Program Name	: **Diploma in Instrumentation / Instrumentation & Control**
Program Code	: **IS / IC**
Semester	: **Fourth**
Course Title	: **VB.net Elementary Programming**
Course Code	: 22037

1.   RATIONALE

Visual basic.net programming language is used to write efficient, compact and portable interfaces, drivers, software. This course will help the diploma pass-outs to develop applications having interfacing between front-end and back-end and graphical representation of data, using different types of controls. This course provide basic foundation of VB.net programming which will enable students to implement programs and interfaces along with generation of different kinds of reports in the real world of work such as SCADA.

2.   COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:
*   **Develop simple GUI based applications using Visual Basics.net.**

3.   COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:
a.   Use Visual Basic.net IDE to design simple applications.
b.   Use basic VB.net controls to develop simple applications.
c.   Use advanced VB.net controls with events.
d.   Represent data graphically.
e.   Interface the front-end and back-end (data) in Visual Basic.net.
f.   Manage files using different controls.

4.   TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme												
				Paper Hrs.	Theory						Practical					
					ESE		PA		Total		ESE		PA		Total	
L	T	P			Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
2	-	2	4	-	-	-	-	-	-	-	25@	10	25~	10	50	20

*(~): For the **practical only courses,** the PA has two components under practical marks i.e. the assessment of practicals (seen in section 6) has a weightage of 60% (i.e. 15 marks) and micro-project assessment (seen in section 12) has a weightage of 40% (i.e. 10 marks). This is designed to facilitate attainment of COs holistically, as there is no theory ESE.*
***Legends:** L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit, **ESE** - End Semester Examination; **PA** - Progressive Assessment, '#': No Theory Examination*

5.   COURSE MAP (with sample COs, PrOs, UOs, ADOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of

the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.
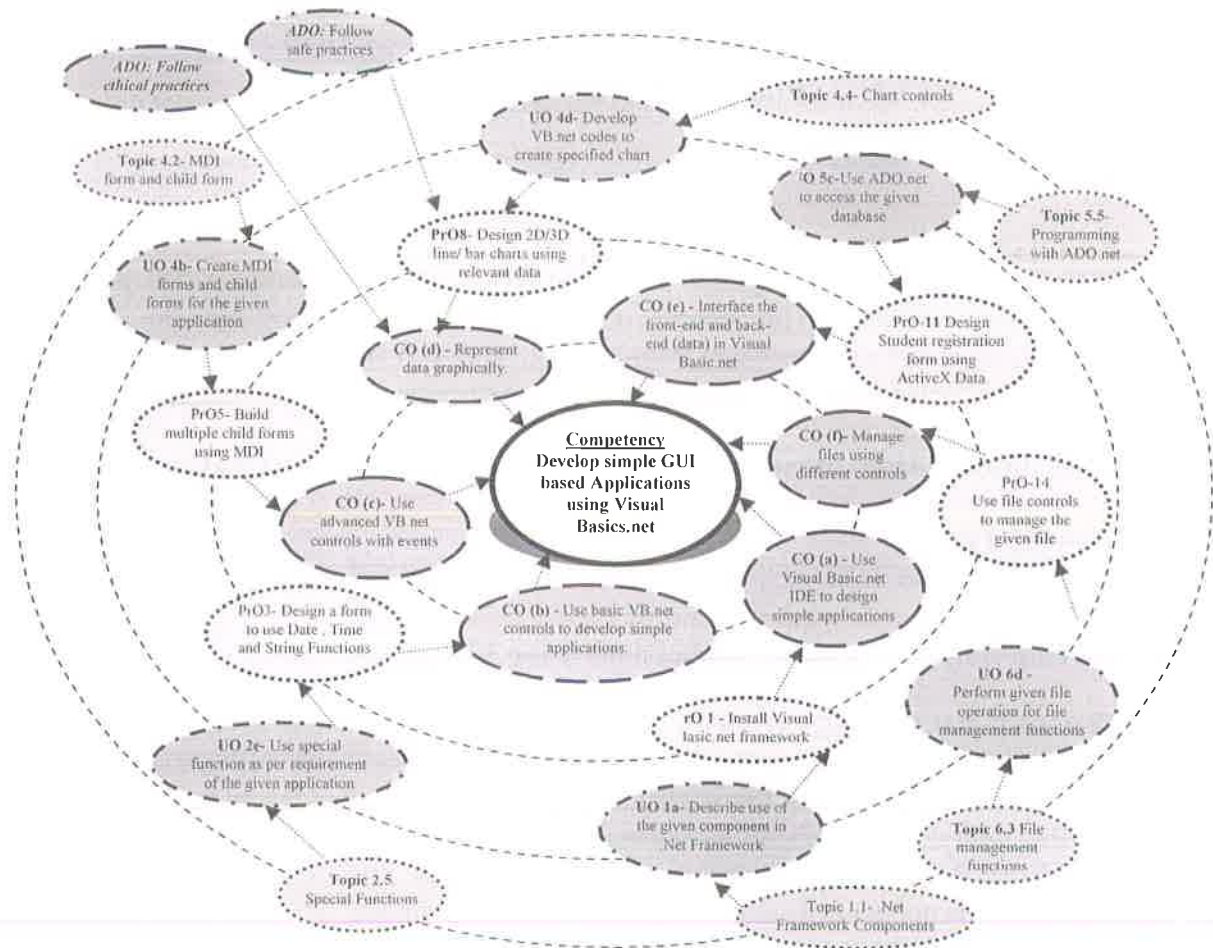
Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1	Install Visual Basic.net framework.	I	02*
2	Design a form to perform all Mathematical Operations with InputBox and MessageBox.	II, III	02*
3	Design a form to use Date , Time and String Functions.	II, III	02*
4	Design a form using picture box and timer Control to rotate the original image after certain fixed time.	III	02*
5	Build multiple child forms using MDI and include Menus like File , View , Help etc. (Part-I)	III	02*
6	Build multiple child forms using MDI and include Menus like File , View , Help etc. (Part-II)	III	02*
7	Use graphics functions such as line , circle, load picture,	IV	02*

