BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207.

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

ARCHITECTURE TECHNOLOGY

TECHNOLOGY CODE: **661**

2nd SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

ARCHITECTURE TECHNOLOGY (661)

2nd 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	66121	Architectural Design -1	1	6	3	20	30	50	50	150
2	66122	Creativity & Concept Development	2	3	3	40	60	25	25	150
3	66611	Computer Application	0	6	2	0	0	50	50	100
4	65711	Bangla	3	3	4	60	90	50		200
5	65712	English	2	0	2	40	60	0	0	100
6	65921	Mathematics-2	3	3	4	60	90	50	0	200
7	65912	Physics-1	3	3	4	60	90	25	25	200
Total			**14**	**24**	**22**	**280**	**420**	**250**	**150**	**1100**

66121 **Architectural Design - 1** **T P C**
1 6 3

AIMS:
To be able to develop knowledge, skill and attitude in the field of the graphical representation of architectural design & drafting with special emphasis on:

- The elements of drawing and principles of design.
- Form, Space, Organization, Circulation, proportion and scale.
- Concepts of Design, Design Process
- Anthropometric data.
- Design of small structure (temporary and permanent)

SHORT DESCRIPTION:
Elements of Drawing and principles of Design, Form & Space, Organization & Circulation, Proportion & scale, Concepts of Design, Design Process, Architectural drawing & drafting, Texture, Anthropometry, and Design of small structure (Temporary and Permanent)

THEORY:

1. Concept of Design & Design process.
1.1. Define Art and architecture.
1.2. Define Design.
1.3. Describe the historical background of design principle.
1.4. Mention the classification of design.
1.5. Describe the Design theme (Analogy, Metaphor, Essences, Problem - Solving and Idea).
1.6. Describe the advantages and disadvantages of design.
1.7. Describe the Design procedure & Design criteria.

2. Primary elements of Design.
2.1. Explain Point as a drawing element and its application.
2.2. Explain Line as a drawing element and its application.
2.3. Explain Plane as a drawing element and its application.
2.4. Explain Volume as a drawing element and its application.

3. Form & Space.
3.1. Define Form, shape & and space.
3.2. Describe the primary shapes i.e. circle, triangle & square and regular and irregular forms.
3.3. Describe the transformation of forms.
3.4. Describe the subtractive and additive forms.
3.5. Explain the centralized, linear, radial, clustered and grid forms.
3.6. Explain Form defining space, Horizontal and Vertical Elements defining space.

4. Organization & Circulation.
4.1. Define Organization in design.
4.2. Describe the organization of Form & Space and their relationship.
4.3. Explain space within a space and interlocking space.
4.4. Describe different types of Organization.
4.5. Define circulation.
4.6. Describe the movement through space (Approach, Entrance, configuration of the path, Path space relationships, Form of the Circulation Space).

5. Proportion and scale.
5.1. Define Proportion and scale.
5.2. Discuss the materials proportions, structural proportions & manufactured proportion.
5.3. Describe the theories of proportions (Golden section, Classical orders, Module, Anthropometry & Scale etc.)
5.4. Describe Golden section and explain its drawing procedure.

5.5. Explain the modules and grids.
5.6. Define Human and Visual scale.

6. Sources and principles of Design.

6.1 State the source of nature from which design is developed.
6.2 Explain the principles of design in natural design that are observed easily (Rhythm, Appearance, Variety, Unity, Balance etc.)
6.3 Discuss the Emphasis factors in design.
6.4 Explain the Emphasis factors procedure determination.

PRACTICAL

1.0 **Primary Elements**
1.1. Indicate a position in space by point.
1.2. Draw a line with different properties.
1.3. Extend a line to plane with different properties.
1.4. Make different volume (i.e. Cubic, Cylindrical, Prismatic)

2.0 **Form & Shape**
2.1. Draw different two dimensional forms using lines.
2.2. Draw different Shapes (i.e. Square, Rectangle, Triangle, Circle.)
2.3. Draw different Shapes showing difference between sizes.
2.4. Draw different three dimensional forms.

3.0 **Different Forms**
3.1. Draw a centralized form.
3.2. Draw linear form.
3.3. Draw a Radial form.
3.4. Draw a Clustered form.
3.5. Draw a Grid form.

