed, acceleration etc.
- To enable to use the knowledge of conic in finding the girder of a railway bridge, cable of a suspension bridge and maximum height of an arch.
- To make understand the basic concept and techniques of composition and resolution of vectors and computing the resultant of vectors.

- **SHORT DESCRIPTION**

**Menstruation** : Area of rectangles, squares, triangles, quadrilaterals, parallelograms, rhombus, trapezium, circle, sector, segment; Volume of rectangular solids, prism, parallelepiped, pyramids, cones, spheres, frustum of pyramid and cone; Area of curved surface of prism, Cylinder cone, pyramid and frustum of cone.

**Co-ordinate Geometry**: Co-ordinates of a point, locus and its equation, straight lines, circles and conic.

**Vector**: Addition and subtraction, dot and cross product.

**DETAIL DESCRIPTION****MENSURATION:****1 Apply the concept of area of triangle.**

1.1 Find the area of triangle in the form,

i)  $A = \frac{\sqrt{3}}{4} a^2$ , a = length of a side of equilateral triangle.

ii)  $A = \frac{c}{4} \sqrt{4a^2 - c^2}$ , where a = length of equal sides, c = third side.

iii)  $A = \sqrt{s(s-a)(s-b)(s-c)}$ , where a, b, c = length of the sides of a triangle and 2s is the perimeter of the triangle.

1.2 Use formula in 1.1 to solve problems.

**2 Apply the concept of finding areas of quadrilateral & Parallelogram & finding areas of rhombus & trapezium.**

2.1 Define quadrilateral & Parallelogram.

2.2 Find the areas of quadrilateral when off sets are given.

2.3 Find the areas of a parallelogram.

2.4 Solve problems using above formulae.

2.5 Define rhombus & trapezium.

2.6 Find the areas of rhombus when the diagonals are given.

2.7 Find the areas of trapezium in terms of its parallel sides and the perpendicular distance between them.

2.8 Solve problems related to rhombus & trapezium.

**3 Apply the concept of finding areas of regular polygon.**

3.1 Define a regular polygon.

3.2 Find the area of a regular polygon of n sides, when

i) The length of one side and the radius of inscribed circle are given.

ii) The length of one side and the radius of circumscribed circle are given.

- 3.3 Find the area of a regular.
- Hexagon
  - Octagon when length of side is given.
- 3.4 Solve problems of the followings types:  
A hexagonal polygon 6 m length of each side has a 20 cm width road surrounded the polygon. Find the area of the road.

**4 Understand areas of circle, sector and segment.**

- Define circle, circumference, sector and segment.
- Find the circumference and area of a circle when its radius is given.
- Find the area of sector and segment of a circle.
- Solve problems related to the above formulae.

**5 Apply the concept of volume of a rectangular solid.**

- Define rectangular solid and a cube.
- Find geometrically the volume of a rectangular solid when its length, breadth and height are given.
- Find the volume and diagonal of a cube when side is given.
- Solve problems with the help of 6.2 & 6.3.

**6 Apply the concept of surface area, volume of a prism, parallelepiped and cylinder.**

- Define a prism, parallelepiped and a cylinder.
- Explain the formulae for areas of curved surfaces of prism, parallelepiped and cylinder.
- Explain the formulae for volume of prism, parallelepiped and cylinder when base and height are given.
- Solve problems related to 7.2, 7.3.

**7 Apply the concept of the surface area, volume of pyramid, cone and sphere.**

- Define pyramid, cone and sphere.
- Explain the formula for areas of curved surfaces of pyramid, cone and sphere.
- Explain the formula for volumes of pyramid, cone and sphere.
- Solve problems related to 8.2, 8.3.

**CO-ORDINATE GEOMETRY**

**8 Apply the concept of co-ordinates to find lengths and areas.**

- Explain the co-ordinates of a point.
- State different types of co-ordinates of a point.
- Find the distance between two points  $(x_1, y_1)$  and  $(x_2, y_2)$ .
- Find the co-ordinates of a point which divides the straight line joining two points in certain ratio.
- Find the area of a triangle whose vertices are given.
- Solve problems related to co-ordinates of points and distance formula.

