BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207.

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

COMPUTER TECHNOLOGY
TECHNOLOGY CODE: **666**

2nd SEMESTER

COMPUTER TECHNOLOGY (666)

2nd 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	66621	Database Application	0	6	2	-	-	50	50	100
2	66622	IT support System-I	0	6	2	-	-	50	50	100
3	66623	Graphics Design-I	0	6	2	-	-	50	50	100
4	66823	Analog Electronics	3	3	4	60	90	25	25	200
5	65921	Mathematics-2	3	3	4	60	90	50	-	200
6	65922	Physics-2	3	3	4	60	90	25	25	200
7	65722	Communicative English	1	3	2	20	30	50	00	100
		Total	**10**	**30**	**20**	**200**	**300**	**300**	**200**	**1000**

66621	**DATABASE APPLICATION**	**T**	**P**	**C**
		0	**6**	**2**

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 is 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 is 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 is 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 is 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 is 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

Reference:
It is recommended to follow the Competency standard of Computer Operation NTVQF Level 2.
http://www.btebcbt.gov.bd/utility/searchUser?sector=8&occupation=76&level=&btnSearch=Search

66622	IT Support System-1	**T**	**P**	**C**
		0	**6**	**2**

OBJECTIVES

SHORT DESCRIPTION

DETAIL DESCRIPTION

1.   Assemble a PC

    1.1   Prepare specification of the parts and components of a PC

       1.1.1   Parts and components are listed

       1.1.2   Specification are prepared and written

       1.1.3   Costing of the PC parts and accessories are estimated

    1.2   Prepare hardware for assemble

       1.2.1   Hardware, parts and components are collected as per specification and documented Or Required PC components are collected from store according to the manual or user guide or clients requirement