4.0 **Different Spaces**
4.1. Draw Space within Space.
4.2. Draw different interlocking space.
4.3. Draw Spaces linked by a common space linked.
4.4. Draw adjacent Spaces.

5.0 **Different Planes**
5.1. Draw a Base plane.
5.2. Draw a elevated Base plane.
5.3. Draw Depressed Base plane.
5.4. Draw a Overhead plane.

6.0 **Golden section & Order**
6.1. Draw a golden section of rectangle showing mathematical solution.
6.2. Draw a golden section of a pentagon.
6.3. Show the golden section of Parthenon to show its ratio.
6.4. Draw different classic order (i.e. Doric, Ionic, Corinthian, Tuscan, Composite)
6.5. Draw different configuration of path (Linear, Radial, Spiral, Grid, Network, Composite)

7.0 **Circulation movement through Space.**
7.1. Draw approach to show distance view.
7.2. Draw a entrance from outside to inside.
7.3. Draw configuration of the path to show the sequence of spaces.
7.4. Draw path-space relationships (Edges, Nodes & Terminations of the path)
7.5. Draw form of the circulation space (Corridors, Halls, Stairways & rooms)

8.0 Design temporary or permanent single room building/single structure (Police Box, Guard Room with Gate, Traffic/Passenger Shed, Park Shed etc. - any one project).

8.1 Sketch a site with necessary information.

8.2 Draw a free hand sketch of the selected (Police box, guard room with gate, Passenger Shed, Park Shed etc.) project plan.
8.3 Draw elevation and section of the plan.
8.4 Draw a 3D view of the project.

Reference Books:

1. Architecture: Drafting & Design(5th edition) - Donald E. Hepler, Paul I Wallach
2. A Visual Dictionary of Architecture - Francis D.K. Ching.
3. Building Construction Illustrated (3rd Edition) - Francis D.K. Ching.
4. Design Riti O Sthapatya Dhara - Abu H. Imam Uddin
5. Architecture Form, Space & Order - Francis D.K. Ching.

66122 **CREATIVITY & CONCEPT DEVELOPMENT** **T P C**
2 3 3

AIMS:

- Able to understand creativity & concept development in architecture.
- Understand the Anthropometric data in different situation.
- Develop composition by different elements of Architecture.

SHORT DESCRIPTION :
Creativity in Architecture, Concept in Architecture, Anthropometric data, Balance & Composition.

THEORY :

1. Creativity in Architecture
1.1 Define Creativity.
1.2 Describe two stages of creation.
1.3 Describe three points of working definition of creativity.
1.4 State creative thinking theories.
1.5 State creative process theories.
1.6 Mention different creative process.
1.7 Explain the climate for creativity.
1.8 Describe the effective management for creativity.
1.9 Mention the guidelines to encourage creativity.

2. Techniques for Creative Thinking & Understanding Creativity.
2.1 Define brainstorming & cataloging.
2.2 Describe checklists & attribute list.
2.3 Describe free association & forced relationship.
2.4 State Morphological analysis & Input-output technique.
2.5 Explain model for problem solving.
2.6 State creativity organization.

3. Architectural Concepts
3.1 Define architectural concept.
3.2 Mention the stages of design process.
3.3 State design philosophy.
3.4 Explain design problems.
3.5 State the process to establish concept by understanding the problem.
3.6 State the stages of design.
3.7 Explain design solution.

4. Anthropometry.
4.1 State the meaning of anthropometric data.
4.2 Mention anthropometric data for the children.
4.3 Mention anthropometric data for the Adults.
4.4 Mention the comparative dimension of different portion of a human body (male and female).
4.4 State the comparative dimension of different working position of a human body (male and female).

5. Composition in Architecture.
5.1 Describe composition.
5.2 State necessity of composition.
5.3 Explain necessity of composition in Architectural design.
5.4 State 2- dimensional and 3- dimensional compositions.
5.5 Explain the role of color in composition.
5.6 State role of texture in composition.

6. Balance in Architecture.

6.1 Describe balance.
6.2 State classification of balance.
6.3 Describe about symmetrical, asymmetrical and circular balance.
6.4 Explain the role of balance in Architectural design.