**9 Apply the concept of locus & the equation of straight lines in calculating various Parameter.**

- Define locus of a point.
- Find the locus of a point.
- Solve problems for finding locus of a point under certain conditions.
- Describe the Equation  $x=a$  and  $y=b$  and slope of a straight line.
- Find the slope of a straight line passing through two point  $(x_1, y_1)$  and  $(x_2, y_2)$ .
- Find the equation of straight lines:
  - Point slope form.
  - Slope Intercept form.
  - Two points form.
  - Intercept form.
  - Perpendicular form.
- Find the point of intersection of two given straight lines.
- Find the angle between two given straight lines.
- Find the condition of parallelism and perpendicularity of two given straight lines.
- Find the distances of a point from a line.

**10 Apply the equations of circle, tangent and normal in solving problems.**

- 10.1 Define circle, center and radius.
- 10.2 Find the equation of a circle in the form:  
 (i)  $x^2 + y^2 = a^2$   
 (ii)  $(x - h)^2 + (y - k)^2 = a^2$   
 (iii)  $x^2 + y^2 + 2gx + 2fy + c = 0$
- 10.3 Find the equation of a circle described on the line joining  $(x_1, y_1)$  and  $(x_2, y_2)$ .
- 10.4 Define tangent and normal.
- 10.5 Find the condition that a straight line may touch a circle.
- 10.6 Find the equations of tangent and normal to a circle at any point.
- 10.7 Solve the problems related to equations of circle, tangent and normal.

**11 Understand conic or conic sections.**

- 11.1 Define conic, focus, Directorx and Eccentricity.
- 11.2 Find the equations of parabola, ellipse and hyperbola.
- 11.3 Solve problems related to parabola, ellipse and hyperbola.

**VECTOR :****12 Apply the theorems of vector algebra.**

- 12.1 Define scalar and vector.
- 12.2 Explain null vector, free vector, like vector, equal vector, collinear vector, unit vector, position vector, addition and subtraction of vectors, linear combination, direction cosines and direction ratios, dependent and independent vectors, scalar fields and vector field.
- 12.3 Prove the laws of vector algebra.
- 12.4 Resolve a vector in space along three mutually perpendicular directions
- 12.5 Solve problems involving addition and subtraction of vectors.

**13 Apply the concept of dot product and cross product of vectors.**

- 13.1 Define dot product and cross product of vectors.
- 13.2 Interpret dot product and cross product of vector geometrically.
- 13.3 Deduce the condition of parallelism and perpendicularity of two vectors.
- 13.4 Prove the distributive law of dot product and cross product of vector.
- 13.5 Explain the scalar triple product and vector triple product.
- 13.6 Solve problems involving dot product and cross product.

**Reference**

SL No	Athour	Title	Publication
01	G. V. Kumbhojkar	Companion to basic Maths	Phadke Prakashan
02	Murary R Spigel	Vector & Tensor Analysis	Schaum's Outline Series
03	Md. Abu Yousuf	Vector & Tensor Analysis	Mamun Brothers
04	Rahman & Bhattacharjee	Co-ordinate Geometry & Vector Analysis	H.L. Bhattacharjee
05	Md. Nurul Islam	Higher Mathematics	Akkhar Patra Prakashani

## 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 2<sup>nd</sup> 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               |

**Full Marks: 100 (Practical-50.Theoretical-50)**

### **Introduction**

This Course Will Provide A Unique Foundation In The Basic Level For Developing Listening, Speaking, Reading And Writing Skills Into Some Of More Specialized And Advanced Capabilities Of Basic Operation In Communication.

### **Theory Part**

Total Mark:	: 50
Continuous Assessment	: 20
Final Exam	: 30

### **Objectives:**

After The Completion of the Module, Learners Will Be Able To Develop-

- # Creative Writing Ability
- # Transferring Information, Ideas And Knowledge
- #Communicative Competence Effectively In The Workplace Situation.

