CHAPTER : V

ANALYSIS AND INTERPRETATION OF THE DATA

Based on the conceptual foundations developed in the preceding chapters, analyses and interpretations of the data collected have been presented in this chapter. As pointed out earlier, the analyses and interpretations of the data based on the Objectives from No.1-6 would give thorough details; Objective No.7 for the corroborative evidences from teachers, students and experts would reflect external validity for the data collected based on the relevant Objectives; and the last Objective No.8, would give an overall interpretation made based on all other Objectives; content analysis has been the major research technique for all the Objectives; but in the case of Objective No.7, questionnaires, opinionnaire and interviews have also been used. As pointed out in the previous chapter, based on certain well identified criteria, content analyses have been carried out at manifest level as well as at latent level to include the feeling tone within the analyses; at the former level, content analysis is based on strictly what is present in the textbooks; it is simply a direct transcription of the content present in the textbooks in terms of some code. Content analysis at latent level, is in contrast to the former level - the researcher goes beyond the transcription of what is said directly in the textbooks and seeks to infer what is implied or meant (p.135). As pointed out in the preceding chapter, criteria were identified mainly based on several relevant studies outlined in the earlier chapters as well as NCERT's guidelines. At times, analyses and interpretations were also carried out using a serious and deep inspection, concentrated attention and deduction based on several years of experience of the investigator in the field of teaching physics and physics education.

For almost all the Objectives, as far as possible, all the available data and their interpretations have been placed in different columns and rows of the constructed tools-structured content analyses sheets; based on these information sheets and the set criteria, interpretations were listed down in terms of positive aspects (coded as +ve) and inadequacies (coded as -ve) by reflecting the analyses at manifest as well as latent level; but some of the observations/interpretations were of mixed type (+ve as well as -ve) because of their nature. It may be noted that because of the very nature of certain data, their observations and the nature of their interpretations in the case of certain Objectives/Sub-objectives, it was not always possible to present them through any tabular form as such; in such cases, they were given directly in terms of positive aspects and inadequacies or mixed in some cases.

5.1: FOR OBJECTIVE NO.1: i.e., TO MAKE A DETAILED STUDY OF CONTENT OF THE PHYSICS TEXTBOOKS UNDER STUDY IN TERMS OF SUITABILITY OF :

(a) PRE-TEXT PAGES

(b) EACH CHAPTER IN CONNECTION WITH THE FOLLOWING AREAS:

- (i) INTRODUCTION
- (ii) PREREQUISITE/ENTRY BEHAVIOUR
- (iii) CONTENT IN EACH SECTION
- (iv) INTEGRATED SCIENCE APPROACH
- (v) REFERENCES TO SCIENTISTS AND HISTORY OF SCIENCE

(c) POST-TEXT PAGES.

5.1.1: FOR OBJECTIVE NO.1(a): i.e. TO MAKE A DETAILED STUDY OF CONTENT OF THE PHYSICS TEXTBOOKS UNDER STUDY IN TERMS OF SUITABILITY OF PRE-TEXT PAGES :

As pointed out earlier in Ch.I, in this investigation pre-text pages refer to cover page, title page, publisher's details, foreword, preface, a note for students, a note for teachers, editorial details and contents page.

FOR STD.XI: PART-I TEXTBOOK :

POSITIVE ASPECTS :

- The cover page contains an artist's impression of the domain of physics from the microcosm to the macrocosm.

- On p.(ii) of the textbook, along with Western calender months and years (June 1988 and June 1989), Indian calender months and years are also mentioned (i.e., 'Jyaistha' 1910 and 'Jyaistha' 1911 for first and reprinted editions respectively); this 'Indian consciousness' is worth noting.

- Foreword and preface have been well written with the usual formalities of thanking the concerned; in any case some of the points raised, would be again referred to in due course and especially in Ch.VI on Discussion, towards the end; and some other relevant points have already been referred to while discussing the rationale and other conceptual foundations for this investigation.

- 'A Note for Students' (p.viii) is very well written by referring to the nature and structure of physics, the way to study and develop confidence and to face the examination in physics, etc.

- As seen from the editorial details given in p.(xi), most of the members of the Book-writing Group in Physics and its Advisory Committee are university physics professors and a few of them practising physicists from well known Research Institutes; but, even if they have had enough exposures to Snr. Sec. level physics teaching earlier in their career, there was a strong need for them to seek help from the fairly senior and practising physics teachers (especially, those who have higher qualifications such as M.Phil/Ph.D. in physics and M.Sc., M.Ed. with physics education background).

INADEQUACIES :

- On the cover page, after the title of the book, only class is mentioned but mentioning of 'Part I' is missing.

- On title page (p.i), after the publisher's name (i.e. NCERT), the place 'New Delhi' is missing.

- In 'A Note for students' (p.viii), the last sentence is: "We wish you happy problem-solving in physics" ! This might give general impression to an average student as if physics consists of 'only problem-solving'; but a bright student, who may be knowing the nature and structure of science in general and physics in particular, may appreciate it, as physics has to be used in daily life situations, to solve the life problems, some of them created by the very "Nature" with which we are surrounded by and some of them by the members of our own human species.

- 'A Note for Teachers' (p.x) does not contain sufficient guidelines for the teachers for the effective use of the textbook.

- From the editorial details given on p.(xi), it is clear that there was not even a single practising Snr. Sec. physics teacher among the members of the Book-writing Group in Physics; even in Advisory Committee only one member is a practising Snr. Sec. physics teacher (that too only as a representative from the Indian Association of Physics Teachers - IAPT).

- Based on the information given on p.(xii), it is clear that Textbook Review Workshop was held just for 7 days (to review 193 pages of the text with 247 exercises !); in this Review Workshop, only 15 members mainly from Kendriya Vidyalayas and that too mainly from urban areas (such as Delhi, Bangalore, Mysore, Madras, etc.) had participated.

- On the 'Contents' page (p.xiii), page-wise pre-text pages and post-text pages have not been included; moreover sectional details of each chapter are not shown in 'contents'.

- Among the pre-text pages, list of Tables, Figures/Diagrams, Abbreviations used, Units used, etc., are missing.

FOR STD.XI PART II:

This Part II is the continuation of Part I and hence doesn't contain pre-text pages other than title page, publisher's page and table of contents; as such these pages do not need additional remarks other than those which have been reported earlier for Part I; however, it may be pointed out that the cover page could have been a different one instead of using the same from Part I.

FOR STD.XII: PART:I:

In this case, most of the pre-text pages are almost the same as that of STD.XI. Part I, except that the last paragraph of the preface on page ix, contains another set of technical staff for getting the work done; however the following details have been noted.

POSITIVE ASPECTS:

- The eight members of the Book-Writing group for Std.XI physics textbook are also the members of the group for STD.XII with the same chairman, convener and programme co-ordinator.

- Members of the Advisory Committee as well as the Physics curriculum Group Members, DES&M, NCERT, are the same for both the textbooks.

INADEQUACIES :

- Cover page showing the images of Super Nova Remnant G1895-1.1 at radio wavelengths processed at the National Images Processing Facility for Astronomy, Ooty, may appeal neither academically nor aesthetically to any body, perhaps mainly because of very poor print; moreover, not many details have been given about this astronomically exciting information in Part II of STD.XII textbook where there is a chapter on Astronomy i.e.,Ch.15.

- In Foreword, para-2 starts with a statement, "In August 1986--------." whereas in STD.XI Part I textbook, the same Foreword shows 1987; most probably 1987 must be correct, based on their timetable of events.

- Note on 'Significant Figures' is missing in this textbook which has been given in STD.XI textbook.

- The additional four members in the Book-Writing Group are also not among practising Snr. Sec. teachers of physics.

- As in the case of STD.XI textbook (7 days), Review Workshop was held for a very brief period - just for 5 days for this textbook and only 12 additional members participated; among them only 9 were practising Snr. Sec. school physics teachers and only two among them were involved in the review of STD.XI textbook also.

FOR STD.XII, PART-II :

This is the continuation of Part I; hence its pre-text pages contain only title page, publisher's page and table of contents with a list of participants of the Review Workshop. Among the reviewers, only 6 were practising teachers out of 12 members; among whom only 3 were involved in reviewing the part I textbook; moreover, Review Workshop was held just/double that of Part I and the cover of this book is the same as that of Part I, of course with slightly fast colour, but without improving its status in any way.

/for 5 days, eventhough content of this Part II is more than

5.1.2: FOR OBJECTIVE NO.1(b): i.e. TO MAKE A DETAILED STUDY OF CONTENT OF THE PHYSICS TEXTBOOKS UNDER STUDY IN TERMS OF SUITABILITY OF EACH CHAPTER, IN CONNECTION WITH THE FOLLOWING AREAS:

(i) INTRODUCTION .
(ii) PREREQUISITE/ENTRY BEHAVIOUR.
(iii) CONTENT IN EACH SECTION.
(iv) INTEGRATED SCIENCE APPROACH.
(v) REFERENCE TO SCIENTISTS AND HISTORY OF SCIENCE.

For the above sub-objectives content analyses were carried out by going through each page carefully and/sheets developed for the purpose enclosed Table No.3.1-3 were prepared based on the observations made in connection with the sub-objectives 1(b)(i), (ii),(iii),(iv) and (v) respectively; and the following interpretations were made based on the careful scanning of vertical and horizantal components of the prepared tables :

5.1.2.1: FOR OBJECTIVE NO.1(b)(i) i.e. FOR INTRODUCTION: FOR STD.XI: TEXTBOOK (Based on Table No.5.1: pp.180-182):

POSITIVE ASPECTS :

- Introductions for all chapters, except for Ch.12, are related to science/physics from previous classes and previous chapter/s within the textbook.

- Among the 13 chapters, introduction for Ch.4 appears to be quite suitable and for Ch.1,3,5,6,7 & 11, somewhat suitable.

/the observations were noted on content analysis

TABLE NO.5.1

CONTENT ANALYSIS FOR OBJECTIVE NO.1(b)(i)i.e.,FOR SUITABILITY OF INTRODUCTION IN EACH CHAPTER : FOR STD.XI TEXTBOOK :

CHAPTER NO. & TITLE	WHETHER RELATED TO PREVIOUS		WHETHER			ANY OTHER REMARKS (APPRECIATION/ CRITICISM) (+ve) / (-ve) POSITIVE ASPECTS/ INADEQUACIES
	CLASSES (YES/NO)	CHAPTER/S	QUITE SUIT-ABLE	SUITABLE	NOT SUI-TABLE	
	Y/N	Y/N	Y/N	Y/N	Y	
1	2	3	4	5	6	7
1.Introduction	Yes,but not specified as such	-		Y		-
2.Physical World & Measurement	"	Y			Y	+ ve Looks too elementary
3.Motion in one dimension	"	Y to some extent		Y	Y	-ve: Top.3.1-Looks like an introduction for mechanics (i.e.,3rd to 8th chapters); but +ve: 'The importance of geometry'-quite interesting. -ve: Top.3.2 -looks like the actual introduction for this chapter.

TABLE No.5.1 (CONTD)

1	2	3	4	5	6	7
4.Description of motion on two and three dimensions.	Yes,but not specified as such	Y	Y			-
5.Laws of Motion	"	Y		Y (Somewhat)		-
6.Work,energy and power	"	Y (Not much)		Y (Somewhat)		-
7.Centre of Mass, Rigid bodies, Rotational Motion.	"	Y (Related to 3rd - 6th chapters)		Y		-
8.Gravitation	"	Y			Y	-
9.Molecules	Y	Y		Y		-
10.Properties of matter	Y	Y			Y	-ve: Looks like introduction to a unit on 'Properties of Matter' rather than for a chapter.
A.Solids	Y	Y			Y	-ve: Too short; the introduction could be for a separate chapter rather than for a sub-chapter
B.Fluids	Y	Y			Y	-ve: Too short.
C.Liquids	Y	Y			Y	-ve: Too short.
D.Gases						-ve: Not given.

TABLE No.5.1 (CONTD)

1	2	3	4	5	6	7
11.Heat and Thermodynamics	Y	Y		Y		-
12.Oscillation	N	N			Y	-ve: Not at all sufficient - contains only five lines
13.Waves	Y	Y		Y		-
FOR CLASS : XII TEXTBOOK:						
1.Electrostatic force and electrostatic field	Y	Y		Y		-ve: Introduction has not been given separately, but as section.1.1
2.Electrostatic Potential, Conductors, Capacitance and Dieletrics	-	-	-	-	-	-ve: This chapter does not seem to have any formal introduction in the text; it starts directly with 2.1: an important property of electrostatic fields: i.e. towards potential.
3.Current Electricity	Y	Y	Y	Y	-	-

TABLE No.5.1 (CONTD)

1	2	3	4	5	6	7
4.Thermal and Chemical Effects of Currents	Y	Y	Y	-	-	-
5.Magnetic Effects of Currents	Y	Y			Y	-ve: This introduction does not look like the one for the whole chapter, but for the topic - Oersted's discovery.
6.Magnetism	Y	Y		Y		-ve: This introduction, at the end relates the study of electricity and magnetism with their similarities and dissimilarities, but without any side heading.
7.Electromagnetic Induction	Y	Y			Y	-ve: Too short
8.Alternating Current Circuits	Y	Y			Y	-ve: There is no separate introduction as such in this chapter; it starts with a topic itself i.e. 2.1 Alternating Currents
9.Electromagnetic Waves	-	-	-	-	-	-ve: No introduction is given.

TABLE No.5.1 (CONTD)

1	2	3	4	5	6	7
10.Wave optics	Y	Y			Y	-ve: Very short
11.Ray Optics and Optical Instruments	-	-	-	-	-	-ve: No introduction as such
12.Electrons and Photons	Y	Y	Y	-	-	+ve: Very good introduction.,
13.Atoms, Nuclei and Molecules	Y	Y		Y		-
14.Solids and Semiconductor Devices						
A. Solids	Y	Y		Y		-
B. Semiconductor devices	Y	Y		Y		-
C. Digital Curcuits	Y	Y		Y		-
15.The Universe	Y	Y		Y		-

INADEQUACIES :

- Just a 3 page write-up has been termed as Ch.1.Introduction; but this chapter, though contains a few useful basic information/concepts, appears to be lacking in a general introduction to the course work in physics at Std.XI & XII; in this chapter introduction to basic units such as Mechanics, Heat, Light, Sound, Electricity, etc., are missing.

- For Ch.2,3,8,10 & 12, introductions are not suitable and the reasons for the same have been briefly pointed out in Col.7 of Table 5.1.

FOR STD.XII: (Based on Table No.5.1: pp.182-184):

POSITIVE ASPECTS :

- Introductions (wherever given) for all chapters are found to be related to STD.XI and other previous classes and previous chapter/s.

- For Ch.3,4 & 12, the introductions given are quite suitable; Ch.12 contains a very good introduction; Ch.1,6,14 & 15 contain more or less suitable introductions.

INADEQUACIES :

- As shown on Col.7 of Table.5.1, introduction as such is missing in the case of Ch.2,9 & 11.

- Introductions for Ch.5,7,8 & 10 are not suitable.

5.1.2.2. FOR OBJECTIVE NO.1(b) (ii) i.e. PRE-REQUISITE/ ENTRY BEHAVIOUR : FOR STD.XI: TEXTBOOK (Based on Table No.5.2 pp. 187-188):

POSITIVE ASPECTS :

- If the development of chapters one after the other within the textbook are considered, it appears that there are no serious problems for the learners, with respect to prerequisites from the readings of previous chapter/s while entering into the reading of the subsequent chapter/s.

INADEQUACIES :

- A very serious inadequacy of the physics textbook for STD.XI is the assumption that a write-up of a few pages (even if, supported by actual classroom discussion) on differential and integral calculus, would enable the readers to digest several chapters of physics based on this major area of higher mathematics; this handicap is further aggravated by the fact that the readers would acquire entry behaviour with respect to calculus only in Std.XII mathematics course, due to lack of co-ordination; moreover physics textbook readers who are allowed to study physics without studying mathematics in the Snr. Sec. science stream programme would possess highly diluted amount of entry behaviour.

- As shown on Col.4 of Table No.5.2, there are several concepts which either look too elementary at Snr.Sec. level or are being repeated from previous classes especially from STD.IX (NCERT) Science textbook; in some cases, they are discussed in Snr. Sec. chemistry textbook also.

TABLE NO.5.2

CONTENT ANALYSIS FOR OBJECTIVE NO.1(b)ii i.e., SUITABILITY OF PREREQUISITIVE/ENTRY BEHAVIOUR FOR STD.XI TEXTBOOK :

CHAPTER NO.	PREREQUISITIVE/ENTRY BEHAVIOUR/CONTENT		
	MISSING	INSUFFICIENT INFORMATION	REPEATED/UNNECESSARY/IRRELEVANT INFORMATION FROM PREVIOUS CLASS/ CHAPTER/s (INADEQUACIES: -ve)
1	2	3	4
1.	-	-	-
2.	-	-	The difference between mass and weight of a substance - already treated in detail in Std.IX textbook. very minor details about electron and proton are taught even in upper primary schools nowadays (so no need to print this in italics). The definition, unit and measurement of force - dealt in detail in Std.IX textbook.
3.	Thorough knowledge of Differehtial calculus - as this is taught only in Std.XII Maths;and non-Maths students do not study this.	Treatment of Differential calculus.	Instead of strating from the very beginning on 'speed, velocity,uniform motion, acceleration, equations of motion', references could have been made from Std.IX Science.