PRACTICAL:

1. Form Transformation.

1.1 Make form transformation of block.
1.2 Make form transformation of cylinder.
1.3 Make transformation of prism.
1.4 Make form transformation of pyramid.

2. Origami.

2.1 Make an origami by paper.
2.2 Make origami by board/Transparent sheet.
2.3 Make origami by stick.
2.4 Make an origami by composite materials.

3. Metamorphosis.

3.1 Study metamorphosis of Bird.
3.2 Study metamorphosis of Ant.
3.3 Study metamorphosis of Bee.
3.4 Study metamorphosis of Butterfly.
3.5 Make metamorphosis by Block/Cylinder/Prism etc.

4. Prepare a set of the Anthropometric data.

4.1 Draw different standing dimension of an adult male.
4.2 Draw different standing dimension of an adult female.
4.3 Draw the various positions with dimension for the child.

5. Prepare a set of the Anthropometrics data. (Different working position.)

5.1 Draw different dimension of working positions of the Adult male.
5.2 Draw different dimension of working positions of the Adult female.
5.3 Calculate the comparative dimension of different portion of a human body (male and female) in the context of Bangladesh.
5.5 Calculate the comparative dimension of different working position of a human body (male and female) in the context of Bangladesh.

6. Draw Techniques of composition.

6.1 Make composition of different objects with color.
6.2 Make composition with dots and circle.
6.3 Make composition with 2-dimensional surface and geometric forms.
6.4 Make composition with 2-dimensional geometric elements.
6.5 Make composition with 3-dimensional geometric elements.

Reference Books:

1. Design in Architecture - Geoffrey Broadbent.
2. Conceptual Blockbusting - J. L. Adams.
3. Top International Architects design concepts in Architecture.
4. Generating concepts and design ideas.
5. The Architecture concept.

66611	COMPUTER APPLICATION	T	P	C
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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 P*rinter* 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 though 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

65711	BANGLA	T	P	C
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উদ্দেশ্য :
১. মাতৃভাষা হিসেবে বাংলা ভাষার প্রকৃতি ও বৈশিষ্ট্য সম্পর্কে ধারণা লাভ। ভাষার ব্যবহারে প্রায়োগিক যোগ্যতা অর্জন।
২.বাংলা সাহিত্য পঠন-পাঠনের মাধ্যমে জাতীয় চেতনা, দেশপ্রেম, মুক্তিযুদ্ধের চেতনা, শুদ্ধাচার, নীতি ও মূল্যবোধের উন্মেষ ঘটানো।

সংক্ষিপ্ত বিবরণী :
মাতৃভাষা ও সৃজনশীলতা : বাংলা ভাষা রীতির বিচিত্রতা, বানান রীতি, পত্র রচনা এবং কবিতা, প্রবন্ধ, নাটক, উপন্যাস ও ছোট গল্প ।
বিশদ বিবরণী:

১.বাংলা ভাষার প্রয়োগ:
ক)বাংলা ভাষা :
ভাষার সংজ্ঞা, বাংলা ভাষা রীতি - সাধু, চলিত, আঞ্চলিক বা উপভাষা (সংজ্ঞা, বৈশিষ্ট্য, পার্থক্য ও উদাহরণ)
খ) বাংলা বানান রীতি ও শব্দ প্রয়োগ:
১.বাংলা একডেমির প্রমিত বানান রীতি, ণ-ত্ব ও ষ-ত্ব বিধি

২. শব্দ ও শব্দের শ্রেণি বিভাগ (সংজ্ঞা, শব্দের গঠন, উৎস বা উৎপত্তি ও অর্থগত)
৩.বাক্য প্রকরণ ও গঠন রীতি (সংজ্ঞা, বাক্য গঠন এবং প্রকার)
গ) পত্র রচনা :
আবেদন পত্র (চাকুরি, ছুটি), চাকুরিতে যোগদান পত্র, মানপত্র, স্মারকলিপি, সংবাদপত্রে প্রকাশের জন্য পত্র

২. বাংলা সাহিত্য:

ক. কবিতা :
১.বঙ্গভাষা –মাইকেল মধুসূদন দত্ত
২. সোনার তরী – রবীন্দ্র নাথ ঠাকুর
৩. উমর ফারুক –কাজী নজরুল ইসলাম
৪. বাংলার মুখ আমি– জীবনানন্দ দাশ
৫. আসাদের শার্ট – শামসুর রাহমান
৬. স্বাধীনতা শব্দটি কি করে আমাদের হলো? – নির্মলেন্দু গুণ

খ. প্রবন্ধ :
১. অর্ধাঙ্গী –রোকেয়া সাখাওয়াত হোসেন
২.বইকেনা – সৈয়দ মুজতবা আলী

গ. একাঙ্কিকা (নাটিকা): মানুষ –মুনীর চৌধুরী

ঘ. উপন্যাস: লালসালু – সৈয়দ ওয়ালী উল্লাহ

ঙ.ছোট গল্প:
১. হৈমন্তী – রবীন্দ্র নাথ ঠাকুর
২. একুশের গল্প – জহির রায়হান
৩. পাতালেহাসপাতালে – হাসান আজিজুল হক

ব্যবহারিক

১.নির্ধারিত বক্তৃতা :
বাংলাদেশ ও বাঙালি সংস্কৃতি, বিভিন্ন জাতীয় দিবস (একুশে ফেব্রুয়ারি ও আন্তর্জাতিক মাতৃভাষা দিবস, স্বাধীনতা দিবস, বিজয় দিবস,জাতীয় শোক দিবস, মুজিব নগর দিবস, মহান মে দিবস)
প্রাতিষ্ঠানিক বক্তৃতা- নবাগত শিক্ষক/ছাত্রছাত্রীদের বরণ, গুরুত্বপূর্ণ ব্যক্তিবর্গের আগমন উপলক্ষে বক্তৃতা।

২. উপস্থিত বক্তৃতা :
বিষয়বস্তু উন্মুক্ত

৩.আবৃত্তি :

১. মানুষ - কাজী নজরুল ইসলাম
২. আকাশ নীলা - জীবনানন্দ দাশ
৩. পল্লী জননী -জসীম উদ্‌দীন
৪. ছাড়পত্র - সুকান্ত ভট্টাচার্য
৫. তোমাকে পাওয়ার জন্য হে স্বাধীনতা - শামসুর রাহমান
৬. নিষিদ্ধ সম্পাদকীয় – হেলাল হাফিজ

৪. বিতর্ক (নমুনা)

সংস্কৃতিই আধুনিক মানুষের ধর্ম
তথ্য প্রযুক্তির অবাধ ব্যবহারই যুব সমাজেরঅবক্ষয়ের মূল কারণ
গতানুগতিক শিক্ষা নয় কর্মমুখি শিক্ষাই অর্থনৈতিক মুক্তির চাবিকাঠি
চালকের অসাবধনতাই সড়ক দুর্ঘটনার প্রধান কারণ
মুক্তিযুদ্ধের চেতনাই অসাম্প্রদায়িক বাংলাদেশ প্রতিষ্ঠার মূলমন্ত্র
প্রযুক্তির বিকাশই প্রকৃতি বিনাশের একমাত্র কারণ

৫. প্রতিবেদন প্রণয়ন ও উপস্থাপন:

স্থানীয় বিভিন্ন সমস্যা ও অনুসন্ধানী যে কোন বিষয়।

65712 **ENGLISH** **T P C**
2 0 2

Objectives:

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

- Reading, Listening With Understanding
- The Fluency Of Speech
- Grammatical Accuracy With Emphasis On Spelling & Punctuation
- Creative Writing

Seen Comprehension: (Marks-20)

Unit	Lesson	Title
People Or Institutions Making History (Unit One)	1	Nelson Mandela ,From Apartheid Fighter To President
	2	The Unforgettable History
Food Adulteration(Unit Three)	1	Food Adulteration Reaches Height
	2	Eating Habit And Hazards
Human Relationship(Unit Four)	2	Love And Friendship
Environment And Nature (Unit Eight)	1	Water ,Water Everywhere
	5	Kuakata: Daughter Of The Sea
Greatest Scientific Achievement (Unit Thirteen)	1	Some Of The Greatest Scientific Achievements Of The Last 50 Years
	2	Science And Technology Against An Age- Old Disease
Art And Music (Unit Fourteen)	1	What Is Beauty?
	3	Crafts In Our Time
Tours And Travels (Unit Fifteen)	1	Travelling To A Village In Bangladesh
	4	The Wonders of Vilayet

N.B: The Unit Mentioned Refers To The Text Book (1st Paper) English For Today For Class 11- 12 By National Curriculum & Text Book Board, Dhaka.