       1.2.2   PC equipment is Isolated from electrical source before assembling

       1.2.3   Electrostatic discharge precautions are observed

       1.2.4   Safe work practice observed and personal protective equipment (PPE) worn as required

       1.2.5   Tools and equipment are selected and collected as required

       1.2.6   Modification of check list is observed

    1.3   Install PSU and Assemble motherboard components into the casing

       1.3.1   PC power supply unit (PSU) is installed in casing

       1.3.2   Processor, processor heat sink and cooling fan are installed to the motherboard

       1.3.3   RAM module are installed into the motherboard

       1.3.4   Motherboard is set to the casing

       1.3.5   Other peripherals are installed

       1.3.6   Wi-Fi adapter is installed

       1.3.7   AGP, NIC and Sound card is installed as required

    1.4   Install storage devices and electrical connection to the PC

       1.4.1   Hard disk, optical drive (CD/DVD R/W drive) are installed

       1.4.2   Power and data cables are properly connected

       1.4.3   Front panel power switch, front or back panel USB port, status LED's etc. are properly connected

       1.4.4   Motherboard is connected with power supply

    1.5   Assemble the system unit

       1.5.1   All connections are checked

       1.5.2   Screwing is observed

       1.5.3   Installation is completed by setting and screwing the cover

    1.6   Connect Input and output units

       1.6.1   Ensure power switch is switched off

       1.6.2   PC system unit is connected to the electrical power line

       1.6.3   Display unit (monitor) is connected to the electrical power line

    1.7   Modify the BIOS setting

       1.7.1   Power switch is switched On

       1.7.2   Entered to the BIOS setting

       1.7.3   Date and Time is adjusted

       1.7.4   Correct processor and memory clock frequency is chosen

       1.7.5   Hard disk and CD/DVD interface is selected correctly

       1.7.6   Boot device sequence is modified as required

       1.7.7   Change and modification are saved

       1.7.8   Exit from the BIOS setting

1.8 Install operating system and required device driver

    1.8.1   Operating system container is connected or entered to the drive of the PC

    1.8.2   Installation is started

    1.8.3   Hard disk partition is done correctly

    1.8.4   Operating system is configured and installed

    1.8.5   Required device driver is installed

    1.8.6   System information is observed and cross checked with the requirements check list

1.9 Shut-down and clean work place

    1.9.1   Operating system is shut down properly

    1.9.2   Computer is switched off

    1.9.3   Tools and equipment is cleaned and stored as per workplace standard

    1.9.4   Waste materials are dispose as per workplace practice.

2. Install and configure custom software in a personal computer

2.1 Follow Electrical and Electronic safety in work

    2.1.1   PC equipment is isolated from electrical source when assembling

    2.1.2   Electrostatic discharge precautions are observed

    2.1.3   Safe work practice observed and personal protective equipment (PPE) worn as required for the work performed.

2.2 Determine client requirements

    2.2.1   User requirements for software and hardware are documented.

    2.2.2   Analyze user requirements and list of PC components and their costs are determined

    2.2.3   Components and budget are verified with the Client

    2.2.4   Approval of components and required budget from the client is confirmed

    2.2.5   PC hardware and software components are collected and stored according to user manual or guidelines

2.3 Install hardware components

    2.3.1   Ensure that computer power is switched off

    2.3.2   Software container is inserted in appropriate to PC or drives

    2.3.3   I/O slot or Hardware components are connected to the appropriate port(s)

    2.3.4   PC and peripherals are connected with the AC power line if external power is required.

    2.3.5   System automatically detected the hardware and device driver is installed

    2.3.6   Vendor's given or from internet device driver is installed and configured

    2.3.7   Correct functioning of hardware component is confirmed

2.4 Install software components

    2.4.1   Identify if older version of the software component is existing

    2.4.2   If older version is already installed, software component is upgraded

    2.4.3   Fresh installation of the software component is done

    2.4.4   Documented the changes or modification of the system

    2.4.5   Installed/updated software component is checked to work correctly

2.5 Determine user satisfaction and documentation

    2.5.1   User requirements for software and hardware are verified

    2.5.2   User satisfaction is recorded

    2.5.3   Confirmation of completion of work is documented.

3. Use peripherals(Printer, Scanner and Projector) with PC/ Laptop

3.1 Install Printer with PC

    3.1.1   Safety measures are identified and taken

    3.1.2   Printer is selected and placed in appropriate places

    3.1.3   External connectors, setting and controls are identified and interpreted using user manual

    3.1.4   Necessary connection of the cables are confirmed

    3.1.5   Driver software are installed or printer is added

    3.1.6   Installed printer is found or checked.

3.2   Print documents using the installed printer

    3.2.1   Document is Opened

    3.2.2   Appropriate printer is selected

    3.2.3   Necessary configuration and settings are performed

    3.2.4   Document is printed

    3.2.5   Buffer is cleared for any irregularities

    3.2.6   Power switch is turn safely

3.3   Replace the tonner of the printer

    3.3.1   Appropriate tonner is selected

    3.3.2   Cartage/Tonner/ Ribbon is prepared using user manual for installation to the printer

    3.3.3   Old Cartage/Tonner/Ribbon is removed

    3.3.4   New cartage/tonner /ink ribbon is Installed

    3.3.5   Test print is performed to check the print /print quality

3.4   Install Scanner into the PC

    3.4.1   Safety measures are identified and taken