TABLE No.5.2 (CONTD)

1	2	3	4
4.	-	-	Instead of starting the development of all the concepts from the very beginning (as if students have not studied anything about the topics in previous classes), atleast some references could have been made to new Std.IX. Science textbooks by NCERT (Physics portion).
5.	-	-	"
6.	-	-	"
7.	-	-	"
8.	-	-	"
9.	-	-	Concepts such as Avogadro's hypothesis, Avogadro's number - repeated from previous classes/Chemistry.
10.	-	-	Hydraulic lift and mercury barometers need not be discussed in detail as they are treated in lower classes; their mentioning will be enough at Std.XI.
11.	-	-	Details about mercury thermometer are not needed in Std.XI, as it is treated in lower classes.
12.	-	Fourier Coefficients	-
13.	-	Fourier analysis	-

TABLE No.5.2 (CONTD)

FOR STD.XII TEXTBOOK:

1	2	3	4
1.	-	Knowledge of Partial differentiation & Integral calculus	-
2.	-	" "	-
3.	-	-	-
4.	-	-	Most of the concepts in 4.3:Chemical Effects are discussed in Chemistry course.
5.	-	-	-
6.	-	-	Section 6.1-Introduction, contains repetitions of some concepts/historical facts from previous classes/chapters.
7.	-	-	-
8.	-	Treatment of Complex number	-
9.	-	-	-
10.	-	-	-
11.	-	-	-
12.	-	In this chapter, a list of Nobel Prize winners has been presented; in this connection, there is a need to give a historical note on this prize.	-
13.	-	-	-
14.	-	-	-
15.	-	-	-

FOR STD.XII: TEXTBOOK: (Based on Table No.5.2 p.189):

POSITIVE ASPECT :

- Same as in the case of STD.XI textbook.

INADEQUACIES :

- Similar to the case of Std.XI textbooks; further, the success of the comprehensibility of Std.XII physics textbook depends on proper co-ordination of physics and mathematics courses, during the period.

- If chemistry and physics courses of STD.XI/XII and hence the textbooks in their write-up are properly co-ordinated, several cases of repetitions in the physics textbooks, can be avoided.

5.1.2.3 FOR OBJECTIVE NO.1 (b)(iii) i.e., SUITABILITY OF EACH SECTION IN EACH CHAPTER:

This was one of the major parts of the whole investigation. Within 13 chapters of Part I and II of STD.XI textbook there are totally 122 sections including introductions; and within 15 chapters of Part I & II of STD. XII textbook, there are totally 133 sections; depending on the nature of topics included in each section, some are exceptionally too long or too short; however, for the purpose of content analysis, they were treated with equal importance.

Mainly based on the data obtained from Table No.5.3, Table No.5.4 and 5.5 have been prepared to focus on certain positive aspects and inadequacies respectively; and after careful interpretations of these Tables and other textual

TABLE NO.5.3 (COLUMNS 1-9)

PAGE NO.1 (COLUMNS 1-5)

CONTENT ANALYSIS FOR OBJECTIVE NO.1(b)(iii) i.e., FOR SUITABILITY OF EACH SECTION IN EACH CHAPTER : FOR STD.XI TEXTBOOK :

CHAPTER NO. & TITLE	BOOK REFERENCE SECTION NO.	SECTION HEADING - CONTENT	APPEARS TO BE CLEAR IN WRITE-UP -YES/SOMEWHAT/NO (Y/SW/N)	SEEMS INTERESTING/ EXCITING (Y/SW/N)
1	2	3	4	5
1.Introduction	1.1	What is physics ? (Physics/Science & Scientific method).	SW	SW
	1.2	Scope and Excitement of physics.	SW	SW
	1.3	Physics & Technology.	Y	SW
2.Physical World and Measurements	2.1	Need for measurement,Units	Y	N
	2.2	Units for Measurement	Y	N
	2.3	Systems of Units	Y	N
	2.4	Abbreviations in powers of 10	Y	Y
	2.5	Length	SW	Y
	2.6	Some length measurements	SW	Y
	2.7	Mass	Y	Y
	2.8	Time	Y	Y
	2.9	Other base units	Y	Y N
	2.10	Derived Units	Y	N

TABLE No.5.3 (CONTD)

1	2	3	4		5	
	2.11	Dimensions and dimensional analysis.	Y		SW	
	2.12	Accuracy, precision of instruments and errors in measurement.		N	SW	
	* 2.13	Classification & combination of errors.		N		N
3.Description of Motion in one Dimension.	3.1	Introduction		SW	SW	
	3.2	Objects in motion.	Y		SW	
	3.3	Motion in a St. line-preliminaries.	Y		SW	
	3.4	Uniform motion.	Y		SW	
	3.5	Non-Uniform motion -constant acceleration.		SW	SW	
	3.6	The general relation between position and velocity		SW	Y	
	3.7	Acceleration in a general one-dimensional motion	Y		Y	
	3.8	What next after acceleration ?	Y		Y	
	* 3.8 (Additional)	Differential Calculus.		N		N
4.Description of Motion in Two & Three Dimensions.	4.1	Introduction - The need for vectors.	Y		Y	
	4.2	Working with vectors in two dimensions-Positions and displacements.	Y		Y	
	4.3	Resolutions and components of a vector in a plane.		SW	Y	
	4.4	Motion in two dimensions.		SW		N

TABLE No.5.3 (CONTD)

1	2	3	4	5
	4.5	General position-velocity accleration relations for plane motion.	SW	N
	4.6	The case of circular motion -constant speed.	N	N
	4.7	Motion on a general path in a plane	Y	N
	4.8	Motion of objects in three dimensional space.	N	N
5.Laws of Motion.	5.1	Introduction.	Y	Y
	5.2	Force & inertia.	Y	Y
	5.3	The law of inertia or Newton's first law of motion.	Y	Y
	5.4	Newton's second law of motion.	Y	Y
	5.5	Newton's Third law of motion.	Y	Y
	5.6	Equilibrium of Concurrent forces.	SW	N
	5.7	Friction.	Y	N
	5.8	Lubrication.	Y	Y
	5.9	Inertial and accelerated frames of references.	Y	Y
	5.10	Solving problems in mechanics.	Y	Y
6.Work,Power & Energy	6.1	Introduction.	Y	SW
	6.2	Work.	SW	Y
	6.3	Kinetic Energy.	Y	SW
	6.4	Potential energy.	SW	Y

TABLE No.5.3 (CONTD)

1	2	3	4		5	
	6.5	Power	Y		Y	
	6.6	Collisions.	Y		Y	
	6.7.	Different forms of Energy	Y		Y	
	6.8.	Conservation of Energy		SW		N
7.Centre of Mass, Rigid Bodies, Rotational Motion.	7.1	Introduction	Y		Y	
	7.2	The Centre of mass - A two-particle system		SW		N
	7.3	Rigid bodies and rotational motion		SW		N
	7.4	Plane (rotational) motion of a single particle-the torque.		SW		N
	7.5	Some examples of circular motion.		SW	Y	
	7.6	Torque and angular momentum for a system of particles.		N		N
	7.7	Rotational motion and the moment of inertia.		N		N
	7.8	Some examples of two dimensional rigid body motion.		SW		N
	* 7.9	* Rigid body rotation in three dimensions.		N		N
8.Gravitation	8.1	Introduction	Y		SW	
	8.2	Acceleration due to gravity at the surface of the earth.		SW	Y	
	8.3	The universal law of gravitation.	Y		Y	
	8.4	Variation in 'g' of the earth.	Y		Y	
	8.5	Gravitational potential energy.	Y		Y	
	8.6	Geostationary satellites.	Y		Y	
	8.7	Gravitation and the planets.	Y		Y	
	8.8	Beyond the solar system.	Y		Y	
	* 8.9	The general theory of relativity.		SW	Y	

TABLE No.5.3 (CONTD)

1	2	3	4	5
9. Molecules	9.0	Introduction	Y	Y
	9.1	Atomic hypothesis and its development	Y	Y
	9.2	Brownian Motion	Y	Y
	9.3	Avogadro number and Avogadro's hypothesis.	Y	SW
	9.4	Interatomic and intermolecular forces.	Y	Y
	9.5	States of matter.	SW	Y
10.Properties of Matter	10.0	Introduction	Y	SW
	10.1	Solids : Crystalline and glassy solids	Y	Y
	10.2	Elasticity	Y	SW
	10.3	Pressure	Y	SW
	10.4	Atmospheric pressure.	Y	SW
	10.5	Buoyancy and Archimedes' principle	Y	Y
	10.6	Viscosity	Y	Y
	10.7	Fluid flow.	SW	SW
	10.8	Liquids: Surface Tension	Y	Y
	10.9	Gases: Pressure, Volume and Temperature.	Y	SW
	10.10	Kinetic theory of gases.	SW	SW
11.Heat and Thermo-dynamics	11.1	Introduction	Y	SW
	11.2	Temperature	Y	SW
	11.3	Thermal expansion	Y	SW
	11.4	Energy, heat and specific heat	Y	SW
	11.5	First law of thermodynamics	SW	N
	11.6	Thermodynamic states, phases and phase diagrams.	N	N
	11.7	Heat Engines and Second law of thermodynamics.	Y	SW
	11.8	Transfer of heat	Y	Y

TABLE No.5.3 (CONTD)

1	2	3	4	5
12. Oscillations	12.1	Periodic motion	SW	N
	12.2	Period and frequency	SW	N
	12.3	Displacements	SW	Y
	12.4	Periodic functions	N	N
	12.5	Simple harmonic motion (SHM)	N	N
	12.6	Uniform circular motion and SHM	SW	N
	12.7	Springs	Y	N
	12.8	Oscillations due to a spring - SHM	SW	SW
	12.9	Equations of motion	SW	N
	12.10	Numerical solution of Newton's equation of motion.	SW	N
	12.11	K.E. and P.E. of SHM	Y	N
	12.12	Simple pendulum	SW	N
	12.13	Forced oscillation, resonances and damped oscillations	SW	N
	12.14	Harmonic motion using calculus.	SW	N
	12.15	Forced oscillations.	SW	N
13.Waves	13.1	Introduction	Y	Y
	13.2	Speed of wave motion	Y	SW
	13.3	Wave function	SW	N
	13.4	Superposition principle	SW	N
	13.5	Reflection of Waves	SW	N
	13.6	Harmonic Waves	SW	N
	13.7	Periodic Waves	SW	N
	13.8	Standing Waves and normal modes	SW	N
	13.9	Beats	SW	N
	13.10	Doppler effect	N	N
	13.11	Musical sound	Y	N
	13.12	Musical scale	Y	N
	13.13	Acoustics of buildings	SW	SW

TABLE No.5.3 (CONTD)

FOR CLASS XII TEXTBOOK:

1	2	3	4	5	
1.Electrostatic Force and Electrostatic Field	1.1	Frictional Electricity-Two kinds of charges -likes repel and unlikes attract.	Y	Y	
	1.2	Nature, quantization and conservation of electric charges.	SW	Y	
	1.3	Coulomb's law and the coulomb.	SW	Y	
	1.4	Forces among many charges - superposition principle- continuous charge distributions.	SW		N
	1.5	The concept of the electric field.	SW		N
	1.6	Fields of point charges - lines of force - dipoles.	SW	SW	
2.Electrostatic Potential, Conductors, Capacitance and Dielectrics.	2.1	An important property of electrostatic fields: towards the potential.	N		N
	2.2	The electrostatic potential-energy of systems of charges- energy of a dipole.	N		N
	2.3	From the potential to the electric field - equipotential surfaces.	N		N
	2.4	Gauss' theorem for electrostatics.	SW		N
	2.5	Some applications of Gauss' theorem.	N		N
	2.6	Conductors and insulators- electrostatics with conductors.	Y	Y	
	2.7	Capacitors and Capacitance	SW	Y	
	2.8	Dielectrics and polarization of matter	Y	Y	
	2.9	The atmosphere and its electricity	Y	Y	
	2.10	A man-made high voltage generator	SW		N
3.Current Electricity	3.1	Introduction	Y	Y	
	3.2	Current, voltage and resistance	SW	SW	
	3.3	Ohm's law and resistivity of materials	Y	Y	
	3.4	Electrical circuits and Kirchhoff's rules	SW -Except Fig.3.11	SW	
	3.5	Measurement of voltages and resistances.	Y	SW	

TABLE No.5.3 (CONTD)

1	2	3	4	5
4. Thermal and Chemical Effects of Currents	4.1	Introduction	Y	SW
	4.2	Heating effects	Y	SW
	4.3	Chemical Effects	Y	SW
	4.4	Thermolectricity	SW	SW
5. Magnetic Effects of Currents	5.1	Introduction and Oersted's discovery	Y	SW
	5.2	Biot-Savart law and magnetic field due to current.	SW	N
	5.3	Forces on currents and the Lorentz force	SW	N
	5.4	Ampere's circuital law	SW	N
	5.5	Current loop, magnetic dipole moment, torgue and galvanometer.	SW	SW
	5.6	Moving charges in magnetic and electric fields.	SW	SW
6. Magnetism	6.1	Introduction - magnets and magnetic dipoles - the magnetic field.	Y	SW
	6.2	Lines of a magnetic field - case of a bar magnet.	Y	N
	6.3	Magnets as circulating currents - the magnetic Lorentz force.	Y	SW
	6.4	The field of a magnetic dipole - the analogue of Gauss' Theorem.	SW	SW
	6.5	The magnetic field of the earth	SW	Y
	* 6.6.	Magnetic materials- dia, para and ferromagnetism.- the H field.	SW	SW

TABLE No.5.3 (CONTD)

1	2	3	4	5
7. Electro-magnetic induction	7.1	Introduction: Phenomenon of electro-magnetic induction.	Y	N
	7.2	Faraday's discoveries	Y	SW
	7.3	Magnitude and direction of induced current	Y	SW
	7.4	Electromagnetic induction and the Lorentz force.	Y	SW
	7.5	Discussion of Faraday's laws.	Y	SW
	7.6	Discussion of Lenz's rule.	Y	N
	7.7	Eddy currents	SW	N
	7.8	Mutual and self inductance	SW	SW
	7.9	Electrical machines: AC generators, transformers.	SW	SW
	* 7.10	Currents and voltages in a transformer	SW	SW
8. Alternating Current Circuits	8.1	Alternating currents	Y	SW
	8.2	A few simple properties of complex numbers	N	N
	8.3	Complex voltage and currents	N	N
	8.4	Energy and power associated with L.C. and R.	N	N
	8.5	LCR circuit.	N	N
	8.6	LC Oscillations.	N	N
9. Electromag-netic Waves	9.1	Maxwell's displacement current.	SW	N
	9.2	Electromagnetic waves.	N	N
	9.3	A brief history of the observation of electromagnetic waves.	Y	Y
	9.4	Light and the spectrum of electromagnetic radiation.	Y	Y
	9.5	Electromagnetic radiation and the earth's atmosphere.	Y	Y

TABLE No.5.3 (CONTD)

1	2	3	4	5
10.Wave Fronts	10.1	Introduction	Y	N
	10.2	Rays and wavefronts	Y	SW
	10.3	Basic properties of electromagnetic waves	Y	SW
	10.4	The Polarisation of light	SW	SW
	10.5	Interference	SW	SW
	10.6	Diffraction	SW	SW
	10.7	The Doppler effect for light	SW	SW
11.Ray optics and optical Instruments	11.1	Sources of light, luminosity and photometry	SW	N
	11.2	Velocity of light	Y	SW
	11.3	Reflection of light from spherical mirrors	Y	SW
	11.4	Laws of refraction	Y	SW
	11.5	Total internal reflection	Y	SW
	11.6	Refraction in a prism	Y	N
	11.7	Refraction at a spherical surface	Y	N
	11.8	Thin lens formula	Y	N
	11.9	Power of a lens	Y	N
	11.10	Lens combination	SW	N
	11.11	Dispersion	Y	N
	11.12	Spectroscopes	SW	N
	11.13	Types of spectra	N	N
	11.14	Colour of the sky	SW	SW
	11.15	Optical defects in mirrors and lens	N	N
	11.16	Camera	Y	Y
	11.17	Microscope	Y	Y
	11.18	Telescope	SW	SW
	11.19	Resolving power	SW	SW

TABLE No.5.3 (CONTD)

1	2	3	4	5
12. Electrons and Photons	12.1	Introduction	Y	Y -Exciting
	12.2	Discharge through gases at low pressure	Y	SW
	12.3	Cathode rays	Y	SW
	12.4	e/m of electrons	Y	SW
	12.5	Millikan's method for measuring the fundamental charge	Y	Y -Exciting
	12.6	Free electrons in metals	Y	SW
	12.7	Photoelectric effect	Y	SW
	12.8	The photon and the quantum interpretation of the photoelectric effect	Y	Y -Exciting
	12.9	The photo cell	N	SW
	12.10	Wave nature of matter	Y	Y -Exciting
13. Atom,Nuclei and Molecules	13.1	Introduction	Y	SW
	13.2	Alpha particle scattering and Rutherford's model of atom	Y	SW
	13.3	Energy quantisation	Y	Y
	13.4	Bohr Model and the hydrogen spectrum	Y	Y
	13.5	Atomic masses	Y	Y
	13.6	Binding energy	SW	Y
	13.7	Size of the nucleus	Y	Y
	13.8	Radioactivity	SW	SW
	13.9	Nuclear energy	Y	N
	13.10	Fission reaction	Y	N
	13.11	Fusion reaction	N	N
	13.12	Nuclear reactor	SW	SW
	13.13	Nuclear holocaust	Y	SW
	13.14	Molecules	SW	SW

TABLE No.5.3 (CONTD)

1	2	3	4	5
	13.15	Bonding in molecules	SW	SW
	* 13.16	Rotational spectrum	SW	SW
	* 13.17	Vibrational spectrum	SW	SW
14. Solids and Semi-conductor Devices	(A)	Solids	Y	N
	14.1	Crystal structure	Y	Y
	14.2	Energy bands in solids	SW	SW
	14.3	Metals, insulators and semiconductors	SW	SW
	14.4	Electrons and holes in semiconductors	SW	SW
	14.5	Intrinsic semiconductors	SW	SW
	14.6	Extrinsic semiconductors	SW	SW
	14.7	Holes and electrical resistivity of semiconductors.	SW	SW
	(B)	Semiconductor devices	SW	SW
	14.8	pn Junction diode	SW	SW
	* 14.9	Different types of pn junction diodes	SW	SW
	14.10	The junction transistor	N	SW
	(C)	Digital circuits	N	SW
	14.11	Logic gates	SW	SW
	14.12	Combination of gates	SW	SW
	* 14.13	Binary adders	SW	SW
	14.14	Integrated circuits	SW	SW
15. The Universe	15.1	Introduction	Y	Y
	15.2	The Solar System	Y	Y
	15.3	The Stars	Y	Y-Exciting
	15.4	The Milky Way	Y	Y-Exciting
	15.5	The structure and evolution of the universe	Y	Y-Exciting especially the last three paragraphs.