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
	paint picture, and basic shapes.		
8	Design 2D/3D line/ bar charts using relevant data.	IV	02*
9	Design 2D/3D Pie charts using relevant data.	IV	02
10	Design Student registration form using ActiveX Data Object with Access as backend for date of birth using Date Time Picker.	V	02*
11	Design Student registration form using ActiveX Data Object with Access as backend for date of birth using Month View Control.	V	02
12	Generate Crystal report for experiment no.9 with relevant formatting.	V	02*
13	Generate Crystal report for experiment no.10 with relevant formatting.	V	02
14	Use file controls to manage the given file.	VI	02*
15	Use file controls to manage the given folders.	VI	02
16	Use file controls to manage the given drive controls.	VI	02
	Total		**32**

Note

i. *A suggestive list of PrOs is given in the above table. More such PrOs can be added to attain the COs and competency. A judicial mix of minimum 12 or more practical need to be performed, out of which, the practicals marked as '*' are compulsory, so that the student reaches the 'Application Level' of Bloom's Taxonomy' as generally required by the industry.*

ii. *The 'Process' and 'Product' related skills associated with each PrO are to be assessed according to a suggested sample given below:*

S. No.	Performance Indicators	Weightage in %
a.	Debugging ability	20
b.	Quality of output achieved (Product)	40
c.	Complete the practical in stipulated time	10
d.	Answer to sample questions	20
e.	Submit journal in time	10
	Total	**100**

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

a. Follow safety practices.
b. Practice good housekeeping.
c. Demonstrate working as a leader/a team member.
d. Follow ethical practices.

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

• 'Valuing Level' in 1st year

- 'Organising Level' in 2nd year and
- 'Characterising Level' in 3rd year.

7.   MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	PrO S. No.
1	Personal computer, (preferably i3-i5or higher processor based), RAM minimum 2 GB, Hard disk 10 GB minimum available space.	For all Experiments
2	Operating system: Windows 7/8/10	
3	Microsoft Visual Studio 2012 or later.	