### **1.Comprehension For Reading Task (Mark:10)**

(Text May Be Taken From Contemporary Journals, Editorial of News Papers Or From Online Resources)

### **Test Items:**

1. MCQ (Guessing Meaning from Context)
2. Rearranging
3. Gap-Filling (With Clues or Without Clues)
4. Answering Questions
5. Summarizing

### **2. Composition (Mark: 20)**

### **The Following Are The Topic Title Introduced For Writing Task:**

1. Introduce Formal/Informal Greeting & Farewell
2. Describe The Idea Of Communication & Presentation Skills
3. Write Paragraph On The Basis Of Comparison and Contrast
4. Narrate Process, Stories And Interpreted Charts, Graphs.
5. Write Letters to the Print and Electronic Media
6. Write Letters of Advice, Complaints, Inquiry, Order and Cancellation
6. Prepare Seven Days Weather Report.
7. Make An Attractive Poster For The People Giving Advice To Protect The Environment.
8. Prepare A Series Of Questions About Personal Information, Place Of Interest, Foods, Hobby And Employment Opportunity.
9. Write Dialogue On The Following Situations
  - # About Exchanging Views With A Person And Introducing One Narrating Daily Activities
  - # Meeting At The Train Station & Asking Question About The Departure And Arrival Of The Train To The Station Manager
  - # Meeting at The Airport And Asking The Flight Schedule
  - # Getting To The Hotel And Asking For A Reservation
  - # Social Language for Telephonic Conversation
  - # Talking About the Weather, Trips & Sight Seeing
  - # Asking Permission and Making Request.
  - # Talking About Office and Office Manner
  - # Talking About Etiquette and Manner
10. Prepare Job Application With A Complete CV For Job Suitable For You.

**Practical Part:**

**Objectives:**

1. **Communicate The Areas That Learners Encounter In Real Life Situation.**
2. **Reinforce The Basic Language Skills Of Listening And Speaking.**
3. **Integrate ICT As Tools In Learning Language.**

**Course Content**

<b>Unit</b>	<b>Lesson</b>	<b>Title</b>
1. Use Of Dictionary	Define Dictionary	1.1 Know How To Use A Dictionary 1.2 Learn At Least 10 Words In A Day With Correct Pronunciation (Follow The Link : <a href="http://Www.Marriunm-Englishdictionary.Com">Www.Marriunm-Englishdictionary.Com</a> )
2. Basic Vocabulary Practice	Basic Words For Communication By ODGENS	2.1 Use 10 Most Common Formulas (Structure) To Write Correct Sentence. (Follow The Link: <a href="http://Www.Odgensbasicvocabulary.Com">Www.Odgensbasicvocabulary.Com</a> <a href="http://Www.Grammarly.Com">Www.Grammarly.Com</a> )
3. Listening Skill Practice	Listen To The Audio Video Presentation On Current Real Life Situation	3.1 Practice Audio Video Conferencing Activities. 3.2. Communicate With The English Speaking People Online (Link: <a href="http://Www.Speaking24.Com">Www.Speaking24.Com</a> )
4. Speaking Skill Practice (Self Interpretation)	Introduce Yourself With The Vocabulary Prescribed By ODGENS	4.1 Browse Vocabulary Related Phrases To Introduce You. (Link : <a href="http://Www.Youtube.Com/Let%20Me%20Introduce%20Myself">Www.Youtube.Com/ Let Me Introduce Myself</a> )
5. Listening Skill Practice	Listen To The Weather Reports, Sports Commentary In The English TV Channels.	5.1 Prepare Seven Days Weather Report For The Place You Are Staying. 5.2. Make Some Attractive Poster To Protect The Environment.
6. Speaking Skill Practice	Identify Formal And Informal Social Language	6. 1 Practice Conversation Emphasizing On Greetings & Farewell (Link- <a href="http://Www.Esl.Guide@About.Com">Www.Esl.Guide@About.Com</a> ) 6.2 Take Part In Audio Video Conferencing Activities 6.3 Ask Questions About Personal Information, Place Of Interest, Food, Hobby, Employment Opportunity With Foreign Friends Using Social Media.
7. Writing Skill Practice	Develop Paragraph	7.1 Develop Paragraph On The Basis Of Comparison, Contrast And Analysis. Check Plagiarism Wordiness By The Correction Software ( <a href="http://Www.Grammarly.Com">Www.Grammarly.Com</a> ) 7.2. Write E-Mail, Send And Reply E-Mail