TABLE NO. 5.3 (COLUMNS : 1-9)

FOR STD.XI TEXTBOOK: PAGE NO.2 (COLUMNS: CONTD.6-9)

SECTION REFERENCE (CONTD)	SEEMS UNNECESSARY YES/SOMEWHAT/NO (Y/SW/N)	CONCEPT/S WHICH REQUIRE/S MORE EXPLANATION/ MISSING	SEEMS DIFFICULT FOR STUDENTS/ ABOVE THEIR LEVEL (Y/SW/N)	ANY OTHER RELEVANT REMARK/APPRECIATION/ CRITICISM
	6	7	8	9
1.1	N	The relation between 'shastras' and science - Scientific theory	N	+ve: Reference to the term such as & 'Shastras'.
1.2	N	-Pulsor, blackhole, laser, superconductivity.	SW	
1.3	N	-	N	-ve: Last para is not actually connected with 1.3, but it can be a separate section 1.4: Plan for the study of physics in Std.XI.
2.1	N	-	N	-ve: Looks elementary
2.2	N	-	N	-
2.3	N	-	N	-
2.4	N	-	N	-
2.5	N	-	N	+ve: Reference to National Physical Laboratory, Delhi.

TABLE No.5.3 (CONTD)

P.No.2

6		7	8	9
2.6	N	Concept of parallex	N	+ve: References to RADAR, SONAR electron microscope, tunnelling microscope.
2.7	N	-	N	-
2.8	N	-	N	-
2.9 Y (Already included) in 2.2		-	N	-
2.10	N	-	N	-
2.11	N	-	N	-
2.12	N	Requires more explanation	SW	-
* 2.13	N	"	SW	-ve: This section is needed for all students.
3.1	N	-	N	-
3.2	N	-	N	-
3.3	N	-	N	-
3.4	N	-	N	-
3.5	N	-	SW	-
3.6	N	-	SW (Mainly because of Calculus)	-
3.7	N	-	"	
3.8	N	-	N	-
* 3.8 (Additional)	N	Requires more explanation	Y	-ve: Problem of lack of co-ordination in Mathematics and physics courses.

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
4.1	N	-	N	-
4.2	N	-	SW	-ve: Students while writing on the notebook, have to write the vector $\vec{A}$: this has to be mentioned in the text.
4.3	N	-	SW	-
4.4	N	-	SW	-
4.5	N	-	SW	-
4.6	N	-	SW	-
4.7	N	-	SW	-
4.8	N	-	SW	-
5.1	N	-	N	-
5.2	N	-	N	-
5.3	N	-	N	-
5.4	N	-	N	-
5.5	N	-	N	-
5.6	N	-	Y	-
5.7	N	-	SW	-
5.8	N	-	N	-
5.9	N	-	N	-
5.10	N	-	N	-
6.1	N	-	N	-
6.2	N	-	SW	-
6.3	N	-	N	-
6.4	N	-	SW	-
6.5	N	-	N	-
6.6	N	-	N	-
6.7	N	-	N	-
6.8	N	Whole section requires more explanation	N	-

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
7.1	N	-	N	-
7.2	N	-	SW (because of calculus)	-
7.3	N	-	N	-
7.4	N	-	SW (-because of calculus)	-
7.5	N	-	N	-
7.6	N	-	Y	-
7.7	N	-	Y	-
7.8	N	-	Y	-
7.9	N	-	Y	-
8.1	N	-	N	-
8.2	N	-	N	-
8.3	N	-	N	-
8.4	N	-	N	-
8.5	N	-	N	-
8.6	N	-	N	-
8.7	N	-	N	-
8.8	N	-	SW	-
9.1	N	-	N	-ve: Seems too short
9.2	N	-	N	-
9.3	SW	Concept of mole	N	-
9.4	N	-	N	-
9.5	N	-	N	-
9.6	N	-	N	-

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
10.0	N	-	N	-ve: too short for 10(A),(B) & (C)
10.1	N	-	N	-ve: Starred portion in 10.1(a) can be for all students. -ve: Glassy solids are normally termed 'amorphous' in other textbooks.
10.2	N	-	N	+ve: starred portion in p.225, being very interesting can be for all students.
10.3	N	-	N	-
10.4	N	-	N	-
10.5	N	-	N	-
10.6	N	-	N	-
10.7	N		Y	-
10.8	N	-	Y	+ve: summary on p.243 is very useful -but this could have been given at the end.
10.9	N	-	N	-
10.10	N	-	N	-
11.1	N	-	N	-
11.2	N	Logarithmic scale	N	-
11.3	N	-	N	-ve: Coefficient of linear expansion can be treated before coefficient of volume expansion; coefficient of surface expansion has not been treated.
11.4	N	-	N	-ve: To give full form of SI looks too elementary at this stage.
11.5	N	-	Y	-ve: Requires more explanation
11.6	Y	-	Y -especially the graphs	-ve: Contains too much starred portion.
11.7	N	-	Y	-
11.8	N	-	N	+ve: Discussion on Indian monsoons in p.291 is very useful.

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
12.1	N	ECG	N	-
12.2	Y-as a separate section	-	N	- ve: Too short.
12.3	N	Fourier theorem	SW	-
12.4	N	Fourier Coefficients	Y	-
12.5	N	-	Y	-
12.6	N	-	SW	-
12.7	N	-	N	-
12.8	N	-	N	-
12.9	N	-	SW	-
12.10	N	-	SW	-
12.11	N	-	SW	-
12.12	N	-	SW	-
12.13	N	-	SW	-
12.14	N	-	Y	-ve: Lack of practice in Calculus would frustrate the learners.
12.15	N	-	Y	"
13.1	N	-	N	-
13.2	N	-	N	-
13.3	N	-	SW	-
13.4	N	-	SW	-
13.5	N	-	SW	-
13.6	N	-	SW	-
13.7	N	-	SW	-
13.8	N	-	Y	-
13.9	N	-	Y	-
13.10	N	-	Y	-
13.11	N	-	N	-ve: Very short.
13.12	N	-	N	-ve: Too short to be considered as a section
13.13	N	-	N	-

TABLE No.5.3 (CONTD)
P.No.2
FOR STD. XII TEXTBOOK :

	6	7	8	9
1.1	N	-	N	-
1.2	N	Quantization	N	-
1.3	N	-	N -	-
1.4	N	-	Y-Starred portion	-ve: Lack of practice in calculus would frustrate even bright students.
1.5	N	-	"	"
1.6	N	-	SW	"
2.1	N	-	Y	"
2.2	N	-	Y	"
2.3	N	-	Y	"
2.4	N	-	Y SW	-ve: This topic may be simplified
2.5	N	-		-
2.6	N	-	N	-ve: It is better if there can be more examples for polar and nonpolar dieletrics.
2.7	N	-	SW	-
2.8	N	-	N	+ve: Modern ideas on the effects of polarization at the atomic level have been presented.
2.9	N	-	N	-
2.10	N	-	N	-ve: Working principle of van de Graaf generator may be made more clear.

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
3.1	N	-	N	-
3.2	N	-	N	-
3.3	N	Examples for super-conductor have not been named - only chemical formulae have been given (p.82, para.2)	N	+ve: Active research area in the case of insulators (p.75, pa.3) and reference to newspaper reports about latest superconductors (1987-88) have been made (P.82)
3.4	N-except Fig.3.11	-	Y-except Fig.3.11 at this stage	-
3.5	N	-	N	-
4.1	N	-	N	-
4.2	N	-	N	-ve: Looks too short
4.3	SW Technical terms have not been defined clearly	-	N	-ve: Most of the concepts are disscussed in Snr. Sec. chemistry course.
4.4	N		SW	+ve: Reference to recent extensive research especially in the (former) Soviet Union in the field of semiconductors.
5.1	N	-	N	-
5.2	N	-	SW	-
5.3	N	-	SW	-
5.4	N	-	SW	-ve: Better to avoid integral form.
5.5	N	-	SW	-
5.6	N	-	SW	-

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
6.1	SW	-	N	-
6.2	N	-	N	-ve: Too short to be called a separate section.
6.3	N	-	N	
6.4	N	-	SW	-
6.5	N	-	SW	-
* 6.6	Y	-	SW	-ve: Too many details.
7.1	N	-	N	-ve: Looks too short.
7.2	N	-	N	-
7.3	N	-	N	-
7.4	N	-	N	-
7.5	N	-	N	-
7.6	N	-	N	-ve: Requires some more explanation
7.7	N	-	N	-
7.8	N	-	N	-
7.9	N	-	N	-
* 7.10	N	-	N	-
8.1	N	-	N	-
8.2	N	Whole section requires more explanation	Y	-ve: Only students those who study mathematics will be in a position to understand this topic well
8.3	N	-	Y	"
8.4	N	-	Y	"
8.5	N	-	Y	"
8.6	N	-	Y	"

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
9.1	N	-	Y	-ve: It is better to give only qualitative discussion at this stage
9.2	N	-	Y	-ve: "
9.3	N	More details can be given especially about experiments by Indian Scientist Jagdish Chandra Bose	N	-
9.4	N	-	N	-
9.5	N	-	N	+ve: Reference to Concept of 'green house effect'.
10.1	N	-	N	-
10.2	N	-	N	-
10.3	N	-	N	-
10.4	N	-	SW	-
10.5	N	-	SW	-
10.6	N	-	SW	-
10.7	N	-	SW	-
11.1	N	All the technical terms and their units	N	-ve: Photometry can be a separate unit at Std.XII level, with some more details.
11.2	Y (in this unit)	-	-	-
11.3	-	-	N	-
11.4	N	Snell's law - not properly stated	N	+ve: Reference to Optical fibres
11.5	N	-	N	-ve: 11.6 should have been given before 11.5 to enable the readers to understand the total internal reflection in the case of 45^{0} prism.

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
11.6	N	-	N	-
11.7	N	-	N	-
11.8	N	-	N	-
11.9	N	-	N	-
11.10	N	-	N	-
11.11	N	-	N	-
11.12	N	Details about circular scale on the instrument spectroscope is missing	N	-ve: In the textbook, it is stated "Some typical spectra are shown in the colour plates in the book" - but these colour plates are altogether missing in the textbook (not even included in pre/post-textbook pages)
11.13	N	All the terms have not been clearly defined/ explained	SW (Due to lack of details)	"
11.14	N	-	N	-
11.15	N	All the terms have not been defined - their word meanings are also missing.	N	-ve: At STD.XII level, this section seems to be too short.
11.16	N	-	N	-
11.17	N	-	N	-ve: In this section, there could have been atleast some reference to electron microscope.

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
11.18	N	In 11.17, a simple microscope has been discussed to begin with; similarly there is a need to discuss briefly a simple telescope in 11.18	N	-ve: While Introducing technical terms named after scientists, the book doesn't say any thing about such scientists - i.e. atleast to say why they are named so; e.g. Cassegrain telescope, Newtonian reflector, Schmidt reflector, etc.
11.19	N	-	N	-
12.1	N	-	N	+ve: Quotations from Davisson's Nobel address and several citations of the Nobel Prizes chronologically appear to really excite the learners.
12.2	N	Diagrams, showing the observations at different pressures are missing.	N	-
12.3	N	-	N	-
12.4	N	-	N	-
12.5	N	-	N	-
12.6	N	-	N	-
12.7	N	-	N	-
12.8	N	-	N	-
12.9	N	-	SW	-
12.10	N	-	N	-
13.1	N	-	N	-
13.2	N	To begin with, the question, "What are α-particles?" should have been briefly answered.	N	-

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
13.3	N	-	N	-
13.4	N	-	N	-
13.5	N	-	N	-
13.6	N	Exact meaning/definition of binding energy is missing	N	-
13.7	N	-	N	-
13.8	N	1) The process of radioactivity has not been properly stated. 2) Differences between the characteristics of α, β, and γ decay products have not been properly presented.	N	-
13.9	Y (as a separate section 13.9, 10 & 11 could be together)	Terms not clearly defined	N	-
13.10	N	More examples are needed	N	-
13.11	N	"	N	-
13.12	N	Schematic diagram and actual photographs are needed.	N	+ve: Certain details about Indian nuclear reactors are given - but there is need to give some more details.
13.13	N	There should be more discussion on 'Nuclear Energy for Peaceful purposes'	N	-

TABLE No.5.3 (CONTD)

P.No.2

	6	7	8	9
13.14	N	-	N	-
13.15	N	-	N	-
13.16	N	-	SW	-
13.17	N	-	SW	-
A	N	-	N	-
14.1	N	-	N	-
14.2	N	-	SW	-
14.3	N	-	SW	-
14.4	N	-	SW	-
14.5	N	-	SW	-
14.6	N	-	SW	-
14.7	N	-	SW	-
B → 14.8	N N	-	SW SW	-
* 14.9	N	-	SW	-
14.10	N	-	SW	-
C.	N	-	SW	-ve: This section is too long.
14.11	N	-	SW	-
14.12	N	-	SW	-
* 14.13	N	-	SW	-
* 14.14	N	-	SW	-
15.1	N	-	N	-
15.2	N	-	N	-ve: While discussing about comets, Halley's comet could have been mentioned.
15.3	N	-	N	-
15.4	N	-	N	-
15.5	N	-	N	-

TABLE NO.5.4

(CULLED FROM THE DETAILED TABLE NO.5.3)

CERTAIN POSITIVE ASPECTS OF THE CONTENT :

S.No.	CONTENT ASPECTS	FOR STD.XI TEXTBOOK		FOR STD.XII TEXTBOOK	
		No. of Sections (N=122)	APPROX. %	NO.OF SECTIONS (N=133)	APPROX. %
1.	Sections which appear to be clear in write-up.	66	54%	63	47%
2.	Sections which appear to be somewhat clear in write-up.	44	36%	55	41%
3.	Sections which seem to be interesting/exciting.	46	38%	30	23%
4.	Sections which seem to be somewhat interesting/exciting.	29	24%	66	50%
5.	Sections which do not seem difficult for students.	74	61%	84	63%
6.	Sections for which additional positive remarks/appreciations have been made by the investigator.	6	5%	7	5%

TABLE NO.5.5 (CULLED FROM THE DETAILED TABLE NO.5.3)

CERTAIN INADEQUACIES OF THE CONTENT

S.No.	CONTENT ASPECTS	FOR STD.XI TEXTBOOK		FOR STD.XII TEXTBOOK	
		No. of SECTIONS (N=122)	APPROX. %	NO.OF SECTIONS N=133	APPROX. %
1.	Sections which do not seem to be clearly written.	12	10%	15	11%
2.	Sections which do not seem to be exciting/interesting to the learners.	47	39%	37	28%
3.	Sections which seem to be somewhat difficult for learners.	23	27%	38	29%
4.	Sections which seem to be very difficult/above the learners' level.	15	12%	11	8%
5.	Sections of which the content seem to be unnecessary (partly/fully)	3	2%	6	5%
6.	Sections which require more explanation for certain terms/concepts.	10	8%	21	16%
7.	Sections for which additional criticisms have been made by the investigator.	15	12%	19	14%

details the following items of information were obtainted:

OVERALL POSITIVE ASPECTS OF CONTENTS IN ALL SECTIONS :

- If we compare the total percentages of content aspects Nos. 1 & 2 in Table No.5.4 (4.217) with content aspect No.1 in Table No.5.5 (4.518) it is seen that only very few (about 1/10) of the sections seem to be written without much clarity in content, in both the textbooks.

- While comparing the total percentages of content aspects Nos. 3 & 4 from Table No.5.4 with No.2 in Table No.5.5, it can be inferred that approximately 2/3 of the sections of both the textbooks are not altogether dull or uninteresting in their content presentation.

- Comparison between the percentages of content aspect No.5 in Table No.5.4 with the total percentages of content aspects Nos. 3 & 4 in Table No.5.5 shows that the content of roughly 2/3rd of the sections in both the textbooks appears to be easy for learners to comprehend.

- Most of the examples(i.e., solved problems or questions with answer) given in sections are useful in overall understanding of the section/s/chapter/s.

OVERALL INADEQUACIES OF CONTENT IN THE SECTIONS:

- By referring to Table No.5.5, it can seen that the data for content aspects Nos. 1 & 4 indicate inadequacies: but they may not be of major importance (vide Table No.5.4).

- Aspects No.5, 6 & 7 in Table No.5.5 go against the positive aspects of the content, eventhough the percentage of cases are not that high.