Grammar (Marks-20)

1. **(A) Uses of Articles.**
   (B) Uses of Tense *(Right Forms Of Verbs with Indicators)
   (C) Classify Verbs: (Regular and Irregular Verbs, Auxiliary, Principal, Finite, Non-Finite Verbs,)

2. **Sentence:**
   (A) Changing Sentences: (Assertive, Interrogative, Optative, Imperative, Exclamatory Simple, Complex and Compound), Comparison of Adjectives/Adverbs

   (B) Question Making: WH, Yes/No, Tag Question

3. Enrich Vocabulary: Synonyms, Antonyms; Suffix And Prefix.

4. Voice, Narration

5. Sentence Analysis:

Study of Part of Speech, (Type Of Verbs-Regular and Irregular Verbs, Auxiliary and Principal Verb)
Study of Phrases and Clauses (Noun/ Adjective/ Verb/ Participle /Adverbial/ Prepositional Phrases and Principal /Sub Ordinate /Co Ordinate Clauses)

Free Writing (Marks -20)

1. Write Dialogues: (With Teacher, Principal, Shopkeeper, Hotel Manager, Station Master, Newcomer, Buyers, Doctor, Friend, Colleagues Etc).
2. Report Writing On Different Events/ Occasions/ Accidents.
3. Writing Situational Personal and Official Letters.
4. Writing Job Application with CV /Appointment Letter / Joining Letter
5. Write A Guided Paragraph With Questions.

65921 **MATHEMATICS -2** **T P C**
3 3 4

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, adjoin 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 adjoin 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 $e^x = 1 + \frac{x}{\lfloor 1} + \frac{x^2}{\lfloor 2} + \frac{x^3}{\lfloor 3} + \frac{x^4}{\lfloor 4}$ ..... to ∞
3.4 Solve problems of the followings types :
i) $1 + \frac{1}{\lfloor 2} + \frac{1}{\lfloor 4} + \frac{1}{\lfloor 6}$ + ... to ∞
ii) $\frac{1}{\lfloor 2} + \frac{1+2}{\lfloor 3} + \frac{1+2+3}{\lfloor 4} + \frac{1+2+3+4}{\lfloor 5}$ + ... to ∞

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

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

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

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

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

4.5 Solve problems of the following types.

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

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

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

5 Apply the principle of properties of triangles.

5.1 Prove the followings identities :

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

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

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

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

5.2 Establish the followings.

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

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

c) $\Delta = \dfrac{abc}{4R}$

5.3 Solve the problems of the following types:

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

ii) An object experiences two forces F_1 and F_2 of magnitude 9 and 13 Newtons with an angle 100^0 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 $\lim_{x \to a}$ f(x) and f(a).

7.3 Establish (i) $\lim_{x \to 0} \dfrac{\sin x}{x} = 1$

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

Understand differential co-efficient and differentiation.

7.4 Define differential co-efficient in the form of

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

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

8 Apply the concept of differentiation.

8.1 State the formulae for differentiation:

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

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

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

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

9.1 Interpret $\frac{dy}{dx}$ geometrically.

9.2 Explain $\frac{dy}{dx}$ under different conditions

9.3 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 ?

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

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

11 Understand partial differentiation.

11.1 Define partial derivatives.
11.2 State formula for total differential.
11.3 State formulae for partial differentiation of implicit function and homogenous function.
11.4 State Euler's theorem on homogeneous function.
11.5 Solve the problems of partial derivatives.