    3.4.2   Scanner is selected and placed in appropriate places

    3.4.3   External connectors, setting and controls are identified and interpreted using user manual

    3.4.4   Necessary connection of the cables are confirmed

    3.4.5   Driver software are installed or scanner is added to

    3.4.6   Installed scanner is found or checked.

3.5   Scan picture/ documents using the installed scanner

    3.5.1   Document / picture / drawing object is collected and selected

    3.5.2   Document/picture is placed in scanner plate properly

    3.5.3   Appropriate scanner is selected

    3.5.4   Necessary configuration and settings are performed

    3.5.5   Necessary file type is selected

    3.5.6   Document / picture / drawing is scanned

    3.5.7   Scanned document is saved in proper drive/ folders

    3.5.8   Maintain proper action for any irregularities

    3.5.9   Power switch is turn off safely

3.6   Install Multimedia Projector with PC/ Laptop

    3.6.1   Safety measures are identified and taken

    3.6.2   MMP is selected and external connectors, setting and controls are identified and interpreted using user manual

    3.6.3   MMP is placed in appropriate places for proper projection

    3.6.4   Necessary connection of the cables are confirmed

    3.6.5   Turn on the projector and pc properly

    3.6.6   Installed MMP is found or checked.

    3.6.7   Necessary configuration and settings are performed

    3.6.8   Ensure the connection for laptop

    3.6.9   Use fn and appropriate function key if necessary for laptop connection

3.7   Use and maintain the projector

    3.7.1   Document / picture / drawing object is opened

    3.7.2   MMP controls and setting are adjusted

    3.7.3   Projector screen is set.

    3.7.4   Focus control is adjusted

    3.7.5   Use projector

    3.7.6   Turn off projection after a definite time to save life time of bulb.

    3.7.7   Maintain proper action for any irregularities

    3.7.8   Power switch is turn off safely.

4. **Connect a PC to an existing network**

   4.1 **Follow workplace health and safety – OSH**

       4.1.1   Electrical isolation is maintained at the time of installation of the network equipment

       4.1.2   Electrical hazard is avoided at all times

       4.1.3   Safe work practice observed and personal protective equipment (PPE) worn as required for the work performed

   4.2 **Collect existing network specification**

       4.2.1   The person in the organization responsible for existing network is interviewed.

       4.2.2   Existing network topology and network protocol is reviewed and documented

       4.2.3   Existing network topology and IP is reviewed and documented

       4.2.4   Network address plan is documented

   4.3 **Determine client network hardware and software components are required**

       4.3.1   Hardware and software components are determined

       4.3.2   Cost of components is determined

       4.3.3   Approval of components and confirmation of required budget is obtained from the client

   4.4 **Connect PC to the existing network**

       4.4.1   Network hardware and hardware driver software (if not automatically installed) is installed

       4.4.2   Existing network transmission media is determined. e.g.; wireless, wired

       4.4.3   Appropriate transmission media is connected with the existing network Infrastructure

   4.5 **Assign client machine address**

       4.5.1   Address is assigned to client machine (automatically or statically. e.g.; assign IP address, sub net mask statically in the case of TCP/IP protocol)

       4.5.2   Conflict of network interface card is assessed

       4.5.3   Domain name assigned if required.

       4.5.4   Host name assigned if required.

       4.5.5   Network interface card (NIC) is disabled and enabled

   4.6 **Test network connectivity**

       4.6.1   Test is done using simple network connectivity tools like ping, local loop-back and remote loop-back

       4.6.2   If loop-back test fails, network interface card, connecting wire (continuity) is tested.

   Reference:

   It is recommended to follow the Competency standard of IT Support Technician, NTVQF Level 1.
   http://www.btebcbt.gov.bd/utility/searchUser?sector=8&occupation=22&level=&btnSearch=Search

66623	GRAPHICS DESIGN-1	T	P	C
		0	6	2

Separate and compose Images

1.1. Follow OSH practices

    1.1.1.   Safe work practices are observed according to workplace procedures

    1.1.2.   OSH hazards and incidents are reported to appropriate personnel.

1.2. Identify image source

    1.2.1.   Appropriate Image separation software is identified.

    1.2.2.   Image sources are identified

    1.2.3.   Image separation tools are identified.

    1.2.4.   Images are successfully Imported from appropriate source

1.3. Identify image standards

    1.3.1.   Image properties are identified

    1.3.2.   Image resolution are identified and demonstrated.

    1.3.3.   Image format are identified and selected.

1.4. Separate Images using magic wand tools

    1.4.1.   Magic wand tool is selected

    1.4.2.   Image is selected

    1.4.3.   Image is separated

1.5. Separate Images using lasso tools

    1.5.1.   Lasso tool is selected

    1.5.2.   Image is selected

    1.5.3.   Image is separated

1.6. Separate Images using pen tools

    1.6.1.   Pen tool is selected

    1.6.2.   Image is selected

    1.6.3.   Image is separated

1.7. Create layer and compose

    1.7.1.   New document is created

    1.7.2.   Images are pasted for edit

    1.7.3.   Layers are created and selected.

    1.7.4.   Images are edited and arranged.

1.8. Evaluate own work

    1.8.1. Constructive criticism from others is applied to improve own work.

    1.8.2. Own work is evaluated against planned Strategy for own practice.

    1.8.3. Work processes and practice are adjusted as necessary to improve technical, conceptual and commercial outcomes.

Create basic designs using illustration software

3.8. Follow OSH practices

    3.8.1. Safe work practices are observed according to workplace procedures

    3.8.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.