- Every section does not contain examples (with answers). In STD.XI textbook, for a total number of 122 sections, there are only 83 examples; and in STD.XII textbook, for a total number of 133 sections, 79 examples are present.

- Regarding the nature of answered examples, not all of them are numerically based problems, which are in fact needed most in physics; a few are short answer type which can better fit into end-of-chapter exercises rather than to be answered within the chapter.

- As such it is very difficult to note even a single chapter which seems perfect in all respects in content presentation eventhough several sections within the chapter/s are well presented; however, from readers' point of view, contents of Ch.7,12 & 13 in STD.XI and Ch.1,2,5,8 & 9 in STD.XII seem to be somewhat tough,dull and uninteresting in many respects and hence may not help much in the learning process due to several reasons.

5.1.2.4: FOR OBJECTIVE NO.1(b)(iv): i.e. SUITABILITY of INTEGRATED SCIENCE APPROACH :

POSITIVE ASPECTS :

FOR STD.XI TEXTBOOK :

- In Ch.1 in p.1, there is reference to science in general, and in p.3 to interdisciplinary nature of scientific development.

- In Ch.9, in p.208, the statement, "formation of a molecule is chemical, while intermolecular forces are physical"- relates physics and chemistry very well.

FOR STD.XII TEXTBOOK :

- In Ch.1, there are references to contributions to physics from a medical doctor, i.e., William Gilbert and a scientist-statesman i.e., Benjamen Franklin.

- In Ch.2, Gauss has been described as a man gifted in mathematics, physics, engineering, astronomy and land surveying; and Cavendish has been referred to as a physicist as well as a chemist.

- Ch.3 mentions about a professor of anatomy, who had contributed to the field of physics.

- Ch.4, referes to the contributions from a watchmaker turned physicist, i.e. Peltier.

- Ch.5, refers to the contributions from a jurist, i.e. Romagnosi to the field of physics (p.137).

- Ch.15, refers briefly about certain concepts of religion and philosophy.

Though very few, the above observations, atleast to some extent, support the expected integrated science/ interdisciplinary approach, in the physics textbooks under study.

TABLE NO.5.6

CONTENT ANALYSIS FOR OBJECTIVE NO.1(b)(iv); i.e., SUITABILITY OF INTEGRATED SCIENCE APPROACH - IN TERMS OF REFERENCES TO OTHER BRANCHES OF PURE & APPLIED SCIENCE

Std.	Che.	Bio.	Geo-logy	Astro-nomy	Geo-gra-phy	Medi-cal	Agri-cul-ture	Engg. & Tech.	Others
XI	8	12	3	18	2	2	-	8	8
XII	6	2	4	9 + 1 Chapter (Ch.15)	2	1	-	14	3

INADEQUACIES :

- Based on the data available for each chapter Table No. 5.6 has been prepared; eventhough it is not possible to relate all chapters/topics in physics to other branches of pure and applied science, the situations in both the textbooks are very much disappointing if we look at the figures as they are; however, out of all areas, astronomy and Engg/ technology seem to be more touched upon while presenting the content in both the textbooks.

5.1.2.5. FOR OBJECTIVE NO.1(b)(v):i.e.,REFERENCE TO SCIENTISTS AND HISTORY OF SCIENCE :

The data observed for this objective have been presented in Table No.5.7(pp.224-234).

I.POSITIVE ASPECTS:

- Most of the chapters in both the textbooks contain references to physicists/scientists the maximum (47) being in Ch.12 of STD.XII.

- In the case of Std.XI textbook, atleast one specific (but brief) and direct reference to history of physics has been made in most of the chapters; whereas, in Std.XII textbook only in some 6 chapters, there are references to the history (and a few other chapters indirectly reflect the same, only through the scientists' brief works and their periods.)

- Ch.11 & 15 of Std.XII have shown maximum and very systematic historical presentation in the development of physics and astronomy respectively.

- There are a few references to the history and philosophy of science during ancient Indian period.

II. INADEQUACIES :

- Photographs of only 13 and 21 Scientists, have been included in STD.XI and STD.XII textbooks respectively, with the brief notes on their period and their contributions.

- In the case of most of the scientists whose photographs are not given, even the information given about them are not at all sufficient.

TABLE NO. 5.7

CONTENT ANALYSIS FOR OBJECTIVE NO.1(b)(v): i.e., REFERENCE TO SCIENTISTS & HISTORY OF SCIENCE

CHAPTER NO.	REFERENCE TO PHYSICISTS/OTHER SCIENTISTS/PHILOSOPHERS/OTHER EMINENT PERSONALITIES			REFERENCES TO HISTORY OF SCIENCE/ REMARKS POSITIVE ASPECTS (+ve) INADEQUACIES (-ve)
	NAME	WHETHER PHOTOGRAPH IS INCLUDED YES/NO (Y/N)	WHETHER THE GIVEN DETAILS ARE SUFFICIENT YES/SOMEWHAT/NO (Y/SW/N)	
1	2	3	4	5
1.	Newton	N (but given in Ch.5, p.84)	N (but given in Ch.5, p.84)	+ve: Some reference to ancient Indian 'shastras' and science; but there is a need to give more information on their relationship.
2.	Galileo	N (but given in Ch.5,p.82)	N (but given in Ch.5,p.82)	+ve: References to the history behind measurement of length and time.
	Newton	N	N	
3.	Galileo	N	N	+ve: A brief reference to the failure of the philosophers of old times to understand velocity- but this requires more details.
	Euclid	N	N	
	Gauss	N	SW	
	Newton	N	N	
4.	Pythagoras	N	N	-

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
5.	Galileo	Y	Y	+ve: Reference to Greek philosopher Aristotle's concept of force.
	Newton	Y	Y	
	Coulomb	N	N	+ve: Information regarding the coincidence of the year (1642)-of Galileo's death and Newton's birth.
	Aristotle	N	SW	
	Leonardo da Vinci	N	N	
	Einstein	N(given in Ch.8,p.182)	N(given in Ch.8,p.182)	
6.	Hooke	N	N	+ve: Brief history of steam engine.
	James Watt	Y	Y	
	Newcomen	N	N (just mentioned)	
	Einstein	N	N	
7.	Newton	-	-	+ve: A brief reference to history related to Kepler's first law
	Kepler	N(given in Ch.8,p.179)	N(given (in Ch.8,p.179)	
8.	Galileo	-	-	+ve: Brief reference to Galileo and tower of Pisa.
	Newton	-	-	
	Stukeley	-	-	+ve: Reference to Newton and 'Falling of apple' incidence.
	Cavendish	N	SW	
	Eotvos	N	SW	+ve: Brief reference to Newton's invention of calculus.
	R.H.Dicke	N	SW	
	Kepler	Y	Y	+ve: Reference to history related to Newton's discovery of the universal law of gravitation.
	Ptolemy	N	SW	
	Copernicus	N	SW	+ve: Reference to weighing of the Planet Earth for the first time by Cavendish.
	Tycho Brahe	N	SW	
	Einstein	Y	Y	

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
8.	S.N.Bose	N	SW	+ve: Brief reference to history of artificial satellites.
	Euclid	N	N	
	Riemann	N	N	+ve: Reference to history behind Kepler's laws of planetary motion.
	Gauss	N	N	
9.	Kanada	N	N	+ve: Concept of 'paramānu' (atom) by Kanada - 'Vaiseshika' school of thought
	Lord Buddha	N	N	+ve: 'Lalithavistara'- Lord Buddha's biography.
	Democritus	N	N	
	Plato	N	N	
	Dalton	Y	Y	
	Avogadro	Y	Y	
	Clausius	Y	Y	
	Maxwell	Y	Y	
	Binning	N	N	+ve: Nobel Prize in 1986 for the invention of scanning tunnelling microscope.
	Rohrer	N	N	
	Brown	N	N	
	Perrin	N	N	
	Einstein	N	N	
10.	Robert Hooke	N	N	+ve: Reference to history - finding the purity of gold crown by Archimedes.
	Young	N	N	
	Boyle	N	N	
	Pascal	N	N	
	Archimedes	N	SW	
	Reynold	N	N	
	Bernoulli	N	N	
	Charles	N	N	
	Kelvin (William Thompson)	Y	Y	
	Boltzmann	Y	Y	

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
11.	Benjamin Thompson (Count Rumford)	N	Y	+ve: History related to the concept of horse power
	Joule	Y	Y	+ve: Joule's historical experiments extending over nearly forty years to establish the equivalence between heat and energy.
	William Thompson	N	N	
	Dulong	N	N	
	Petit	N	N	
	Maxwell	N	N	
	Clausius	N	N	
	van der Waals	Y	Y	
12	Halley	N	Y	+ve: Reference to Halley's Comet
	Fourier	Y	Y	
	Hooke	N	N	
	Newton	N	N	
	Leibnitz	N	N	
13.	Huygens	N	N	+ve: Reference to aesthetic influence of waves on art and literature from very early times.
	Hooke	N	N	
	Newton	N	N	
	Fourier	N	N	
	Doppler	N	N	-ve: It is not even mentioned that Doppler is the name of a physicist in discussing Doppler effect.

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
FOR CLASS XII: TEXTBOOK:				
1.	Thales of Miletus	N	Y	+ve: Contribution from ancient Greeks & Chinese.
	Gilbert	N	Y	
	Benjamin Franklin	N	Y	
	Coulomb	Y	Y	-ve: Photograph and details given at the end of the chapters unlike in STD.XI textbook.
	Feyman	N	SW	
	Faraday	N	SW (given in Ch.4 & 7)	
	Maxwell	N	N	
2.	Coulomb	-	-	
	Gauss	Y	Y	+ve: Historical experiments (p.48 last para) by Franklin and Cavendish in connection with the zero field inside conducting shell of charge.
	Cavendish	Y	Y	
	Franklin	N	N	
	Priestley	N	N	
	Faraday	N	SW	
	van de Graaf	N	N	
3.	Galvani	N	N	
	Volta			
	Ohm	N	N	
	Tolman	N	N	
	Stewart	N	N	
	Kirchhoff	N	N	
	Wheatstone	N	N	

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
4.	Seeback	N	Y-(Only expt. details)	
	Peltier	N	Y- " "	
	Galvani	N	Y- " "	
	Volta	N	Y- " "	
	Faraday	N	Y- " "	
	Maxwell	N	Y- to some extent	
	Daniel	N	N	
	Leclanche	N	N	
	Thomson	N	N	
5.	Romagnosi (basically a jurist)	N	SW	+ve: Historically, negligence was shown to Romagnosi's observation in connection with magnetic effect of electric current and the same was rediscovered by Oersted, who could get recognition.
	Oersted	N	SW	
	Arago	N	N	
	Ampere	Y(at the end of the chapter)	Y	
	Biot	N	N	
	Savart	N	N	
	Tesla	N(but given at the end of Ch.8)	N	
	Lorentz	N	SW	
	Hall	N	N	

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
6.	Miletus	N	SW	-ve: This whole chapter is not presented historically/ it could have been given earlier
	Gilbert	N	SW	
	Weber	N	N	
	Gauss	N	SW	
	Oersted	N	SW	
	Cavendish	N	N	
	Coulomb	N	N	
7.	Faraday	N	Y	
	Henry	N	N	
	Lenz	N	SW	
	Lorentz	N	SW	
8.	Faraday	N	Y	
	Hertz	N	N	
	Kirchhoff	N	N	
9.	Maxwell	N	SW	
	Hertz	Y (at the end of the chapter)	Y	
	Jagdish Chandra Bose	Y "	Y	
	Marconi	N	Y	
10.	Brewster	N	N	
	Young	N	SW	
	Doppler	N	N	
	Huyghens	Y (at the end of the chapter)	Y	
	Fresnel	Y (at the end of the chapter -but not referred to in the text)	Y	
	Foucault	Y " "	Y	

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
11.	Galileo	-	-	
	Romer	N	N	
	Fizeau	N	N-except his method	
	Michelson	Y	Y	
	Newton	-	-	
	Snell	N	N	
	Fraunhofer	N	N	
	Cassegrain	N	N	
	Schmidt	N	N	
12.	Faraday	N	Y	+ve: (pp.302-305) List of physicists and their contributions in chronological order gives a very good picture of historical development in physics; moreover the citations of the Nobel Prizes further excite and strengthen the development of modern concepts in physics
	Plucker	N	Y	
	Hittorf	N	Y	
	Goldstein	N	Y	
	Crookes	N	Y	
	Hertz	N	Y	
	Lenard	N	Y	
	Kaufmann	N	Y	
	J.J. Thomson	Y	Y	
	Millikan	N	Y	
	Rontgen	N	Y	
	Lorentz	N	Y	
	Zeemann	N	Y	
	Beequerel	N	Y	
	Pierre Curie	N	Y	
	Sklodowska-Madam Curie	Y	Y	
	Anton	N	Y	
	Lenard Laue	N	Y	
	W.H. Bragg	N	Y	

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
	W.L. Bragg	N	Y	
	Planck	N	Y	
	Einstein	-	Y	
	Bohr	Y	Y	
	Millikan	N	Y	
	Gustav	N	Y	
	Hertz	N	Y	
	Wilson Compton	N N	Y Y	
	de Broglie	Y	Y	
	C.V. Raman	N	Y	
	Heisenberg	N	N	
	Schrödinger	N	Y	
	Paul	N	Y	
	Dirac	N	Y	
	Chadwick	N	Y	
	Hess	N	Y	
	Anderson	N	Y	
	Davisson	N	Y	
	G.P. Thomsan	N	N	
	Fermi	Y	Y	
	Balmer	N	N-Not at all	
	Rydberg	N	N- "	
	Germer	N	N- "	
	Ruska	N	N-	
	Binng	N	N-	
	Rohrer	N	N	

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
13.	J.J.Thomson	-	Y	+ve: Historical reference to nuclear bomb explosions at Hiroshima and Nagasaki.
	Rutherford	-	Y	+ve: Reference to explosion of Chernobyl reactor at the former USSR.
	Geiger	N	N	
	Marsden	N	N	
	Perrin	N	N	
	Nagaoka	N	N	
	Coulomb	-	-	
	Schrödinger	N	-	
	Heisenberg	N	-	
	Rydberg	-	-	
	Balmer	N	N	
	Lyman	N	N	
	Paschen	N	N	
	Pfund	N	N	
	Chadwick	N	N	
	Becquerel	N	N	
	Hahn	N	-	
	Strassmanu	N	N	
	van der Waal	N	N	
14.	Boltzmann	N	N	
	Bardeen	N	N	
	Brattain	N	N	
	Shockley	N	N	
	Kirchhoff	N	N	

TABLE NO.5.7 (CONTD.)

1	2	3	4	5
15.	Aryabhata	N	N	+ve: Most of the concepts are historically presented.
	Ptolemy	N	N	
	Copernicous	Y	Y	
	Galileo	-	-	
	Kepler	N	N	
	Newton	N	-	
	Helmholtz	N	N	
	Kelvin	N	-	
	Bethe	N	N	
	Chandrasekhar	Y	Y	
	Herschel	N	N	
	Shapley	N	N	
	Kant (Philosopher)	N	Y	
	Hubble	N	SW	
	Aristotle	N	N	
	Doppler	N	-	
	Humason	N	N	

- In the case of a few scientists, their names have been mentioned while refering to their contribution but without even mentioning that these are scientists' names; eg; Brewster angle in Ch.10; because in some rare cases, unless is it specified, readers may not even know whether the new name is the name of a person or place or an event, as they are mostly foreign names.

- Most of the references to history of physics are very brief.

5.1.3: FOR OBJECTIVE NO.1(c): i.e., POST-TEXT PAGES:
FOR STD.XI PART.I TEXTBOOK:

These consist of only answers for exercises from Ch.2-8; For Ch.1, answers are not given.

FOR STD.XI PART II: TEXTBOOK : These consist of :

(i) ANSWERS to exercises from Ch.9-13.

(ii) INDEX for Part I & II: Eventhough more than 400 terms have been included in this, still, one would be in a position to point out several missing terms, even those which have been printed in italics in the text.

(iii) BIBLIOGRAPHY: Consists of a good number of useful books, but all from foreign authors; moreover, they are without any specification regarding particular chapters and pages for particular chapters in the textbooks.

(iv) CORRIGENDUM: There is no corrigendum or errata at the end of STD.XI textbooks, eventhough this is mentioned in the preface (Part I p.vii, pa.2).

FOR STD.XII. PART I: TEXTBOOK:

In this case, post-text pages consist of :

(i) APPENDIX-A: THE MATHEMATICS OF LINE, SURFACE AND VOLUME INTEGRALS (pp.121-127):

This is useful only for students who study mathematics along with physics and that too if they have gone ahead with sufficient practice in solving problems on differentiation and further if they have through practice in integration in calculus.

(ii) ANSWERS to exercises in Ch.1-4.

(iii) INDEX is altogether missing in this book; it is not given even along with Part II (as in the case of STD.XI).

FOR STD.XII. PART.II TEXTBOOK: These consist of

(i) EPILOGUE : This gives a sort of exciting link to many of the major concepts within the main framework of physics; but this cannot be considered as full-fledged summary of the complete physics course for Snr. Sec. level; moreover, this epilogue, does not relate much in a significant way to what has been presented in the prologue, through the preface as well as in Ch.1-Introduction(in STD.XI. Part I textbook).

(ii) APPENDIX B. UNITS IN ELECTRICITY AND MAGNETISM:

No doubt this is useful for readers especially those who wish to refer to other reference materials; but can be fully digested by only those who would digest calculus; moreover it would have been better if these pieces of information were incorporated within the relevant chapters on Electricity & Magnatism.

Table.2 on Elements on p.359 could have been given as appendix, as it is useful to deal with all chapters.