INTEGRAL CALCULUS

12 Apply fundamental indefinite integrals in solving problems.

12.1 Explain the concept of integration and constant of integration.
12.2 State fundamental and standard integrals.
12.3 Write down formulae for:
(i) Integration of algebraic sum.
(ii) Integration of the product of a constant and a function.
12.4 Integrate by method of substitution, integrate by parts and by partial fractions.
12.5 Solve problems of indefinite integration.

13 Apply the concept of definite integrals.

13.1 Explain definite integration.

13.2 Interpret geometrically the meaning of $\int_a^b f(x)\,dx$

13.3 Solve problems of the following types:

(i) $\int_0^{\pi/2} \cos^2 x\,dx$. (ii) $\int_0^1 \frac{(\sin^{-1}x)^2}{\sqrt{-x^2}}dx$

P* =Practical continuous assessment

Reference

SL No	Athour	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 Shantinarayan	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

65912	PHYSICS-1	T	P	C
		3	3	4

OBJECTIVES

- To develop the students a background of basic science i.e. Physics required for understanding technological subjects.
- To develop a working knowledge of common engineering and industrial materials and to enable to determine through experiments the properties of such materials.
- To develop through experiments an understanding of fundamental scientific concept.
- To develop a basic knowledge and concept of physical properties of common engineering and industrial materials.

SHORT DESCRIPTION

Measurement, Units; Vector and Scalar quantities; Motion and Equations of motion; Force and Newton's Laws of motion; Gravity and Gravitation; Simple Harmonic motion; Hydrostatics; Surface tension and viscosity; Pressure, Sound; wave and sound Concepts and nature of sound, Velocity of sound, Ultrasonic.

DETAIL DESCRIPTION

THEORY :

1. PHYSICAL WORLD AND MEASUREMENT

1.1. Nature of Physical World.
1.2. Scope and Excitement of Physics.
1.3. Few Terms about Physics.
1.4. Physics and other world of Technological Knowledge.
1.5. Principle of Measurement.
1.6. Fundamental and Derived Quantities and Units.
1.7. Dimensions of Units.
1.8. Errors in Measurement.

2. SCALAR AND VECTOR QUANTITIES

2.1 Define vector and scalar quantities with examples.
2.2 Show the various representations of the vector quantities; and representation of a vector by unit vector.
2.3 Find and explain the resultant of two vectors in different directions.
2.4 Resolve a vector into horizontal & vertical component.
2.5 Explain the dot and cross product of two vectors.
2.6 Define laws of triangle of vector.

3. MOTION AND EQUATIONS OF MOTION

3.1 Define rest and motion
3.2 Classify and explain of motion.
3.3 Define and explain displacement, speed, velocity, acceleration and retardation.
3.4 Deduce the relationship between displacement, velocity, acceleration and retardation from these definitions.
3.5 Motion of a Projectile.
3.6 Equation of motion of a freely moving body thrown obliquely vertically upward or motion of a projectile.
3.7 Define angular velocity and linear velocity with their units.
3.8 Deduce the relation between angular velocity and linear velocity.
3.9 Define centripetal and centrifugal force with examples.

3.10 Prove that centrifugal force = $\frac{mv^2}{r}$

3.11 State and explain the laws of falling bodies and mention the equation of motion of a body when it is projected vertically upwards or downwards.

4. NEWTON'S LAWS OF MOTION FORCE AND FRICTION

4.1 Define force.
4.2 State Newton's laws of motion.
4.3 Define different units of force and their correlation and also mention the dimension of force.
4.4 Prove P=mf, from Newton's 2nd law of motion.
4.5 Find out the resultant of parallel forces.
4.6 Define inertia and momentum
4.7 State and prove the principles of conservation of momentum.
4.8 Define friction and describe the different kinds of friction.
4.9 Define the co-efficient of static friction.
4.10 Show that the co-efficient of static friction is equal to the tangent of angle of repose
4.11 State the merits and demerits of friction.