8. Listening Skill Practice	Watch Short Films, Documentary And Listen To The English Music(With Lyric) To Practice In A Group	8.1 Listen To Hard Talk, Interview 8.2. Prepare A Series Of Questions To Interview A Celebrity 8.3. Down Load Documentary From <a href="http://Www.Youtube.Com/Education">Www.Youtube.Com/Education</a>
9. Presentation	Define Presentation	9.1 Edutain/Entertain Yourself Preparing A Documentary In A Group With The Activities Done During The Period Of Class Hours In The Lab For Communicative English.

Evaluation:

Students Can Be Evaluated Individually Or In A Group On The Basis Of Performance Done In The Lab. Furthermore, They May Be Given Online Test Using Authenticated Websites Like [www.Britishcouncil.Org/Education/Blog/Podcast/News/Weather](http://www.Britishcouncil.Org/Education/Blog/Podcast/News/Weather), [www.Englishteststore.Com](http://www.Englishteststore.Com), [www.Ieltsexam.Com](http://www.Ieltsexam.Com)

Lab-Facilitator, 30 Students In A Group:

Physical Facility	Size (In Ft)	Area (In Sq Ft)
Class Room Cum Laboratory	15 × 20	300
Library	15 × 20	300
Wash Room	4 × 7	28

Lists Of Equipments And Resources For 30 Learners:

Personal Computers With Accessories	15
Projector Multimedia	01
Printer	01
Scanner	01
Modem	01
Essential Software	01 Set
Internet Connection For Each Computer	Broad Band/Dial Up
Camera (Digital)	01
Video Conferencing Equipments	01 Set
TV Card	01
Satellite Cable Connection	01
Head Phone	15
Related Books And Journals	01
First Aid Box	01

Reference:

[www.Britishcouncil.Org](http://www.Britishcouncil.Org), [www.Marium-Websters.Com](http://www.Marium-Websters.Com), [www.Compellingconversation.Com](http://www.Compellingconversation.Com),  
[www.Esl.Guide@About.Com](http://www.Esl.Guide@About.Com), [www.Bbc.Com/News](http://www.Bbc.Com/News), [www.Speaking24.Com](http://www.Speaking24.Com), [www.Itutor.Com](http://www.Itutor.Com),  
[www.Ieltsexam.Com](http://www.Ieltsexam.Com), [www.Englishteststore.Com](http://www.Englishteststore.Com), [www.Ginger.Com](http://www.Ginger.Com), [www.Grammarly.Com](http://www.Grammarly.Com)

(Note: This Course May Be Introduced After Fourth Semester Coz It Needs Some Maturity Of The Students To Adopt With The Course Materials And The Contents. These Themes Are Suggestive Not Prescriptive.)

**Aims**

- To be able to understand and classify the press, prepress post press materials
- To be able to understand the quality and characteristics of graphic materials .
- To be able to develop awareness of handling graphic materials
- To be able to develop ability to exercise qualitative judgment to selecting the proper materials.

**Short Description**

materials for art and copy preparation materials used in desktop publication, photographic materials, image preparation materials, offset printing materials, Gravure, Screen printing paper board, film foils and solvent, printing ink, Binding and Packaging materials

**Detail Description****1. Understand the materials used for art and copy preparation**

- 1.1 Describe different types of paper and board used in art design and copy preparation.
- 1.2 Mention the use of pen, pencil, shading, sheet in art and copy preparation.
- 1.3 Discuss the use of airbrush.
- 1.4 Discuss the different category of brushes.
- 1.5 Describe the characteristics of water color, poster color, oil paint etc.