    3.9.   Create basic designs

    3.9.1. Required designs are specified.

    3.9.2. Appropriate shape and size are identified

    3.9.3. Content area is defined

    3.9.4. Contents are inserted and composed

    3.9.5. Shapes are modified as per requirements.

    3.9.6. Typographical design is applied as per requirements.

    3.9.7. Font attributes are applied per requirements.

    3.9.8. Design and colour are applied per requirements.

3.9.9. Design is saved in appropriate file format

3.10.   Create Outline and transfer.

3.10.1.   Design is reviewed and finalized

3.10.2.   Outline is created and grouped

3.10.3.   Final design is saved in appropriate file format

3.10.4.   Final design is transferred to the recipients

3.11.   Develop conceptual skills and ideas

3.11.1.   Working with others to develop basic design ideas is demonstrated.

3.11.2.   Ability to gain experience in a range of genres and interpretation of basic design guidelines is demonstrated.

3.11.3.   Ability to gain experience in a range of genres and interpretation of basic design guidelines is demonstrated.

3.11.4.   A range of opportunities to develop own practice and keep informed about current design practice are identified and used for basic design guidelines.

3.12. Evaluate own work

3.12.1.   Constructive criticism from others is applied to improve own work.

3.12.2.   Own work is evaluated against planned strategy for own practice.

3.12.3.   Work processes and practice are adjusted as necessary to improve technical, conceptual and commercial outcomes.

Manipulate image using image processing Software

3.1. Follow OSH practices

3.1.1.   Safe work practices are observed according to workplace procedures

3.1.2.   OSH hazards and incidents are reported to appropriate personnel according to workplace procedures

3.2. Retouch Image

3.2.1.   Appropriate retouch tools are identified

3.2.2.   Tools are calibrated as required

3.2.3.   Layers are created and preserved

3.2.4.   Different retouch tools are used as per requirement

3.2.5.   Images are corrected and saved in appropriate file format

3.3. Colour Correction

3.3.1.   Different colour correction methods are identified

3.3.2.   Appropriate image mode is selected

3.3.3.   Various colour correction methods are used

3.3.4.   Compare image enhancement with the original one

3.3.5.   Save in appropriate file format

3.3.6.   Transfer the image to recipient

3.4. Apply Effect

3.4.1.   Identify appropriate effect options

3.4.2.   Proper image mode is selected

3.4.3.   Different Effects are applied to images as per requirements

3.4.4.   Compare and adjust effects

3.4.5.   Save in appropriate file format

3.4.6.   Transfer the image to recipient

3.5. Evaluate own work

3.5.1.   Constructive criticism from others is applied to improve own work

3.5.2.   Own work is evaluated against planned strategy for own practice

3.5.3.   Work processes and practice are adjusted as necessary to improve technical, conceptual and commercial outcomes.

Create professional designs using Illustration software.

3.13. Follow OSH practices

    3.13.1.   Safe work practices are observed according to workplace procedures

    3.13.2.   OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.

3.14. Prepare design

    3.14.1.   Required Professional Design works are selected.

    3.14.2.   Appropriate Tools, Palette and arrange them as needed are identified.

    3.14.3.   Ruler/unit/Grids/Guides/Smart Guides as per requirement are set

    3.14.4.   Key Drawing / Design Layout are prepared

    3.14.5.   Various Marks.

    3.14.6.   Layer lock is applied

3.15. Create Design

    3.15.1.   Insert Contents are inserted.

    3.15.2.   Colour/Design/Pattern is applied.

    3.15.3.   Pathfinder to create complex Objects are used

    3.15.4.   Font Attributes as per requirement Applied

    3.15.5.   Zoom In-Out and Panning are used

    3.15.6.   Design for further use is saved

3.16. Review and Finalize

    3.16.1.   Artwork and Preview is used

    3.16.2.   Layer Hide-Unhide option is used

    3.16.3.   Outline and Group Created

    3.16.4.   Appropriate File Format Saved

    3.16.5.   The image to recipient Transferred

Reference:

It is recommended to follow the Competency standard of Graphics Design, NTVQF Level 1
http://www.btebcbt.gov.bd/utility/searchUser?sector=8&occupation=23&level=&btnSearch=Search

66823   **ANALOG ELECTRONICS**   **T P C**
                                                                 3 3 4

OBJECTIVES
- To provide understanding soldering technique and color code.
- To provide understanding and skill on the basic concept of semiconductor and to identify physically a range of semiconductor diodes.
- To develop comprehensive knowledge and skill on special diodes and devices.
- To develop the abilities to construct different rectifier circuits.
- To provide understanding of the basic concept and principle of transistor and to identify physically a range of transistor.
- To provide understanding and skill on the basic concept of ICs.
- To provide the understanding skill on Op-Amp.

SHORT DESCRIPTION
Color code and soldering; Semiconductor; P-N junction diode; Special diodes and devices; Power supply; Transistor; Transistor amplifier; Oscillator, Multi-vibrator; IC; Op-Amp.

DETAIL DESCRIPTION

Theory:
1   **Soldering and Color Code**
     1.1   Define soldering.
     1.2   List the materials needed in soldering.
     1.3   Mention the properties of a good soldered joint.
     1.4   Multi layered Printed circuit board.
     1.5   Mention the function of resistor, capacitor and inductor in electronic circuits.
     1.6   Describe the procedure of determining the value of Capacitor, & Resistor using numeric and color code.

2   **Semiconductor**
     2.1   Define Conductor, Semiconductor and Insulator.
     2.2   Describe Semiconductor with atomic structure.
     2.3   Explain the energy band diagram of Conductor, Semiconductor and Insulator.
     2.4   Classify Semiconductor.
     2.5   Describe the formation of P-type & N-Type Semiconductor material.
     2.6   Explain the majority & minority charge carrier of P-type & N-Type Semiconductor.

3   **P-N Junction Diode**
     3.1   Define PN junction diode
     3.2   Describe the formation of depletion layer in PN junction.
     3.3   Mention the behavior of PN junction under forward and reverse bias.
     3.4   Explain the forward & reverse current voltage (IV) characteristics of PN junction diode.
     3.5   Describe the operation of Zener diode.
     3.6   Describe the application of Zener diode in voltage stabilization.
     3.7   Describe the construction operation and application of (i) varactor diode (ii) LED (iii) LCD (viii) Photo diode (ix) Solar cell.
     3.8   Describe the construction operation and application of (i) DIAC (ii) TRIAC and (iii) SCR.

4   **DC power supplies**
     4.1   Define (i) dc power supply (ii) Regulated and Unregulated Power Supply.
     4.2   Describe the block diagram of a typical regulated dc power supply.
     4.3   Explain the operation of Half wave, Full wave and Bridge rectifier.
     4.4   Mention ripple factor of Half wave, Full wave and Bridge rectifier.
     4.5   Explain the operation of different types filter circuits with wave shape.

5 Bipolar Junction Transistor (BJT)
    5.1   Define Transistor.
    5.2   Describe the construction PNP and NPN Transistor.
    5.3   State the biasing rules of BJT.
    5.4   Explain the mechanism of current flow of PNP and NPN Transistor.
    5.5   Draw the three basic transistor configuration circuits (CB, CC, CE).
    5.6   Describe the characteristics of transistor in CB, CE, CC configuration.
    5.7   Describe current amplification factor α , β and γ.
    5.8   Establish the relation among α , β and γ.
    5.9   Solve problem related to $I_E,$ $I_C,$ I_B, α , β and γ.

6 Bipolar Junction Transistor biasing and load line
    6.1   Mention the needs for biasing of transistor
    6.2   State the conditions for proper biasing of transistor.
    6.3   Describe the methods of drawing load line of transistor.
    6.4   Explain the Effect of the location of operating point on the output signal.
    6.5   Describe the various methods of transistor biasing.