5. GRAVITY AND GRAVITATION

5.1 Define and explain the Kepler's Law.
5.2 Define gravity and gravitation.
5.3 Define and determine the gravitational constant (G) and also mention its units and dimension.
5.4 Define acceleration due to gravity 'g' and also mention its units and dimension.
5.5 Discuss the variation of 'g' at different places.
5.6 Define mass and weight with their units and dimension.
5.7 Distinguish between mass and weight.
5.8 Define and explain gravitational potential and escape velocity

6. SIMPLE HARMONIC MOTION (SHM)

6.1 Define Periodic and simple harmonic motion (SHM).
6.2 State the characteristics of SHM.
6.3 Describe a simple pendulum and a second pendulum.
6.4 Define effective length, amplitude, phase, complete oscillation, period of oscillation, frequency.
6.5 State and explain the laws of simple pendulum.
6.6 Motion of simple pendulum and it's time period.

7. WORK, POWER AND ENERGY

7.1 Define work, power and energy.
7.2 State the units and dimensions of work, power and energy.
7.3 State and prove the principle of the conservation of energy.
7.4 Define potential energy (PE) and kinetic energy (KE).
7.5 Derive the equation of potential and kinetic energy.
7.6 Recognize that the useful work can be found from:

$$\text{Efficiency} = \frac{\text{output work}}{\text{input work}} \times 100.$$

8. ELASTICITY

8.1 Name some of the general and special properties of matter.
8.2 Define Elasticity and Elastic limit.
8.3 Define perfectly elastic body and perfectly rigid body.
8.4 Define stress and strain with their units and dimensions.
8.5 State and explain the Hook's law.
8.6 Describe various kinds of modulus of elasticity.
8.7 Mention the units and dimensions of modulus of elasticity.
8.8 Define and explain Poisson's ratio.

9. HYDROSTATICS

9.1 Define pressure as force per unit area and state that it is measured in N/m^2 or Pascal.
9.2 State characteristics of liquid pressure.
9.3 Establish the pressure at a point in a fluid depend upon the density of the fluid, the depth in the fluid and acceleration due to gravity.
9.4 Surface tension and surface energy, Angle of contact.
9.5 Capillarity and theory of capillarity.
9.6 Viscosity and co-efficient of viscosity.
9.8 Necessity of viscosity.

10. WAVE AND SOUND

10.1 Wave and wave motion.
10.2 Transverse wave and longitudinal wave.
10.3 Some definitions relating waves.
10.4 Progressive wave and stationary waves.
10.5 Equation of progressive wave.
10.6 Sound and production of sound.
10.7 Sound is a longitudinal traveling wave.
10.8 Interference of sound: Constructive and Destructive interference.
10.9 Define beats and Mechanism of formation of beats.

11. SOUND AND VELOCITY OF SOUND

11.1 Identify that sound is produced by vibration and travels through a medium as a longitudinal wave.
11.2 Recognize that sound can be produced of different pitches (frequencies) & that the human ear has an audible frequency range covering approximately 20 Hz to 20 KHz.
11.3 State the approximate frequency range for
a. infrasonic sound, b. Ultrasonic (supersonic) sound.
11.4 Explain how sound is absorbed, reflected & refracted by different types of surface.
11.5 Describe the practical uses of echo sounding devices.
11.6 Define velocity of sound.
11.7 State the velocity of sound at NTP in still air.
11.8 Compare the effects of pressure, temperature & humidity on the velocity of sound in air.

PRACTICAL

1. Determine accurate diameter/side of an object using vernier calipers.
2. Measure the area of cross section of a wire by micrometer screw gage.
3. Measure the thickness of a glass plate by speedometer.
4. Verify the law of parallelogram of forces by a force board.
5. Draw L-T^2 graph and determine the value of "g" by using a simple pendulum.
6. Determine the coefficient of static friction.
7. Determine Young's modulus of a steel wire by Searle's apparatus.
8. Determine gravity of a solid heavier than and insoluble in water by hydrostatic balance.
9. Determine specific gravity of a liquid by specific gravity bottle.
10. Determine velocity of sound by resonance air column method.

REFERENCE BOOKS:

1. Higher Secondary Physics - First Part - by Dr. Shahjahan Tapan
2. A Text Book of Properties of of matter -By N Subrahmanyam and Brij Lal
3. A Text Book of Sound -By N Subrahmanyam and Brij Lal
4. Higher Secondary Physics- First Part -by Prof. Golam Hossain Pramanik
5. Higher Secondary Physics- First Part -by Ishak Nurfungnabi