**2. Understand the materials used in Desktop publication.**

- 2.1 Describe various types of storage devices.
- 2.2 Mention different types of printers Ink.
- 2.3 Describe digital print materials.
- 2.4 Describe the use of film for positive output.
- 2.5 Describe the use of chemicals for positive output.

**3. Understand photography and photographic materials.**

- 3.1 Describe the different types of graphic film.
- 3.2 Mention the name of developing agent of Photographic Film.
- 3.3 Describe the preparation of developing and fixing solution.
- 3.4 Explain the function of light source used in graphic arts process camera.
- 3.5 Describe the digital photographic materials.
- 3.6 Mention the name and function of stripping materials.

**4. Understand the Image Preparation Materials**

- 4.1 Describe the physical and chemical properties of different metals used in Image preparation.
- 4.2 Describe the different types of plate used in offset printing process.
- 4.3 Describe different types of chemical used in printing Image Preparation.
- 4.4 Describe the function and application of coating materials of offset plate used in Image preparation.
- 4.5 Describe various types of Acid, Alkalis, bicromete, solvent used in plate making.

## **5. Under Stand the Offset printing materials.**

- 5.1 Explain the function of dampen roll covering/shock materials
- 5.2 Describe the dampen roller materials.
- 5.3 Describe the method of preparation of damping solution.
- 5.5 Describe the blanked preparation materials.
- 5.6 Describe the plate handling in offset printing.
- 5.7 Describe the handling method of raw materials in printing industry

## **6. Understand the materials of Gravure Printing**

- 6.1 Mention the raw materials of gravure printing.
- 6.2 Mention chemical and solvent use in gravure printing.
- 6.3 Discuss the characteristics of paper, board, film and foil
- 6.4 Mention the different types of ink use in gravure printing.
- 6.5 Mention the lamination, glue, solvent and other materials use in lamination process.

## **7. Understand the screen printing materials.**

- 7.1 List the materials used in screen printing.
- 7.2 Describe the mesh materials.
- 7.3 Describe stencil making materials.
- 7.4 Describe Flock printing materials.
- 7.5 Explain the different types of screen printing Ink used in different types of stock.
- 7.6 Describe various kind of glitter's used in screen printing.
- 7.7 Describe the embossing gum of Screen Printing.

## **8. Understand the CTP Materials**

- 8.1 Describe the characteristic of CtP chemicals
- 8.2 Describe CtP software.
- 8.3 List the name of various materials used in CtP system.
- 8.4 Describe the unit of CtP.

## **9. Understand the paper and board used in printing.**

- 9.1 Explain the characteristics of pulp.
- 9.2 Discus different types of materials used for paper and board manufacturing.
- 9.3 Describe the various size and weight of paper and board.
- 9.4 Explain the tearing tensile strength of paper, board, film and foils.
- 9.5 Describe the method of paper storing
- 9.6 Describe the grain direction test of paper and board.

## **10. Understand the Printing Ink.**

- 10.1 Describe the main ingredients of printing ink
- 10.2 Describe the function of pigment.
- 10.3 Describe the method of Ink manufacturing.
- 10.4 Describe the method of testing offset Ink.
- 10.5 Explain the factors raw materials that influence in printing performance.

## **11. Understand Binding and packaging materials**

- 11.1 Mention different binding materials.
- 11.2 List the name of packaging materials.
- 11.3 Describe the materials used for folding carton.
- 11.4 Discuss the use of book decoration materials.
- 11.5 Mention the raw materials use in die cutting.

## **Practical**

1. Identify the various film used in photography.
2. Identify the processing chemicals of photography.
3. Identify the different kinds of binding materials
4. Identify the various types of printing papers and board
5. Identify the various types of lubricating materials
6. Select the materials of screen printing
7. select the materials of gravure printing
8. Test the pH value of ink, dampening solution, paper and board
9. Test the grain direction of paper and board
10. Test the tensile strength of print stock