7 Bipolar Junction Transistor Amplifier
    7.1   Define (i) Amplifier (ii) Amplification and (III) Gain
    7.2   Mention the classification of Amplifier.
    7.3   Describe the principle of operation of a single stage common emitter (CE) Amplifier.
    7.4   Draw DC & AC equivalent circuits of the CE amplifier circuit.
    7.5   Explain the operation of RC coupled and transformer coupled multistage amplifier.
    7.6   Describe the operation of Push-Pull amplifier.

8 Field-Effect Transistor (FET)
    8.1   Define field effect transistor (FET).
    8.2   Mention the types of FET
    8.3   Describe the construction and operation Junction Field Effect Transistor (JFET).
    8.4   Explain characteristics of JFET.
    8.5   Describe the parameters of JFET.
    8.6   Establish the relationship among FET parameters.
    8.7   Describe the DC biasing of JFET and its load line.
    8.8   Describe the Construction and operation of DE and E-Only MOSFET.

9. Sinusoidal Oscillators
    9.1   Define feedback
    9.2   Describe different types of feedback with block diagram.
    9.3   Calculate the gain of amplifier with feedback (positive and negative).
    9.4   Mention the advantages and disadvantages of negative feedback.
    9.5   Explain the principle of operation of a oscillatory tank circuit.
    9.6   Describe the essentials of feedback LC oscillators.
    9.7   Explain the principle of operation of Hartly, Colpitt and Wein-bridge oscillators.
    9.8   Explain the principle of operation phase shift & crystal oscillators.

10. Multi-vibrator circuits
    10.1   State what is meant by multivibrator.
    10.2   Describe the operation of transistor as a switch.
    10.3   Explain the operation of astable, monostable and bistable muti-vibrator circuits with wave shapes.
    10.4   Mention the principle of operation of Schmitt trigger circuit.

11. Wave shaping circuits
    11.1   Mention the types of wave shaping circuit.
    11.2   Discuss the principles of RC and RL differentiating and integrating circuits.
    11.3   Analyze the output waves for various input wave shapes of differentiating and integrating circuit.
    11.4   Explain the operation of various clippers by PN junction diode,.
    11.5   Describe the operation of of diode clamping circuit for different input wave shape.

12. **Integrated Circuit (IC)**
    12.1   Define IC
    12.2   List the advantages and limitation of IC's.
    12.3   Mention the scale of integration.
    12.4   Identify the types of Integrated circuits.
    12.5   Describe the fabrication ofmonolithic integrated circuits.

13. **Operational Amplifier (Op- Amp)**
    13.1   Define operational amplifier.
    13.2   Recognize the Op-Amp symbol.
    13.6   State the golden rule and virtual ground of Op-Amp.
    13.7   List the characteristics of an ideal Op-Amp.
    13.8   Explain the operation of Op-Amp in inverter, comparator, adder &subtractor

Practical : (Using Real component and Simulation Software)
1   **Show skill in identifying the electronic components.**
    1.1   Observe the electronic components board and read the manuals.
    1.2   Identify the different types of resistors with their values, tolerance and wattage.
    1.3   Identify the different types of potentiometers with their values, & wattage.
    1.4   Identify the different types of capacitors with their values, dc working voltages and types.
    1.5   Identify the different types of diodes & rectifiers with the numbers and specifications.
    1.6   Identify the different types of transistors and thyristors with their number and specifications.
    1.7   Identify the different types of LED's, IC's and miniature relays with their number & specification.
    1.8   Identify different types of transformer with their specification.
    1.9   Identify different inductors with their values & current ratings.
    1.10   Study the printed circuit boards.
    1.11   Sketch the symbols of components used in electronic circuits.
    1.12   Describe the basic function of each component.
    1.13   Write a report on above activities.

2   **Show skill for determining the values of different resistors and capacitors with the help of color code.**
    2.1   Select color code resistors & capacitors of different values.
    2.2   Identify the colors and their numerical numbers.
    2.3   Determine the value of resistors with tolerance.
    2.4   Determine the value of capacitors and dc working voltage.
    2.5   Write a report on above activities.