(iii) ANSWERS to Exercises from Chapt. 5-15.

(iv) INDEX FOR PART II (ONLY): This consists of more than 500 terms; but not that all the terms, included in the chapters, are present; the end-of-chapter exercises contain several scientific terms related to advanced physics (which were of course not touched in the chapter discussion) are not available in the index.

(v) BIBLIOGRAPHY: The same as given in STD.XI Part II textbook.

(vi) CORRIGENDUM : or errata is missing eventhough this is indicated in the Preface of Part I.

5.2 FOR OBJECTIVE NO.2, i.e., TO CRITICALLY EXAMINE THE PHYSICS TEXTBOOKS AS TO THEIR SUITABILITY TO THE DEVELOPMENT OF SOME OF THE PROCESSES OF SCIENTIFIC INQUIRY :

As discussed in Ch.II and Ch.IV, the process aspects of physics have been conceptualized in terms of the following three sub-aspects which are of course interrelated: scientific attitude, scientific method and scientific process skills; the former influences the scientific method, which in turn involves the process skills; some cases of these have been identified in terms of the sub-categories/steps wherever they get reflected directly or indirectly in a prominent way, in the presentation of the content in the textbooks, of course by keeping in mind that a textbook as such cannot directly develop the process aspects but can only help to develop.

As discussed in the previous chapters, scientific attitude has been identified in terms of sub-categories such as developing interest, curiosity, humility, skepticism, open-mindedness, suspended judgement, critical thinking, avoidance of dogmatism or supertition, determination, positive approach to failure, etc. Scientific method gets reflected in terms of major steps or procedures such as statement of the problem, observation, hypothesisation, theorisation, experimentation, conclusion, etc. The use of scientific method involves certain delicate processes or process skills such as observing, measuring, classifying, using numbers, using space-time relationships, defining operationally, formulating hypotheses, formulating mental models, theorisation, controlling variables, experimenting, interpreting data, infering, predicting, communicating, etc.; here it has to be recalled that skills have been listed starting from the simpler to the more and more complex and they are hierarchical in nature too, as the lower skills are somewhat prerequisites too to the higher ones. As these process skills are within the scientific methodology, at times it is difficult to trace them out from their overlappings.

It may be noted that, as such, it is not very meaningful to separate process aspects from product aspects; everytime a product aspect is introduced, the process aspect would be attached to that; because of the bulky product of the textbook, it is difficult to present all the cases of process aspect in the report; so, this section of analyses and interpretations deal with only a representative sample of seemingly striking cases of process aspects as they got reflected in the overall content presentation.

FOR STD.XI TEXTBOOKS : (a) FOR SCIENTIFIC ATTITUDE:

POSITIVE ASPECTS :

- All the 13 chapters contain atleast some references or the other to the physicists and their works related to the content of the respective chapters which help in creating interest for physics among the readers.

- In the case of Ch.5 & 8 the sub-aspect of creating interest seems to be heavily loaded by referring to the history of physics with respect to mainly Galileo's and Newton's works.

- Ch.9 has created very good interest by referring to physics in ancient India in connection with 'Vaiseshika' school of thought and Lord Buddha's biography - 'Lalitavistara'; these reflect on critical thinking too by some of the ancient Indians.

- In Ch.8, reference to Cavendish's experiment to determine 'G' which has led to the indirect method to weigh our planet Earth, would be definitely creating very good interest among the careful readers; but there could have been more emphasis on this important information.

INADEQUACIES :

- An attempt has been made to create some interest by referring to the physics behind some toys, only in Ch.7 (but that too under starred section only - spinning top and rolling coin); perhaps all readers may be interested in going through these information but may find it difficult to digest as the treatment of the whole chapter is not that easy to follow.

- Developing interest by referring to the major application and use of principles of physics in daily life is seen only in two chapters i.e. application and use of thermodynamics in Ch.11 and application of Doppler effect in Ch.13.

- Curiosity or eagerness to know more is reflected briefly but indirectly, only in Ch.1 and 3.

- Open-mindedness is briefly reflected only in Ch.1.

- Critical thinking is likely to get developed to some extent among the readers while going through the historical aspects presented in Ch.5 and 9 only.

- Eventhough reference has been made to a comet (Halley's comet) in Ch.12, no attempt has been made in the Chapter to relate and hence to reject the superstition in India about it.

- Original direct quotations from the works of the physicists are presented only in Ch.5 (Galileo's); but this quotation may not impress the students much. Other chapters do not seem to contain any original quotation to create special interest among students.

- Brain teasers, which would develop special interest while reading, do not seem to be present throughout the textbook.

- The investigator has not been able to locate direct or indirect support given to the development of all other subcategories of scientific attitude.

(b) FOR SCIENTIFIC METHOD:

I. POSITIVE ASPECTS :

- Ch.8 reflects on the deeper importance given to the major step - observation, in scientific method, by Galileo and Newton.

- Ch.8 (p.171) gives certain details about Cavendish's experiment to determine 'G', and hence to weigh the planet Earth; here a careful reader might conceptualize the importance of measurement, the accuracy achieved even in 18th century studies, the practical and theoritical applications of the experimental conclusions, etc.

- Ch.9 reflects on the importance of hypothesisation in the development of physics by discussing Avogadro's hypothesis.

- Ch.9,10,11,12 & 13 reflect on the details of theorisation in the development of physics by referring to Dalton's atomic theory, kinetic theory of gases, thermodynamic states, SHM and wave function respectively, though the presentation of the process of theorisation might seem very dull in the case of last two major concepts.

- Ch.10 reflects very much on early experimental designs followed by Boyle and Charles especially by controlling the three major variables in thermal physics, which eventually led to their laws.

- Ch.5 indirectly reflects on sticking on to the scientific method by stating Newton's laws of motion only after discussing fully about them, unlike in traditional textbooks (and even in typical instruction), where a law is stated first followed by experimental verification. A similar treatment

of the content is observed in Ch.11, where the laws of thermodynamics have been stated only after discussing the related theorisation, measurement and experimentation, etc.

INADEQUACIES :

- Eventhough an indirect attempt has been made in Ch.1 Introduction, (p.1, para 3 & 4) to refer to the steps involved in scientific method, steps such as statement of the problem and experimentation are somehow missing.

- Ch.2,3,6 & 9 somehow do not reflect on scientific method, though some process skills as such, are observed in these indirectly.

- Cases of experimentation followed by careful observation, inference and prediction which lead to the collection of a lot of information are altogether inadequate; as such even suggested activities (outside the class) leading to the above are also very rarely given.

(c) SCIENTIFIC PROCESS SKILLS :

POSITIVE ASPECTS :

- All chapters contain cases of direct or indirect support to the development of scientific process skills, the maximum number of skills being in Ch.10 (incidently which is the longest chapter too with 48 pages) and the minimum being 2 in Ch.3 & 13.

- The most simple but one of the most important skills of observation is specifically reflected in Ch.1,2 and 8.

- The skill of measuring is very much identified in Ch.1 & 2; as Ch.2 itself is on 'Measurement', it has been stressed very well along with the skill of observation.

- The skill of classification has been identified specifically in the following cases: Classification of (i) errors (Ch.2),(ii) the basic forces in nature (Ch.5), (iii) the different forms of energy (Ch.6), (iv) the types of motion, in two categories, linear and rotational (Ch.7) and (v) the three different types of elastic moduli i.e.(Ch.10).

- The skill of using numbers has been very broadly and widely used, as the language of physics, i.e. mathematics is full of alphabets in the form of numbers; some of the stronger examples are in the following cases: (i) In connection with abbreviation in powers of 10 (Ch.2, p.9), (ii) In the conceptualization of differential calculus (Ch.3,7 & 12), (iii) In the conceptualization of and the mathematical operations in vector algebra (Ch.4,6,7), (iv) In systematizing the procedure for solving problems in mechanics (Ch.5 pp.101-102) (v) In system of units in powers of seven as given in the reference made to Lord Buddha's biography (Ch.9, p.196), (vi) In the conceptualizations of Avogadro's number (Ch.9) and Reynold's number (Ch.10).

- The skill of using space-time relationships seems to get emphasis almost throughout the following chapters : Ch. 3,4,5 & 6.

- Some of the examples for the possible development of the skill of defining operationally are as follow: (i) Introduction of terms such as impulse, momentum, force, etc. (Ch.5), (ii) The concepts of work and energy (Ch.6), (iii) The concepts of temperature based on Kinetic theory of gases and triple point of water (Ch.11).

- In the historical development of atomic physics, Avogadro's hypothesis is a major example for the skill of formulating hypothesis (Ch.9).

- The skill of formulating mental models gets reflected very much (i) in the case of the conceptualization of micro and macro worlds (Ch.2, Fig.2,14 & 2.15) and (ii) in the case of three states of matter (Ch.9).

- Some ideas on skill of theorisation in physics are reflected in the development of kinetic theory of gases using certain operational definitions/assumptions (Ch.10), and in the theory building of SHM (Ch.12) and of wave function (Ch.13).

- Some of the examples for emphasis on the skill of controlling variables are the following:

(i) Work done by a constant force at different angles- angle being one of the variables (Ch.6), (ii) Gas laws when the temperature, pressure and volume are the three important variables (Ch.10) and (iii) starred portion on the thermodynamic processes with different constants and variables (adiabatic, isobaric, isochoric Ch.11, p.281).

- The skills of experimenting, observing, interpreting data and infering are difficult to separate from each other, as they have to be developing one after the other; these are reflected in cases such as: (i) suggested activity (Ch.2) in connection with angular distance (Fig.2.4) and inertial balance (Fig.2.11), (ii) experiments (Ch.5) on force due to a coiled spring (Fig.5.5) and of friction (Fig.5.7), (iii) the (theoretical as well as) experimental verification of

the conservation of energy (Ch.6), (iv) Cavendish's experiment to determine G (Ch.8), (v) historical experiment on Brownian motion as a direct evidence for molecules (Ch.9, pp.199-201), (vi) experiments related to properties of matter (Ch.10), (vii) study of SHM based on oscillations due to a spring (Ch.12, pp.207-308), (viii) situations related to (Ch.13) the study of superposition principle (Fig.13.3) and Doppler's effect (Fig.13.14).

- The skill of prediction gets reflected in cases such as: (i) The weight of a boy on earth, moon and other planets (Table 2.2, p.15 Ch.2), (ii) prediction with the help of graphical analysis (Ch.3,4,5,6,10,11 & 13), (iii) In Ch.10, prediction based on historically important extrapolation of graph of temperature versus volume of a gas (Fig.10.43) leading to the operational definition of the important concept of absolute temperature; moreover Charles' law also predicts that gases expand uniformly (linearly) with temperature (p.249), which led to the construction of gas thermometer, (iv) Ch.8 gives an idea about the possible predictions beyond the solar system.

INADEQUCIES :

- The major inadequacy with respect to the development of process skills through the textbook write-up is the lack of sufficient numbers of activities inside/outside the classroom, (Of course, these are included in a separate book titled 'Laboratory Manual' which was published later - the investigator has not dealt with the separate analysis of these manuals, as it is beyond the scope of this investigation as stated in Ch.I of this report).

- It appears that the process skill of communication hasn't got reflected even indirectly any where in the textbook.

FOR STD. XII TEXTBOOK :

(a) FOR SCIENTIFIC ATTITUDE:

POSITIVE ASPECTS :

- All the 15 chapters made references to the physicists and their contributions to the chapter content, the maximum number being in Ch.12(48) followed by Ch.13 (19) and Ch.15 (17); these references would definitely help to develop interest in physics.

- History of physics gets reflected especially in Ch.1, (contribution by Greeks and Chinese in Electricity and Magnetism and later by a medical doctor, Gilbert in England and by an American scientist Benjamin Franklin), Ch.5, Ch.9 (observation of EM Waves), Ch.10 (Wave theory of light), Ch.12 (maximum reference to history and development of modern physics) and Ch.15.

- Nobel Prize address by Davisson in 1937 (Ch.12, p,303) would be very much exciting to the readers with all the high sounding, emotional and sensational words such as credence in the pessimistic saying, perfect child of physics, admirable decorum, rules of etiquette by Lorentz, privacy of the atom, well-behaved system, apology for perversity, unexplained absence, delight to a surrealist, remarkable fidelity, tour de force, etc.; if the readers are in a position to internalise the meaning behind all these words, it would go a long way in developing scientific attitude.

- Some of the other cases which might help to create interest are the following: Faraday's intuitive ways of thinking about the concept of lines of force (Ch.1), reference to earth's atmosphere as a fascinating laboratory

for the study of interaction of EM radiations and modern trends in telecommunications (Ch.9), introduction of modern popular topics such as liquid crystal display (LCD), digital circuits for computers, integrated circuits (IC), electronic evolution, etc. (Ch.14), importance of watching of night-sky, stellar evolution (Ch.12), etc.

INADEQUACIES :

- No doubt there are a few references to Indian contribution/information which are useful in developing scientific attitude; [some of these are: information about magnetic equator passing through India, near Tiruvananthapuram (Ch.6), J.C.Bose's contribution and Indian satellites (Ch.9), Indian nuclear reactor (Ch.13)] reference to 'Aryabhatiya' and Chandrashekhar's contribution (Ch.15)]; but the investigator's observation is that these are not at all adequate as many other important information are missing; in Ch.11, no reference has been made to advanced telescopes developed in India, in the field of Astronomy (Ch.15); references to information such as, Jantar Mantar Observatory in Delhi, advanced observatory in Udaipur, Astronomical Research Institutes at Udakamandal and Pune, etc., are missing in the relevant chapters of the textbook.

- Burning issues such as Green House Effect (Ch.9) have not been elaborated by connecting it to Environment Education, so as to strengthen scientific thinking and global understanding; similarly contents on AM & FM which are getting popular in India in broadcasting, are inadequate.

- Only Ch.12,13 and 15 make clear-cut references to the development of other important aspects of scientific attitude (as in the following cases: In Ch.12: Open-mindedness

and positive approach to failure while dealing with conceptual differences between Newtonian mechanics and quantum mechanics (Ch.12), determination and boldness to present revolutionary ideas such as the concept of photon, scepticism and critical thinking exhibited by some physicists; in Ch.13: critical thinking based on logic and experimental evidences to improve upon the various models of atomic structure and the positive approach to failure in discarding some models based on experimental evidences, appreciation and accommodation of paradoxes in classical and modern physics which led to the foundation of Quantum Physics by Schrödinger and Heisenberg, etc., and in Ch.15: aspects such as avoidance of dogmatism, open-mindedness and humility are reflected in its contents by making the readers to be aware of a number of unsolved challenging problems and questions regarding the structure and evolution of the universe, eventhough the scientists by now have gathered so much details by carefully avoiding the dogmas). No specific references have been found to the aspect of scientific attitude in all other chapters.

- Ch.13 discusses briefly nuclear holocaust by referring to World War -II with special reference to Hiroshima and Nagasaky in Japan and the recent explosion of the Chernobyl Reactor in the erstwhile USSR; but the details given may not be enough to impress upon the readers to firmly determine themselves to, not to use the scientific knowledge against humanity when they become physicists in future; this chapter did not connect issues to World Environment Education and World Peace Education; and in other chapters also, somehow or the other, there was no provision for such important linkings.

- Original direct quotations from the works of the physicists are available only in Ch.12 (by Davisson) and in Ch. 15 (From 'Aryabhatiya'); in other chapters, the quotations, which could have played a special role in developing scientific attitude are altogether missing though references to several physicists are there.

- Only in Ch.2, there is a brain teaser (p.54) in connection with calculation of capacitance; these teasers, if provided in all the chapters, could have developed better interest and scientific attitude.

(b) SCIENTIFIC METHOD :

POSITIVE ASPECTS :

- Ch.12, (p.301, para.2) contains very good statements about the scientific method; i.e.,

> "Although no one has 'seen' an electron as we see each other, its existence is well established. How did we come to know of it ? Exploration in this unknown territory involved chance discovery, false clues, dogged hard work, inference from facts, forming tentative hypotheses and their test with experiments. The story of the discovery of the electron is as exciting as any of your favourite detective stories".

The above statements reflect very well not only on scientific method but also on nature and structure of physics, development of scientific attitude as well as indirectly the process skills too. Perhaps, this is the only place in the whole textbook, where most of the steps in the scientific method are well-emphasised, though not in detail.

- Ch.15 lays special emphasis on observation as one of the major steps in the scientific method in the study of astronomical details by careful observation especially of night-sky and indirect methods of measurement, of course by making use of highly advanced telescopes.

- In Ch. 12, de Broglie's hypothesis on matter waves is emphasised. In Ch.13, there are references to hypothesisation and testing of various atomic models.

- Regarding theorisation, the following are some of the references: Gauss theorem (Ch.2), Kirchhoff's rules for electrical circuits (Ch.3), Biot-Savart law and Ampere's circuital law (Ch.5), Gauss theorem for magnetism (Ch.6), analyses of LCR circuits (Ch.8), EM waves (Ch.9), wave and particle nature of light (Ch.10), Quantisation and radioactive decay (Ch.13), stellar evolution (Ch.15), etc.