8.   UNDERPINNING THEORY COMPONENTS

The following topics are to be taught and assessed in order to develop the sample UOs given below for achieving the COs to attain the identified competency. More UOs could be added.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Visual Integrated Development Environment (IDE)	1a. Describe the use of the given component in .Net Framework. 1b. Describe the use of the given element in VB.Net IDE. 1c. Apply the given System Namespace in VB.net Application 1d. Use predefined forms in the given problem.	1.1 .Net Framework Components- Common Language Runtime (CLR),Microsoft Intermediate Language (MSIL) 1.1 Integrated Development Environment: Menu bar, toolbar, project explorer, toolbox, properties window, form designer, form layout. 2.1 Drag and drop operation. 3.1 Using predefined forms, menus and projects.
Unit– II rogramming Fundamentals	2a. Select the relevant data types for the given task. 2b. Write expression using operators for the given application. 2c. Develop Procedure/ Function for the given problem. 2d. Apply relevant control flow or Loop statement to solve the given problem. 2e. Use special function as per requirement of the given application.	2.1 Data types, variables, constants, arrays, collections. 2.2 Procedure and function. 2.3 Operators: Arithmatic, logical, relational, string functions. 2.4 Control flow statements, loop statements, nested control structure, exit statement. 2.5 Special Functions :Input Box(), Message Box(), Format() Date and Time function, financial functions.
Unit– III Basic Controls and	3a. Use basic controls and container for the given task. 3b. Apply DateTimePicker and	3.1 Basic control: text box, list box, Combo box, scroll bar, frame, option button.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Event Handling	Month View for the given task. 3c. Apply timer control to control time based action for the given operation. 3d. Create menus and dialogs to develop the given application.	3.2 DateTimePicker control and MonthView control. 3.3 Container: Picture box, frame 3.4 Image and timer controls 3.5 Displaying dialogs. 3.6 Menus: Menu editor, popup menu
Unit-IV Modules, MDI and Working with Graphics	4a. Design class module to solve the given problem. 4b. Create MDI forms and child forms for the given application. 4c. Draw basic geometric shapes to create given figure. 4d. Develop VB.net codes to create specified chart based on the given data.	4.1 Concept of module, class module 4.2 MDI form and child form 4.3 Drawing Line, circle, box etc. 4.4 Chart controls: Pie charts, 2D and 3D Lines charts, bar and Step charts.
Unit-V Working With Data Controls	5a. Create basic databases to solve the given problem. 5b. Use relevant data control to solve the given problem. 5c. Use ADO.net to access the given database. 5d. Generate report using data and crystal reports as per the given requirement.	5.1 Introduction to Database: Database, record, record set 5.2 Data control and Its properties 5.3 Data bound controls: Text box, combo box, list box, DBgrid etc. 5.4 Working with visual Data Manager 5.5 Programming with ADO.net (ActiveX Data Object) 5.6 Report Generation using data reports and Crystal reports
Unit-VI File Handling	6a. Select relevant file as per the given application. 6b. Identify drives and directories on the given system. 6c. Use relevant component for managing drives/directories in the specified manner. 6d. Perform the given file operation for file management functions.	6.1 Types of files, The System.IO namespace 6.2 Working with drives, files, and directories: My.Computer.FileSystem 6.3 File management functions: opening and closing files, reading and writing data to files.

Note: To attain the COs and competency, above listed UOs need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN
- Not Applicable -

10. SUGGESTED STUDENT ACTIVITIES
Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare

reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

    a. Prepare journals based on practical performed in laboratory.
    b. Undertake survey and prepare report on features of 'VB.Net' useful for preparing SCADA application interface.
    c. Undertake survey and prepare comparative analysis report of different software products useful for developing SCADA applications.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

    a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
    b. *'L' in item No. 4* does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
    c. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
    d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
    e. Guide student(s) in undertaking micro-projects.
    f. Demonstrate students, observe them and monitor their performance in Lab.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be *individually* undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should *not exceed three.*

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than *16 (sixteen) student engagement hours* during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects are given here. Similar micro-projects could be added by the concerned faculty:

    a. Build a notepad using Menu editor and Dialog Controls.
    b. Students' placement system: Store the students' details and find the entire eligible candidate for placement.
    c. Salary system: Salary calculation of employees based on their earnings and deductions.
    d. Hostel room allotment system: System shows the vacant rooms available and Store the details about students to allocate them the available rooms.
    e. Students' fee management system: Report the information of fees due and deposited by students.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Visual Basic .NET The Complete Reference	Jeffrey R. Shapiro	McGraw–Hill, California, USA ISBN0–07–213381–3
2	Visual Basic .NET Programming Black Book	Holzner Steven	Dreamtech Press, 2015, New Delhi, ISBN-13:978-81-7722-609-6.
3	Beginning Visual Basic 2012	Bryan Newsome	Wrox Press, USA, Edition: 2012; ISBN: 9781118311813,

14.   SUGGESTED SOFTWARE/ LEARNING WEBSITES

a. http://www.vbtutor.net/index.php/visual-basic-2012-tutorial
b. http://howtostartprogramming.com/vb-net
c. https://www.tutorialspoint.com/vb.net
d. http://vb.net-informations.com
e. http://www.java2s.com/Tutorial/VB/CatalogVB.htm
f. http://www.functionx.com/vbnet