3   **Show skill in performing soldering.**
    3.1   Select wires (single strand and multi strand) and cut wires to required length.
    3.2   Select soldering iron, soldering tag and soldering lead.
    3.3   Remove wire insulation to required length.
    3.4   Clean and tin both iron and work piece.
    3.5   Use a tinned iron in order to transfer adequate heat to the joint.
    3.6   Joint two singles& multi stranded wires mechanically and solder.

4   **Show skill in soldering & de-soldering of electronic components and wires to the other components and circuit boards.**
    4.1   Select electronic components, wires and PCB.
    4.2   Determine the rating of the soldering iron suitable for the work piece.
    4.3   Clean and tin both iron & work piece.
    4.4   Feed new soldering materials to the tinned and heated joint, in order to produce a correctly soldering.
    4.5   Check the quality of soldering.
    4.6   Clean and tin iron and de-solder the joint and components.
    4.7   Use solder suckers and solder braid for de-soldering.
    4.8   Write a report on the Job.

5   **Show skill in checking the semi-conductor diode.**
    5.1   Collect a range of semi-conductor diodes and manufactures literature.
    5.2   Select the digital multi-meter and set the selector switch to ohm range.
    5.3   Determine the specification of semi-conductor diode.
    5.4   Compare the determined specification with that of manufactures literature.

5.5 Measure forward & reverse resistances of the diode.
5.6 Identify p and p side of the diode.
5.7 Determine the condition of the diode.

6 Show skill in sketching forward and reverse characteristics curves of a semiconductor diode.
6.1 Select meter, power supply, components and materials.
6.2 Complete circuit according to circuit diagram for forward bias.
6.3 Check all connections.
6.4 Measure forward bias and corresponding forward current.
6.5 Record results in tabular form.
6.6 Connect circuit according to circuit diagram of reverse bias.
6.7 Measure reverse bias and corresponding reverse current.
6.8 Record results in tabular form.
6.9 Sketch the curves form data.

7 Show skill in sketching waves of half wave rectifier circuit.
7.1 Select meter, component, oscilloscope and materials.
7.2 Complete circuit of a half wave rectifier according to circuit diagram.
7.3 Check the circuit before operation.
7.4 Measure the input and output voltage and observe wave shapes in the oscilloscope.
7.5 Sketch the output voltage wave shape.

8 Show skill in sketching waves of full wave center tapped rectifier circuit.
8.1 Select meter, component, oscilloscope and materials.
8.2 Complete a full wave rectifier circuit according to circuit diagram.
8.3 Check the circuit supply & polarity of supply.
8.4 Measure the input & output voltages and observe wave shapes in the oscilloscope.
8.5 Sketch the output voltage wave shape.
8.6 Compare the result with half-wave rectifier circuit.

9 Show skill in constructing full wave bridge rectifier.
9.1 Select meter, component, oscilloscope and materials.
9.2 Build the circuit according to the circuit diagram.
9.3 Check the circuit.
9.4 Measure the input and output voltage.
9.5 Observe wave shape.
9.6 Compare the result with other rectifiers.

10 Show skill in identifying the terminals of bipolar junction transistor.
10.1 Select PNP & NPN bipolar junction transistors.
10.2 Take AVO meter and manufacture's literature of transistor.
10.3 Identify transistor legs.
10.4 Measure base-emitter, base-collector, forward and reverse resistance.
10.5 Determine the specifications with help of manufacturer's literatures.
10.6 Identify PNP & NPN transistor.

11 Show skill in determining input and output characteristics of a transistor in common emitter connection.

10.7 Select component, AVO meters, circuit board and required materials.
10.8 Construct the circuit.
10.9 Adjust the biasing voltage to appropriate point.
10.10 Record input and output voltage and current.
10.11 Plot the curve with recorded data.