- Experimentation followed by inference leading to laws/effects are reflected in the following cases : Coulomb's law (Ch.1), Ohm's law (Ch.3), Faraday's laws of electrolysis and thermoelectric effect (Ch.4), Faraday's laws on EM induction (Ch.7) and photoelectric effect (Ch.12). Some of the cases of experimentation, careful observation, inference and prediction which led to the collection of a lot of information in physics are the following: Experiments with gold-leaf electroscope (Ch.3), Voltaic pipe (Ch.4), Oersted's experiments (Ch.5), Young's experiment to support wave nature of light (Ch.10), ray optics in the case of mirrors and lenses (Ch.11), experiment to measure velocity of light by Fizeau's method and Michelson's method (Ch.11), Geiger-Marsden's experiment on α-particle scattering based on Rutherford's nuclear model of the atom (Ch.13), experi-

mentations to study the characteristics of transistors (Ch. 14). In particular, Ch.12 contains several cases of the above type; some of them are: discharge of electricity through gases, experiments to note properties of cathode rays, measurement of e/m of electrons by Thomson, Millikan's oil-drop experiment which led to the determination of charge of an electron, Compton's investigation of scattering of monochromatic X-Rays from electron, Davison & Germer's experiment to observe wave nature of matter.

- Some of the cases of application of the information obtained from theories, experiments, laws, etc., are the following: Gauss theorem to find the field produced by certain simple sources (Ch.2), EM induction in electrical machines such as generators, transformers, etc. (Ch.7), knowledge of EM waves to study earth's atmosphere (Ch.9), ray optics in optical instruments (Ch.11), information from solid state physics in electronic devices such as semiconductor devices, digital circuits, binary adders, integrated circuits, etc.

INADEQUACIES :

- In the textbook, additional (suggested) activities along with the textual matter are almost missing; the additional activities would have strengthened the development of scientific method, especially for careful experimentation and observation using improvised apparatus at home or in the laboratory.

(c) SCIENTIFIC PROCESS SKILLSS :

POSITIVE ASPECTS:

- All the 15 chapters contain atleast a few cases of direct or indirect support to the development of scientific process skills.

- Much emphasis is laid on the importance of observation process skill especially in the following cases: Behaviour of certain objects while rubbing with each other to conceptualise static electricity (Ch.1) and the study of characteristics of charges produced by rubbing, by using gold-leaf electroscope (Ch.3), interference and diffraction pattern (Ch.10), discharge of electricity through gases (Ch.12), observation of night-sky (Ch.15), etc.

- The skill of measuring is specifically reflected in cases such as the following: measurement of voltages, current and resistences (Ch.3), measurement of velocity of light (Ch.11), measurement of charge of electron (Ch.12), indirect measurement of cosmic distance and masses (Ch.15), etc.

- Some of the cases of presence of skill of classification are as given below : classification of materials into conductors and insulators and into polar and non-polar dielectrics (Ch.2); classification of materials into dia, para and ferromagnetic materials (Ch.6); classification of EM waves based on their frequencies (Ch.9); classification of spectra (Ch.11); classification of nuclear reactions and bonding in molecules (Ch.13); classification of crystal system, semi-conductors, junctions, gates, binary adders (Ch.14).

- The skill of using numbers, eventhough present throughout the physics content, is reflected specially in some cases such as the following: using of integral calculus, higher mathematics including complex numbers (Ch.1,2,8,9); using numbers and colour codes to identify different resistors (Ch.3).

- The skill of using space-time relationship is reflected in Ch. 3,5,8,9,12 & 14 followed by graphical analyses; as such, the time coordinate gets involved in many cases indirectly whenever electric current (I) gets involved (as it is nothing but the rate of flow of electric charges) or work done and energy get involved (with their time coordinates).

- The skill of defining operationally mainly gets reflected in the following cases : In Ch.1- conventions adopted in naming positive/negative charges in the process of rubbing (by Benjamin Franklin), quantization, the unit of electric charge as coloumb, electric field, lines of force; in Ch.2- electric potential, electrostatic potential energy, equipotential surface; in Ch.3 - volt, ampere; in Ch.6 - gauss, oersted, magnetic declination, dip angle, etc.; in Ch.8 - ideal inductor, ideal capacitor, Q-factor of a current, etc; in Ch.9 - modulation, demodulation, carrier wave, modulating signal, etc.;in Ch.10 - polarisation, interference, diffraction, etc., in Ch.11 - sign conventions used in ray optics; in Ch.12 - photon, photocell, work function, de Broglie's wavelength etc.; in Ch.13 - radioactivity, α-particles, β-particles, γ-rays, fission, fusion, etc.; and in Ch.14 - lattice, unit cell, holes, mobility, doping, analogue signal, digital signal, gate, binary adders, IC, etc.

- The skill of formulating hypothesis specially gets reflected as in the case of hypothesisation of matter waves (de Broglie's hypothesis, Ch.12) and of various atomic models (Ch.13); the skill of formulating mental pictures and theorisation which are almost adjacent or nearer to the skill of formulating hypothesis gets reflected specially in the following cases: In Ch.8- formulating mental picture of an ideal capacitor by considering its components of two conductors as large parallel plates;in Ch.13- formalating

mental models of atomic structures - by Thomson, Rutherford and Bohr, and in Ch.15 - formulating mental models of planetary and star motion. The skill of theorisation gets reflected mainly in the following chapters (as discussed in the case of scientific method): Ch.2,3,5,6,9,10,13 and 15.

- The skill of controlling variables gets reflected specially in the following case: In Ch.5 - in the case of moving charges in magnetic and electric field (p.153-159).

- The skills of experimenting, observing and infering which take place one after the other are reflected in almost all the Chapters (as discussed in the case of scientific method) except perhaps in the case of Ch.2,6 & 15.

- The skill of prediction specially gets reflected to some extent (only) in the following cases : In Ch.2 - graphical prediction. In Ch.12 - prediction of matter waves based on dual nature of light and in Ch.15 - astronomical prediction.

INADEQUACIES :

- Same as in the case of Std.XI textbook (p.245 of this report).

5.3: FOR OBJECTIVE NO.3: i.e., TO CRITICALLY EXAMINE THE COMMUNICATION STRATEGIES, IN TERMS OF :

(a) QUESTIONING STRATEGIES.
(b) STATUS OF TERMS.
(c) STATUS OF ILLUSTRATIONS.

As discussed in Ch.II (pp. 64-68) & Ch.IV (pp.146-151), communication has been conceptualized as the interaction process between the textbook and the student-reader; questioning strategies, status of terms and status of illustrations such as pictures/diagrams/tables/photographs help a lot in the process of proper communication.

(a) FOR QUESTIONING STARTEGIES :

Table No.5.8(a) & (b) (pp. 256-257) give classifications and other relevant analyses for STD.XI and STD.XII textbooks respectively.

FOR STD.XI TEXTBOOK :

POSITIVE ASPECTS:

- In the whole textbook, number of higher order questions (p. 256) are the highest (79%).

- Based on the number of questions per number of sections in each chapter, the following chapters have more than one question per section (in the order of magnitude) : Ch.11,10, 7,9,4 & 3. In the process of communication with the learner in a textbook chapter, higher the number of suitable questions, the better.

TABLE NO. 5.8(a)

FOR OBJECTIVE No.3(a): i.e., CONTENT ANALYSIS TO CRITICALLY EXAMINE THE COMMUNICATION STRATEGIES IN THE TEXTBOOKS IN TERMS OF QUESTIONING STRATEGIES (FOR STD. XI TEXTBOOK):

CHAPTER NO.	No.of SIMPLE/ LOWER ORDER QUESTIONS	NO.OF ACTIVITY ORIENTED QUESTIONS.	NO.OF HIGHER* ORDER QUESTIONS	TOTAL NO. OF QUESTIONS	TOTAL NO.OF SECTIONS IN THE CHAPTER	NO. OF QUESTIONS PER SECTION.
1	-	-	1	1	3	0.33
2.	-	5	-	5	13	0.38
3.	-	-	10	10	9	1.11
4.	-	-	14	14	8	1.75
5.	-	3	3	6	10	0.60
6.	-	-	4	4	8	0.50
7.	3	1	23	27	9	3.00
8.	-	1	2	3	8	0.33
9.	1	-	12	13	6	2.17
10.	2	-	37	39	11	3.55
11.	10	-	19	29	8	3.63
12.	4	3	6	13	15	0.87
13.	1	1	1	3	13	0.23
TOTAL	21 (8%)	14 (13%)	132 (79%)	167	122	1.37 (AVERAGE)

*Refer p.

TABLE NO.5.8(b)

FOR OBJECTIVE NO.3(a): i.e., CONTENT ANALYSIS TO CRITICALLY EXAMINE THE COMMUNICATION STRATEGIES IN THE TEXTBOOKS IN TERMS OF QUESTIONING STRATEGIES (FOR STD.XII TEXTBOOK):

CHAPTER NO.	NO. OF SIMPLE/ LOWER ORDER QUESTIONS	NO. OF ACTIVITY- ORIENTED QUESTIONS	NO. OF HIGHER ORDER/ QUESTIONS	TOTAL NO. QUESTIONS	TOTAL NO.OF SECTIONS IN THE CHAPTER	NO. OF QUESTIONS PER SECTION
1	2	1	12	15	6	2.50
2	2	-	10	12	10	1.20
3	-	-	6	6	5	1.20
4	-	2	3	5	4	1.25
5	-	-	3	3	6	0.50
6	-	1	2	3	6	0.50
7.	-	-	-	-	10	0.00
8	-	1	-	1	6	0.17
9.	-	-	1	1	5	0.20
10.	-	-	5	5	7	0.71
11.	-	-	1	1	19	0.11
12	-	-	4	4	10	0.40
13	-	-	5	5	17	0.29
14	-	-	3	3	17	0.18
15	-	-	3	3	5	0.60
TOTAL	4 (6%)	5 (7%)	58 (87%)	67	133	0.50 (AVERAGE)

- The following chapters have a large number of (< 1 per section) higher order questions (in the order of magnitude) : Ch.10, 7,11,4,9 & 3 (of course, irrespective of the size of the chapters in terms of number of sections).

INADEQUACIES :

- Seven chapters out of 13, have less than one question per section; and in Ch.13,2,8 & 1 (starting from the lowest), it is less than 0.50; in the whole textbook, the average is just 1.37.

- Activity-oriented questions are the lowest in numbers (13 %) in the whole book, and these are totally absent in 7 chapters out of 13.

FOR STD.XII TEXTBOOK :

POSITIVE ASPECTS :

- Number of higher order questions are the highest (87%), compared to other questions in the whole textbook.

- Ch.1,4,2 & 3 (in the order of magnitude) contain, atleast more than one question per section.

- Ch.1,2 & 3 comparatively consist of somewhat large number of higher order questions.

INADEQUACIES :

- In 11 chapters (out of 15), number of questions per section is less than one; and among these, in 7 chapters, it is less than 0.5, the worst being Ch.7, which does not contain any question, for its size of six full sections with 21 pages; in the whole textbook, the average is just 0.50.

- Activity-oriented questions are too low in number and nil in the case of 11 chapters.

5.3(b)/ FOR OBJECTIVE NO.3(b): i.e., TO CRITICALLY EXAMINE THE COMMUNICATION STRATEGIES WITH RESPECT TO THE STATUS OF TERMS :

FOR STD.XI. TEXTBOOK :

Based on the findings shown on Table No.5.9(a) & (b) and 5.10(a) & (b) (Pp.260-290), the following major interpretations have been made; other detailed information for each chapter can be easily seen from the rows and columns of the tables themselves.

POSITIVE ASPECTS :

- In the case of Ch.7 & Ch.13, all the identified terms have been either defined or their meanings have been stated (as the case may be) and they do not contain any term which does not appear to be unclear.

- In the case of Ch.4,5,6 & 10, though they contain a few terms which have not been defined/stated in the respective chapters, atleast they have been clearly treated in the later chapters of the same class or the senior class (i.e. Std.XII), in some cases.

- As 91.7% of the terms identified are those whose definitions/meanings are given in the concerned chapters, the overall communication strategy with reference to the status of the terms is not at all bad; moreover about 94% (48.1% + 46.2%) of the terms appear to be understandable to the readers.

TABLE NO. 5.9(a)
CONTENT ANALYSIS

FOR OBJECTIVE NO.3(b) i.e., TO CRITICALLY EXAMINE THE COMMUNICATION STRATEGIES IN EACH CHAPTER IN TERMS OF STATUS OF TECHNICAL TERMS (FOR STD.XI TEXTBOOK):

CHAPTER No. & PAGE NO.	NEW, MAJOR/IMPORTANT SCIENTIFIC TERM/TERMS/ LAWS/PRINCIPLES/ THEORIES/DEVICES,ETC.	WHETHER DEFINED/ MEANING GIVEN/ STATED Yes/No (Y/N)	IF NO WHETHER DONE LATER ? (WHERE ?) (Y/N)	WHETHER IT IS CLEAR YES/ SOMEWHAT/ NO (Y/SW/N)	WHETHER INCLUDED IN THE INDEX Yes/No (Y/N)
1	2	3	4	5	6
Ch.1 P.1	Physics	Y		Y	N
	Science	Y		Y	N
2	Photoelectric effect	N	Y(Std.XII)	N	N
	Quantum Theory	N	Y(Std.XII)	N	N
3.	Pulsars	N	Y(Std.XII)	N	N
	Black hole	N	Y "	N	Y
	Fission	N	Y (Ch.12)	SW	N
	Laser	N	N	-	N
	Superconductivity	N	Y (Std.XII)	N	N
	Thermodynamics	N	Y (Ch.11)	Y	N
Ch.2 P.8	Unit	Y		Y	Y
	Derived unit	Y		Y	N
9	Length	Y		Y	Y
	Standard : metre	Y		Y	Y
10	Triple point	N	Y(p.205)	Y	N
	Optical interferometer	N	N	-	N
11	Parallax, annual	Y		SW	Y
	Elevation	Y		Y	Y

TABLE No.5.9(a) (CONTD)

1	2	3	4	5	6
11	Distance angular	Y		Y	Y
12	Parallax	Y		SW	Y
	Basis	Y		Y	N
13	RADAR	Y		SW	Y
	SONAR	Y		Y	Y
	Ultrasonic wave	Y		Y	N
15	Mass	Y		Y	Y
	Weight	Y		Y	N
	Atomic weight	Y		SW	Y
	Molecular weight	Y		SW	Y
	amu (Unit: Atomic mass unit)	Y		SW	Y
16	Inertia	Y		Y	Y
	Gravitational mass	Y		SW	Y
	newton (Unit)	N	Y (p.88)	SW	N
18	Mean Solar day	Y		SW	N
	Ephemeris time	Y		SW	N
	Dimensional analysis	Y		N	Y
21	Accuracy	Y		SW	N
	Error	N	Y(p.23)	SW	Y
	Instrumental error	Y		SW	Y
	Random error	Y		SW	Y
22	Significant figure	Y		SW	Y
23	Least count error	Y		N	Y
	Unit of Resolution	N	N	-	N
	Systematic error	Y		N	Y
	Random error	Y		SW	Y
	Gross error	Y		Y	N

TABLE No.5.9(a) (CONTD)

1	2	3	4	5	6
Ch.3 P.29	Mechanics	N	N	-	N
	Kinematics	Y			Y
	Statics	Y			Y
	Dynamics	Y			Y
	Motion	N	Y(p.30)	Y	Y
	Point object	Y			Y
34	Position, instantaneous	Y		Y	Y
	Uniform motion	Y		Y	Y
36	Relative velocity	Y		SW	Y
39	Constant acceleration	Y		SW	Y
45	Instantaneous acceleration	Y		SW	Y
Ch.4 p.55	Vector	N	Y(p.57)	Y	Y
56	Displacement vector	Y		Y	Y
57	Scalar	Y		Y	Y
61	Zero vector	Y		Y	Y
65	Uniform velocity	Y		Y	Y
66	Uniform acceleration	Y		Y	Y
70	Circular motion	Y		SW	Y
72	Unit vector	Y		SW	Y
	Radial component of a vector	Y		SW	N
	Tangential component of a vector	Y		SW	N
	Angular acceleration	Y		SW	N
	Centripetal acceleration	Y		Y	N

TABLE No.5.9(a) (CONTD)

1	2	3	4	5	6
Ch.5 P.85	Newton's first law of motion	Y		Y	Y
86	Momentum	Y		Y	Y
87	Newton's second law of motion	Y		Y	Y
91	Force, gravitational	Y		Y	Y
	Force, electrostatic	Y		Y	Y
	Force, magnetic	Y		SW	Y
92	Force, electromagnetic	Y		Y	Y
	Strong nuclear force	Y		Y	N
	Weak nuclear force	Y		SW	N
93	Law of gravitation	N	Y-Ch.8	Y	Y
	Coulomb's law	N	Y-Ch.1 (Std.XII)	Y	N
	Impulse	Y		Y	Y
94	Newton's third law of motion	Y		Y	Y
	Law of conservation of momentum	Y		Y	Y
97	Friction	Y		SW	Y
	Static friction	Y		SW	Y
98	Kinetic friction	Y		Y	Y
	Laws of friction	Y		Y	Y
	Coefficient of static friction	Y		Y	N
	Coefficient of kinetic friction	Y		Y	N
	Rolling friction	Y		Y	Y
99	Lubrication	Y		SW	Y
100	Reference frame	Y		Y	Y
	Inertial reference frame	Y		Y	Y
101	Centrifugal force	Y		SW	Y

TABLE No.5.9(a) (CONTD)

1	2	3	4	5	6
Ch.6 P.107	Work	Y		Y	Y
	Energy	Y		Y	Y
108	joule (Unit)	Y		Y	N
111	Kinetic energy	Y		Y	Y
112	Potential energy	Y		Y	Y
114	Restoring force	Y		Y	N
	Hooke's law	Y		SW	Y
117	Power	Y		Y	Y
	watt(Unit)	Y		Y	Y
	Horsepower (Unit)	Y		SW	Y
118	Kilowatt-hour	Y		Y	Y
	Elastic collision	Y		Y	Y
	Internal energy	N	Y(p.121)	Y	Y
	Inelastic collision	Y		SW	Y
121	Thermodynamics	Y		SW	N
122	Fusion	Y		SW	N
	Law of conservation of energy	Y		SW	7
Ch.7 P.131	Centre of mass	Y		SW	Y
135	Rigid body	Y		Y	Y
137	Rotational motion	Y		Y	Y
139	Torque	Y		Y	Y
141	Angular momentum	Y		Y	Y