12 Show skill in measuring operating points (V_{CE} and I_C) for Transistor circuit.
12.1 Select a fixed bias transistor circuit materials.
12.2 Select required equipment.
12.3 Prepare the circuit.
12.4 Check the connections
12.5 Adjust the circuit**.**

13. **Study the operation of Op-Amp (for IC 741) as inverting adnoun inverting amplifier, adder, comparator, buffer and sub tractor.**
13.1 Select the specific Op-Amp IC.
13.2 Select &Prepare the experimental circuit. the associate equipments and materials.
13.3 Buildup the circuit.
13.4 Observe the input and output wave shape on CRO screen.

14. **Demonstrate the operation of a Hartly, Colpitt and R-C oscillator.**
   14.1   Draw the circuit diagram**.**
   14.2   Select tools, equipment and materials.
   14.3   Connect the circuit diagram.
   14.4   Check and energize the circuit.
   14.5   Observe the output for different frequencies

15. **Study the operation of a transistor astable, monostable & bi-stable multivibrator circuit. Select an experiment circuit.**

   15.1   Select the required tools and materials.
   15.2   Build up the circuit as per diagram.
   15.3   Switch on the power supply.
   15.4   Switch on the trigger signal.
   15.5   Observe the wave shapes at each collector & base of the transistor

REFERENCE BOOKS :
   1. A Text Book of Applied Electronics   - R.S. SEDHA
   2. Principles of Electronics   - V. K. Mehta

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 $\dfrac{dy}{dx}$, 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 $e^{x} = 1 + \dfrac{x}{L^1} + \dfrac{x^2}{L^2} + \dfrac{x^3}{L^3} + \dfrac{x^4}{L^4}$ .... to ∞

  3.4   Solve problems of the followings types :

  i) $1 + \dfrac{1}{L^2} + \dfrac{1}{L^4} + \dfrac{1}{L^6} +$ .... to ∞

  ii) $\dfrac{1}{L^2} + \dfrac{1+2}{L^3} + \dfrac{1+2+3}{L^4} + \dfrac{1+2+3+4}{L^5} +$ .... 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 $\lim\limits_{x \to a} f(x)$ and $f(a)$.
- 7.3   Establish (i) $\lim\limits_{x \to 0} \dfrac{\sin x}{x} = 1$

                 (ii) $\lim\limits_{x \to 0} \dfrac{\tan x}{x} = 1$

8 **Understand differential co-efficient and differentiation.**
- 8.1   Define differential co-efficient in the form of
$$\frac{dy}{dx} = \lim\limits_{h \to 0} \frac{f(x + h) - f(x)}{h}$$
- 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 $\dfrac{dy}{dx}$**
- 10.1   Interpret $\dfrac{dy}{dx}$ geometrically.
- 10.2   Explain $\dfrac{dy}{dx}$ 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) $\int_{0}^{1} \frac{(\sin^{-1}x)^2}{\sqrt{-x^2}}\, dx$

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

65922   **PHYSICS-2**   **T   P   C**
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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;$PV\gamma$=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

65722	**COMMUNICATIVE ENGLISH**	**T**	**P**	**C**
		1	**3**	**2**

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

Unit	Lesson	Title
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 : Www.Marriunm-Englishdictionary.Com)
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: Www.Odgensbasicvocabulary.Com Www.Grammarly.Com)
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: Www.Speaking24.Com)
4. Speaking Skill Practice (Self Interpretation)	Introduce Yourself With The Vocabulary Prescribed By ODGENS	4.1 Browse Vocabulary Related Phrases To Introduce You. (Link : Www.Youtube.Com/ Let Me Introduce Myself)
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- Www.Esl.Guide@About.Com) 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 (Www.Grammarly.Com) 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 Www.Youtube.Com/Education
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.Britishcoucil.Org/Education/Blog/Podcast/News/Weather,Www.Englishteststore.Com.Www.Ieltsexam.Com

Lab-Facilitator, 30 Students In A Group:

Physical Facility	Size (In Ft)	Area (In Sq Ft)
Class Room Cum Laboratory	$1\,5 \times 20$	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,Www.Marium-Websters.Com,Www.Compellingconversation.Com, Www.Esl.Guide@About.Com, Www.Bbc.Com/News, Www.Speaking24.Com, Www.Itutor.Com, Www.Ieltsexam.Com, Www.Englishteststore.Com, Www.Ginger.Com, 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.)