TABLE No.5.9(a) (CONTD)

1	2	3	4	5	6
142	Moment of force (Torque)	Y		Y	Y
	Moment of momentum (angular momentum)	Y		Y	Y
143	Kepler's I law	Y		Y	Y
	Kepler's II law	Y		Y	Y
149	Law of conservation of angular momentum	Y		SW	Y
	Isolated system	Y		Y	N
150	Moment of inertia	Y		SW	Y
	Radius of gyration	Y		SW	Y
152	Parallel axes theorem	Y		SW	Y
	Perpedicular axes theorem	Y		SW	Y
159	Precession	Y		SW	Y
Ch.8 P.170	Universal law of gravitation	Y		Y	Y
170-171	Gravitational constant	Y		Y	Y
174	Gravitational potential	Y		Y	Y
175	Escape velocity	Y		Y	Y
176	Geostationary satellite	Y		Y	Y
177	Kepler's III law	Y		Y	N
181	Light year	Y		Y	Y
	Milky way	Y		Y	Y
182	Special theory of relativity	Y		SW	N
	Geodesic	Y		Y	N
	Accelerated frame	Y		SW	Y
183	General theory of relativity	Y		SW	Y
	Gravitational wave	N	N	-	N
	Reimannian geometry	Y		SW	N

TABLE No.5.9(a) (CONTD)

1	2	3	4	5	6
Ch.9 P.195	'Paramānu'	Y		Y	N
198	Scanning tunnelling miscroscope	Y		SW	Y
199	Brownian motion	Y		Y	Y
200	Avogadro's number	Y		SW	Y
202	Mole	Y		SW	Y
204	Avogadro's hypothesis	Y		Y	Y
205-206	Interatomic force	Y		SW	Y
	Intermolecular force	Y		SW	Y
206	Covalent bond	Y		SW	N
207	Ionic bond	Y		SW	N
208	van der Waals attraction	Y		Y	Y
211	Liquid crystal	Y		SW	N
	Isotropic liquid	N	N	-	N
215	Elasticity	Y		SW	Y
Ch.10,P.215	Viscosity	Y		Y	Y
216	Interface	Y		SW	N
218	Anisotropic	Y		SW	N
219	Elongation	Y		Y	N
	Stress	Y		Y	N
	Strain	Y		Y	N
	Young's modulus	Y		Y	Y
	Elastic region	Y		Y	N
	Plastic region	Y		Y	N

TABLE No.5.9(a) (CONTD)

1	2	3	4	5	6
P.220	Elastic hysterisis	Y		SW	Y
	Tensile strength	Y		SW	N
	Elastomer	Y		Y	Y
221	Compressive stress	Y		SW	N
	Compressive strain	Y		SW	N
	Collagen	Y		SW	N
	Hydroxyapatite crystal	Y		SW	N
222	Bulk modulus	Y		SW	Y
	Shear	Y		SW	Y
223	Shear stress	Y		Y	N
	Shear strain	Y		Y	N
	Shear modulus	Y		Y	N
224	Buckling	Y		SW	N
227	Pascal's law	Y		Y	Y
	Aneroid barometer	Y		Y	Y
231	Systolic	Y		SW	N
	Diastolic	Y		SW	N
	torr (Unit)	Y		Y	N
233	Buoyancy of Archimedes principle	Y		Y	Y
234	Velocity gradient	Y		SW	N
	Laminar flow	Y		SW	N
	poiseiulle (Unit)	Y		Y	N
235	Terminal velocity	Y		Y	N
	Viscous drag force	Y		SW	N
237	Streamline flow	Y		Y	Y
	Condition of continuity	Y		SW	N
	Aerofoil	N	Y(P.240)	Y	Y

TABLE No.5.9(a) (CONTD)

1		2	3	4	5	6
Ch.10	238	Reynold's number	Y		SW	Y
	239	Bernoulli's theorem	Y		Y	N
		Venturi meter	Y		Y	N
	240	Venturi principle	Y		Y	N
	241	Surface energy	Y		Y	Y
	242	Surface tension	Y		Y	Y
	245	Capillary rise	Y		Y	Y
	247	Boyle's law	Y		Y	Y
	248	Charles' law	Y		Y	Y
		Absolute temperature	Y		Y	Y
	249	Kelvin (Unit)	Y		Y	N
		Perfect gas law	Y		Y	Y
		Universal gas constant	Y		Y	N
	250	Equation of state	Y		Y	Y
		Kinetic theory of gases	Y		SW	Y
	253	Boltzmann's constant	Y		SW	Y
		Classical mechanics	N	Y (STD.XII Ch.12- as Newtonian mechanics)	SW	N
	255	Diffusion constant	Y		SW	N

TABLE No.5.9(a) (CONTD)

1	2	3	4	5	6
Ch.11.P.264	Ideal gas temperature	Y		Y	N
265	Ideal gas thermometer	Y		Y	Y
266	Electrical resistance thermometer	Y		SW	Y
267	Pyrometry	Y		SW	N
	Logarithmic x scale	N	N (Based on figure 11.3 -SW)		N
268	Coefficient of volume expansion	Y		SW	N
	Joule-Thomson effect	Y		SW	N
273	Dulong's and Petit's law	Y		SW	N
276	First law of thermodynamics	Y		SW	Y
277	Thermodynamic state	Y		SW	Y
278	Isothermal	Y		Y	Y
	Critical point	Y		Y	Y
279	Phase diagram	Y		SW	Y
281	Thermodynamic process	Y		SW	Y
	Adiabatic process	Y		SW	Y
	Isobaric	Y		SW	N
	Isochoric	Y		SW	N
282	van der Waals' equation of state	Y		Y	Y
284	Heat engine	Y		Y	Y
	Heat pump	Y		Y	Y
285	Internal combustion engine	Y		Y	Y

TABLE No.5.9(a) (CONTD)

1	2		3	4	5	6	
Ch.11	285	Intake stroke	Y		Y		N
		Compression stroke	Y		Y		N
		Power stroke	Y		Y		N
		Exhaust	Y		Y		N
	286	Engine efficiency	Y		Y	Y	
		Compression ratio	Y		SW		N
	287	Refrigerator	Y		SW	Y	
		Throttling	Y		SW		N
	288	Compressor	Y		SW		N
		Condenser	Y		SW		N
		Coefficient of performance	Y		Y		N
		Second law of thermodynamics	Y		Y	Y	
	289	Thermal conductivity	Y		Y		N
	291	Trade wind	Y		SW	Y	
	292	Universal form	Y		N		N
		Emissivity	Y		SW		N
		Stefan's constant	Y		Y		N
		Arctic clothing	Y		SW		N
Ch.12	P.299	Periodic motion	Y		Y	Y	
	300	ECG (Electrocardiogram)	Y		SW		N
		period	Y		Y	Y	
		Frequency	Y		Y	Y	
		Displacement	Y		Y	Y	
	301	Periodic function	Y		SW	Y	

TABLE No.5.9(a) (CONTD)

1	2	3	4	5	6	
Ch.12	302-303	SHM (Simple harmonic motion)	Y	SW	Y	
	303	Phase	Y	SW	Y	
	304-305	Uniform circular motion	Y	SW	Y	
	306	Spring constant	Y	Y		N
	308	Theory of fluxions	Y	N		N
	314	Constant of motion	Y	Y		N
	317	Tangent component of an acceleration vector	Y	SW		N
		Radial component of an acceleration vector	Y	SW		N
		Centripetal acceleration	Y	SW		N
	318	Forced Oscillation	Y	SW	Y	
		Resonance	Y	SW	Y	
		Damped Oscillation	Y	SW	Y	
		Damping force	Y	SW		N
	320	Differential equation	Y	SW		N
	323	Steady state solution	Y	SW		N
Ch.13	P.329	Wave	Y	Y	Y	
	331	Nondispersive medium	Y	Y		N
	332	Transverse wave	Y	SW	Y	
		Longitudinal wave	Y	SW	Y	
	334	Wave function	Y	SW	Y	
		Wave profile	Y	Y	Y	
		Harmonic wave	Y	Y	Y	

TABLE No.5.9(a) (CONTD)

1		2	3	4	5	6	
Ch.13	335-336	Superposition principle	Y		SW	Y	
		Constructive interference	Y		SW	Y	
		Destructive interference	Y		SW	Y	
	336-337	Reflection of waves	Y		SW	Y	
	338	hertz (Unit)	Y		Y		N
	340	Fundamental/first harmonic	Y		SW		N
		Second harmonic	Y		SW	Y	
		n^{th} harmonic	Y		SW		N
	341	Standing waves/Staitionary waves	Y		SW	Y	
		Nomral mode	Y		SW	Y	
	342	Pitch of the tone	Y		SW	Y	
		Overtone	Y		SW		N
	345	Beats	Y		SW		N
	346	Doppler effect	Y		SW	Y	
	348	Loudness	Y		Y	Y	
		Quality	Y		SW	Y	
		Musical scale	Y		Y	Y	
		Note	Y		Y		N
		Keynote	Y		Y	Y	
		Acoustics	Y		SW	Y	
	349	Reverberation	Y		Y	Y	
		Dead room	Y		Y		N
		Sound reflector	Y		SW		N
		Sound absorber	Y		SW		N

TABLE NO.5.9(b)

FOR OBJECTIVE No.3 (b) i.e., CONTENT ANALYSIS TO CRITICALLY EXAMINE THE COMMUNICATION STRATEGIES IN EACH CHAPTER IN TERMS OF STATUS OF TECHNICAL TERMS (FOR STD.XII TEXTBOOK) :

CHAPTER NO. & PAGE NO.	NEW MAJOR/IMPORTANT TERM/CONCEPT/LAW/ PRINCIPLE/THEORIES/ DEVICES, ETC.	WHETHER DEFINED/ STATED/ MEANING GIVEN ? Yes/No (Y/N)	IF NO, WHETHER GIVEN LATER ? WHERE ? Yes/No (Y/N)	WHETHER IT IS CLEAR ? Yes/ Somewhat/ No. (Y/SW/N)	WHETHER INCLUDED IN THE INDEX ? Yes/No (Y/N)
1	2	3	4	5	6
Ch.1,P.1	Electron	Y		Y	N
2	Vitreous	Y		Y	N
	Resinous	Y		Y	N
	Positive charge	Y		Y	N
	Negative charge	Y		Y	N
3	Quantization of charge	Y		SW	N
	Classical electricity	Y		SW	N
	Classical magnetism	N	N	-	N
5	Coulomb's law	Y		Y	N
5-6	Coulomb (unit)	Y		Y	N
6	Permittivity of vacuum	N	Y(p.60)	SW	N
7-8	Principle of superposition	Y		SW	N
8	Positron	N	N	-	N
9	Surface density of a charge	Y		SW	N
10	Electric field	Y		Y	N
12	Field (should have been given on p.10)	Y		Y	N
	Static field	Y		Y	N
	Gauss law/theorem	N	Y(p.38)	SW	N

TABLE No.5.9(b) (CONTD)

1	2	3	4	5	6
14	Point charge	Y		SW	N
15	Spherical symetry	Y		Y	N
	Field point	Y		Y	N
16	Cylindrical Symmetry	Y		SW	N
17	Electric line of force	Y		Y	N
18	Electric dipole	Y		Y	N
	Dipole field	Y		Y	N
	Homogeneous (uniform) electric field	Y		Y	N
Ch.2 P.27	Line integral	N	Y(P.122) (Appendix A)	SW	N
30-31	Electrostatic potential (Electric potential)	Y		SW	N
33-34	Potential energy of a system of point charges	Y		Y	N
34	Electron volt (eV).	Y		Y	N
35	Potential energy of a dipole	Y		Y	N
37	Equipotential surface	Y		Y	N
38	Surface integral	N	Y(p.125) (Appendix A)	SW	N
	Gaussian surface	Y		Y	N
45	Conductor	Y		Y	N
	Insulator	Y		Y	N
	'Electrik Vertue'	Y		Y	N
45	Dielectric	Y		Y	N
46	Polar dielectrics	Y		SW	N
	Nonpolar dielectrics	Y		SW	N
	Polarization	N	Y(pp.56-57)	SW	N
	Ferroelectrics	Y		SW	N

TABLE No.5.9(b) (CONTD.)

1		2	3	4	5	6
Ch.2	48.	Capacitor	N	Y(p.49)	Y	N
		Electrostatic shielding	Y		Y	N
	49	Capacitance	Y		Y	N
		farad (F, Unit)	Y		Y	N
	50-51	Parallel Plate capacitor	Y		Y	N
	51	Cylindrical capacitor	Y		Y	N
		Edge effect	Y		N	N
	52	Spherical capacitor	Y		Y	N
	53	Capacitors in series	Y		Y	N
		Capacitors in parallel	Y		Y	N
	56	Relative permittivity (Dielectric constant)	Y		Y	N
	56-57	Polarization	Y		SW	N
	56	Atomic polarizability	Y		SW	N
	57	Piezoelectricity	Y		SW	N
	59	Electric susceptibility	Y		Y	N
		Linear dielectrics	Y		Y	N
	60	Electric displacement vector	Y		SW	N
	61	Troposphere	Y		SW	N
	62	Stratosphere	Y		SW	N
		Mesosphere	Y		SW	N
		Ionosphere	Y		SW	N
	63	'Electrical breakdown'	Y		Y	N
	64	van de Graaf generator	Y		SW	N

TABLE NO.5.9(b) (CONTD)

1	2	3	4	5	6
Ch.3 P.69	Electric current	Y		Y	N
-70					
70	Discharge of a condenser	Y		Y	N
71	Electromotive force	Y		SW	N
71	ampere (A, Unit)	Y		SW	N
	ohm (Ω, unit)	Y		SW	N
72.	Ohm's law	Y		Y	N
	Resistivity	Y		Y	N
	Conductance	Y		Y	N
73-74	Conductivity	Y		Y	N
	Colour code	Y		Y	N
	Tolerance	N	N	-	N
76-77	Drift velocity	Y		SW	N
	Ionic site	Y		SW	N
	Relaxation time	N	N	-	N
81	Rectifier	Y		SW (More in Ch.15)	N
81-82	Diode	Y		SW	N
	Thyristor	Y		SW	N
82	Superconductivity	Y		SW	N
82-83	Medium wave receiver circuit	Y		N	N
	Circuit element/symbol	N	Y (pp.385-6 Ch.7)	SW	N
83	Internal resistance	Y		SW	N
84	Resistances in series	Y		Y	N
	Resistances in parallel	Y		Y	N
85	Kirchhoff's rules	Y		Y	N
	Junction rule	Y		Y	N
	Loop rule	Y		Y	N

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6
87-88	Galvanometer	Y		SW	N
88	Voltmeter	Y		SW	N
	Ammeter	Y		SW	N
89-90	Potentiometer	Y		Y	N
90	Null point	Y		SW	N
	Wheatstone bridge	Y		Y	N
Ch.4 P.99	Electrolysis	Y		SW	N
	Electrochemical	Y		SW	N
	Thermoelectricity	Y		SW	N
	Thomson effect	Y		Y	N
	Seebeck effect	Y		Y	N
99-100	Peltier effect	Y		Y	N
P. 100	Photovoltaic process	Y		SW	N
102	Voltaic pile	Y		SW	N
	Electrode	Y		Y	N
103	Electrolyte	Y		Y	N
104-105	Electrodeposition	Y		Y	N
104	Reduction	Y		SW	N
106	Faraday's 1st law of electrolysis	Y		SW	N
	Faraday's 2nd law of electrolysis	Y		SW	N
	Chemical equivalent	Y		Y	N
	'Molecule of electricity'	Y		SW	N
108	Daniel Cell	Y		Y	N
108-109	Polarization	Y		Y	N
109	Leclanche dry cell	Y		Y	N
110	'Button' cell	Y		Y	N
	Secondary cell/accumulator	Y		Y	N

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6
110-111	Fuel cell	Y		Y	N
	Hydrogen oxygen fuel cell	Y		Y	N
111	Thermoelectric emf	Y		Y	N
	Thermocouple	Y		SW	N
112	Seebeck coefficient/ Thermopower	Y		Y	N
	Thomson coefficient	Y		Y	N
	Peltier coefficient	Y		N	N
113	Thermoelectric coefficients (should have been given on p.112).	N	N	-	N
113	Peltier heat (Should have been given on p.112)	Y		SW	N
114	Thermoelectric effect (Should have been given on p.111 in thermoelectricity)	Y		SW	N
	Thomson emf	Y		SW	N
	Contact potential	Y		Y	N
115	Cryogenic temperature	Y		SW	N
115-116	Thermolectric refrigerator	Y		Y	N
Ch.5 P.138-139	Biot-Savart law	Y		SW	N(given (Biot & Savart separately)
140	tesla (unit)	Y		Y	N
143	Ampere's force law	Y		Y	Y
	Fleming's left hand rule	Y		Y	Y
145	Lorentz force	Y		Y	Y
146-147	Ampere's circuital law	Y		SW	Y

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6
	148 Toroidal solenoid	Y		Y	Y
	Long straight solenoid	Y		Y	Y
	149 Magnetic dipole moment	Y		Y	Y
	151-152 Moving Coil Galvonometer	Y		Y	Y
	155-156 Cyclotron	Y		Y	Y
	158 Hall effect	Y		Y	Y
	158-159 Hall voltage	Y		Y	Y
	159 Hall reistance	Y		Y	Y
	Energy gap	Y		SW	N
Ch.6	168-170 Torque law	Y		Y	Y
	Atomic magnet	Y		Y	N
	Magnetic Lorentz force (force law)	Y		Y	Y
	174 Gauss theorem for magnetism	Y		SW	Y
	174-175 gauss (unit)	Y		Y	N
	175 oersted (unit)	Y		Y	N
	175 Magnetic declination	Y		Y	Y
	Dip angle	Y		Y	Y
	177 Tangent galvanometer	Y		Y	Y
	178 'Aurora Borealis' or Northern lights	Y		Y	N
	Solar wind	Y		Y	N
	Diamagnetism	Y		SW	Y
	Paramagnetism	Y		SW	Y
	Ferromegnetism	Y		SW	Y
	Ferrolectrics	Y		SW	Y
	Magnetization	Y		Y	N

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6	
Ch.7 P.187	Electromagnetic induction	Y		Y	Y	
188	Faraday's law of EMI (flux rules)	Y		Y	Y	
	Lenz rule	Y		Y	Y	
	Induced emf	Y		Y	Y	N
192	Conservative field	Y		SW	Y	
	Non-conservative field	Y		SW	Y	
193	Eddy current	Y		SW	Y	
194-195	Mutual inductance	Y		Y	Y	
196	Self-indusctance	Y		SW	Y	
	A.C. Generator	Y		Y	Y	
	Transformer	Y		Y	Y	
196-197	Primary coil	Y		Y		N
	Secondary coil	Y		Y		N
198	Step-up transformer	Y		Y		N
	Step-down transformer	Y		Y		N
	Ideal transformer	Y		Y		N
Ch.8 P.205	Ideal inductor	Y		Y		N
206	Ideal capacitor	Y		Y		N
208	Complex number	Y		Y	Y	
209	Complex current	Y		SW		N
	Complex voltage	Y		SW		N
210	Reactance	Y		Y		N
214-215	LCR circuit	Y		SW		N
215	Resonant frequency	Y		Y	Y	
	Q-factor	Y		Y	Y	
216	LC circuit	Y		Y		N

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6	
Ch.9 P.223-224	Maxwell's displacement current	Y		SW	Y	
225	EM wave (Electromagnetic wave)	Y		Y	Y	
225-226	Electromagnetic plane wave	Y		SW		N
230	Electromagnetic spectrum	Y		Y	Y	
230	Gamma rays	Y		SW	Y	
	X-Rays	Y		SW		N
	Ultraviolet rays	Y		SW		N
	Visible rays	Y		SW		N
	Infrared rays	Y		SW		N
	Microwaves	Y		SW		N
	Radio waves	Y		SW		N
	AM band	Y		SW		N
	FM band	Y		N		N
	VHFband	Y		N		N
	UHF band	Y		N		N
231	Ozone layer	Y		SW		N
	Thermosphere	Y		N		N
	Ionosphere	Y		SW		N
	Mesopause	Y		N		N
	Stratopause	Y		N		N
	Tropopause	Y		N		N
231-2	Greenhouse effect	Y		SW		N
233	Geostationary satellites	Y		SW		N
234-235	Modulation--Demodulation	Y--Y		SW--SW	Y	
236	Modulating signal	Y		SW	Y	N
Ch.10 p.241	Polarisation (Introduction)	Y		SW	Y	
	Intereferenee(")	Y		SW	Y	
	Diffraction (")	Y		SW	Y	
	Doppler effect(") for light waves	Y		SW	Y	

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6
	241-2 Wave theory	Y		SW	N
	Wave front	Y		SW	Y
	245-6 Coherent addition of light	Y		Y	Y
	Incoherent addition of light	Y		Y	Y
	247 Polaroid	Y		Y	N
	249 Polariser	Y		Y	Y
	Brewster angle	N	Y (p.250)	Y	N
	251 Constructive interference	Y		Y	Y
	251-2 Destructive interference	Y		Y	Y
	253 Fringes	Y		Y	N
	253-4 Path difference	Y		Y	Y
	256 Huyghens' principle	Y		SW	Y
	258 Diffraction grating	Y		Y	Y
Ch.11 P.267	Phosphor	Y		Y	N
	Photoluminescene	Y		Y	N
	Electroluminescene	Y		Y	N
	267-8 Luminous intensity	N	N	-	Y
	Luminous flux	Y		Y	Y
	268 Illuminance	N	Y (p.269)	Y	Y
	Standard luminosity curve	Y		Y	N
	Candela	Y		Y	Y
	Lumen	Y		Y	Y
	270 Corpuscular theory	N	N	-	N
	273 Spherical aberration	Y		Y	Y
	275 Total internal reflection	Y		Y	N
	276 Critical angle	Y		Y	Y
	277 Mirage	Y		SW	Y
	Optical fibre	Y		Y	y
	278 Angle of minimum deviation	Y		SW	Y

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6	
Ch.11 p.281	Diopter	Y		Y		N
283	Spectroscope	Y		Y	Y	
	Collimator	Y		Y		N
284	Emission spectra	Y		Y	Y	
	Continuous spectra	Y		SW	Y	
	Line spectra	Y		Y	Y	
284-5	Band spectra	Y		SW	Y	
285	Absorption spectra	Y		SW	Y	
	Fraunhofer lines	Y		SW	Y	
	Rayleigh scattering	Y		SW	Y	
286	Coma	Y		SW		N
	Astigmatism	Y		SW	Y	
	Chromatic aberration	Y		SW	Y	
	Primary rainbow	Y		Y		N
	Secondary rainbow	Y		Y		N
286-7	Achromatic doublet	Y		SW	Y	
287	Anastigmatic lens	Y		SW	Y	
	Exposure time	Y		Y		N
287-8	Aperture of a camera	Y		Y		N
288	Film speed	Y		Y		N
	Exposure meter	Y		Y		N
	Depth of focus	Y		Y		N
290	Angular magnification	Y		Y		N
291	Cassegrain reflector	Y		SW		N
	Newtonian reflector	Y	N			N
	Schmidt reflector	Y	N			N
291	Resolving power	Y		SW	Y	
	Numerical aperture	Y		Y		N

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6	
Ch.12 P.302	Cathode rays	Y		Y	Y	
303	Newtonian mechanics	Y		N		N
	Quantum mechanics	Y		N		N
306	Maltese cross	Y		N		N
312	Thermionic emission	Y		SW	Y	
	Field emission	Y		SW	Y	
	Photoelectric emission	Y		Y	Y	
312-3	Photoelectric effect	Y		Y	Y	
313	Threshold frequency	Y		Y		N
314	Quanta	Y		SW		N
	Photon	Y		SW	Y	
	Planck's constant	Y		SW		N
315	Work function	Y		SW		N
316	Photo cell	Y		Y	Y	
316-7	de Broglie's hypothesis	Y		Y		N
317	de Broglie's wavelength	Y		SW	Y	
Ch.13 P.328	Rutherford's nuclear model of atom	Y		Y	Y	
334	Energy level diagram	Y		SW		N
	Bohr's model of hydrogen atom	Y		Y	Y	
337	Ionisation energy	Y		Y		N
338	Rydberg formula	Y		SW	Y	
	Balmer series	Y		SW	Y	
	Lyman series	Y		SW	Y	
339	Mass spectrometer	Y		SW	Y	
342	Binding energy	Y		Y	Y	
	Mass defect	Y		Y		N
	Anti-matter	Y		Y		N
344	Radioactivity	Y		SW	Y	
	Alpha decay	Y		Y	Y	
345	Beta decay	Y		Y	Y	
	Gamma decay	Y		SW	Y	

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6
346	Radioactive decay law	Y		Y	Y
	Exponential decay	Y		SW	N
	Half-life	Y		Y	Y
347	curie (unit)	Y		Y	N
352	Ionisation potential	Y		Y	Y
353-5	van der Waal's bond	Y		SW	N
355	Metallic bond	Y		SW	N
	Vibrating rotator	Y		Y	N
	Rotational spectrum	Y		SW	N
358	Vibrational spectrum	Y		SW	N
Ch.14 P.367	Crystalline solid	Y		Y	Y
	Amorphous solid	Y		Y	Y
368	Unit cell	Y		Y	Y
	Crystal lattice	Y		Y	Y
	Lattice site	Y		Y	Y
	Lattice constant	Y		Y	Y
369	Triclinic	Y		SW	N
	Monoclinic	Y		SW	N
	Rhombic	Y		SW	N
	Tetragonal	Y		SW	N
	Hexagonal	Y		Y	N
	Rhombohedral	Y		SW	N
370	Monocrystal	Y		Y	Y
	Isotropic	Y		Y	N
	Anistropic	Y		Y	N
371	Polycrystalline solid	Y		Y	Y
	Liquid crystal	Y		Y	Y
	LCD (Liquid Crystal display)	Y		SW	Y
372-3	Forbidden energy gap	Y		SW	Y
	Valence band	Y		SW	Y
	Conduction band	Y		SW	Y

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6
P.374-5	Insulator	Y		Y	Y
	Semiconductor	Y		Y	Y
	Intrinsic carrier	Y		Y	Y
	Hole	Y		Y	Y
376	Point defect	Y		Y	Y
	Doping	Y		Y	Y
	Dopant	Y		Y	Y
	Extrinsic carrier	Y		Y	N
	n-type semiconductor	Y		Y	Y
378	p-type semiconductor	Y		Y	Y
382	Photoconductivity	Y		Y	Y
383	Wafer	Y		Y	N
	pn junction	Y		Y	Y
	Transistor	N	Y (p.390)	Y	Y
	npn Configuration (Intro.)	Y		SW	Y
	pnp Configuration (")	Y		SW	Y
	pn junction diode	Y		Y	Y
384	Electron hole recombination	Y		Y	Y
	Depletion region	Y		Y	Y
385	Forward biased diode	Y		Y	Y
	Reverse biased diode	Y		Y	Y
386	Reverse saturation current	Y		Y	Y
388	Dynamic resistance	Y		Y	N
	Linear region	Y		Y	N
	Rectifier	Y		Y	N
	Half wave rectifier	Y		Y	Y
	Full wave rectifier	Y		Y	Y
389	Zener diode	Y		Y	Y
	Photodiode	Y		Y	Y
390	LED (light emitting diode)	Y		Y	Y
	Solar cell	Y		Y	Y
390-91	Base-collector junction	Y		Y	Y
	Base-emitter junction	Y		Y	Y

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6
392	Figure of merit for a transistor	Y		Y	N
	Transconductance of a transistor	Y		Y	N
393	Amplifier	N	Y(p.395)	Y	Y
396	ac current gain	Y		Y	N
	Saturation state of a transistor	Y		Y	Y
398	Oscillator	Y		Y	Y
399	Digital circuit	Y		SW	N
	Analogue signal	Y		Y	Y
	Digital signal	Y		SW	Y
400	Logic gate	Y		SW	Y
	Truth table	Y		SW	N
	Boolean expression	Y		SW	N
	OR gate	Y		SW	Y
	AND gate	Y		SW	Y
401	NOT gate	Y		SW	Y
402	NAND gate	Y		SW	Y
403	NOR gate	Y		SW	Y
404	XOR gate	Y		SW	Y
405	Binary adder	Y		SW	Y
	LSB (Least significant bit)	Y		SW	N
	MSB-Most significant bit	Y		SW	N
	Half adder	Y		SW	Y
	Full adder	Y		SW	Y
406	IC (Integrated circuit)	Y		SW	Y
	Chip	Y		SW	N
	MSI (Medium scale integrated circuit)	Y		SW	N
	LSI (Large scale integrated circuit)	Y		SW	N

TABLE No.5.9(b) (CONTD.)

1	2	3	4	5	6
Ch.15 P.415	Fixed star	Y		Y	N
416	Constellation	Y		Y	N
417	Geocentric model	Y		Y	Y
	Heliocentric theory	Y		Y	Y
419	Inferior planet	Y		Y	Y
	Planet's elongation	Y		Y	Y
	AU (Astronomical Unit)	Y		Y	Y
420	Superior planet	Y		Y	Y
422	Comet	Y		Y	Y
	Asteroid	Y		Y	Y
	Meteoroid	Y		Y	Y
	Shooting star/meteor	Y		Y	N
	Meteorite	Y		Y	N
424	First-magnitude star	Y		Y	N
425	Stellar spectra	Y		Y	Y
426	Dwarf	Y		Y	N
428	Chandrashekhar limit	Y		Y	N
	Pulsar	Y		Y	N
	Neutron star	Y		Y	N
	Supernova	Y		SW	N
	Black hole	Y		SW	Y
	Milky Way	Y		Y	Y
	Galaxy	Y		Y	N
430	Nabulae	Y		Y	N
431	Red-shift	Y		Y	Y
432	Hubble's law	Y		Y	Y
	Primordial fireball	Y		SW	N
434	Big Bang model of Universe	Y		SW	Y
	Cosmology	Y		Y	Y

TABLE NO. 5.10(a)

CONTENT ANALYSIS

FOR OBJECTIVE No.3(b): i.e. TO CRITICALLY EXAMINE THE COMMUNICATION STRATEGIES IN EACH CHAPTER IN TERMS OF STATUS OF TECHNICAL TERMS :

FOR STD.XI TEXTBOOK: [CULLED FROM TABLE No.5.9(a)] :

CHAPTOR NO.	TOTAL NO.OF IDENTIFIED TERMS	WHETHER DEFINED/MEANING GIVEN/STATED ? YES/NO (Y/N) (Out of Col.No.2)				IF NO, WHETHER DONE LATER ? (Y/N) (Out of Col.No.2 - From Col.No.5)				WHETHER IT IS CLEAR ? -Yes/Somewhat/No (Y/SW/N) (Out of Co.No.2-Excluding The Total No. of N From Col.No.9)						WHETHER FOUND IN THE INDEX ? (Y/N) (Out of Col.No.2)			
		Total Y	% of Y	Total N	% of N	Total Y	% of Y	Total N	% of N	Total Y	% of Y	Total SW	% of SW	Total N	% of N	Total Y	% of Y	Total N	% of N
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1.	10	2	20.0	8	80.0	7	70.0	1	10.0	3	30.0	1	10.0	5	50.0	1	10.0	9	90.0
2.	35	30	85.7	5	14.3	3	8.6	2	5.7	14	40.0	16	45.7	3	8.6	23	65.7	12	34.3
3.	11	9	81.8	2	18.2	1	9.1	1	9.1	3	27.3	7	63.6	-	-	10	90.9	1	9.1
4.	12	11	91.7	1	8.3	1	8.3	-	-	7	58.3	5	41.7	-	-	8	66.7	4	33.3
5.	25	23	92.0	2	8.0	2	8.0	-	-	19	76.0	6	24.0	-	-	20	80.0	5	20.0
6.	17	16	94.1	1	5.9	1	5.9	-	-	11	64.7	6	35.3	-	-	13	76.5	4	23.5
7.	16	16	100.0	0	0.0	-	-	-	-	9	56.3	7	43.8	-	-	15	93.8	1	6.2
8.	14	13	92.9	1	7.1	-	-	1	7.1	9	64.3	4	28.6	-	-	9	64.3	5	35.7
9.	13	12	92.3	1	7.7	-	-	1	7.7	4	30.8	8	61.5	-	-	8	61.5	5	38.5
10.	55	53	96.4	2	3.6	2	3.6	-	-	32	58.2	23	41.8	-	-	23	41.8	32	58.2
11.	39	38	97.4	1	2.6	-	-	1	2.6	17	43.6	20	51.3	1	2.6	16	41.0	23	59.0
12.	23	22	95.7	1	4.3	1	4.3	-	-	6	26.1	16	69.6	1	4.3	11	47.8	12	52.2
13.	31	31	100.0	-	-	-	-	-	-	11	35.5	20	64.5	-	-	21	67.7	10	32.3
TOTAL	301	276	91.7	25	8.3	18	6.0	7	2.3	145	48.1	139	46.2	10	3.3	178	59.1	123	40.9

CROSS CHECKING: 276+25=301 18+7=25 7+145+139+10=301 178+123=301

TABLE No.5.10(b)

CONTENT ANALYSIS

FOR OBJECTIVE No.3(b): TO CRITICALLY EXAMINE THE COMMUNICATION STRATEGIES IN EACH CHAPTER WITH RESPECT TO STATUS OF TECHNICAL TERMS:

FOR STD.XII TEXTBOOK: [CULLED FROM TABLE No.5.9(b)]:

CHAPTER NO.	TOTAL NO.OF IDENTIFIED TERMS	WHETHER DEFINED/MEANING GIVEN/STATED ? YES/NO (Y/N) (Out of Col.2)				IF NO, WHETHER DONE LATER ? (Y/N) (Out of Col.No.2 -From Col.No.5)				WHETHER IT IS CLEAR ? -Yes/Somewhat/No (Y/SW/N) (Out of Col.No.2-Excluding The Total No. of N From Col.No.(9))						WHETHER FOUND IN THE INDEX ? (Y/N) (Out of Col. No.2)			
		Total Y	% of Y	Total N	% of N	Total Y	% of Y	Total N	% of N	Total Y	% of Y	Total SW	% of SW	Total N	% of N	Total Y	% of Y	Total N	% of N
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1.	26	22	84.6	4	15.4	2	7.7	2	7.7	16	61.5	8	30.8	-	-	0	0.0	26	100.0
2.	39	35	89.7	4	10.3	4	10.3	0	0.0	22	56.4	16	41.0	1	2.3	0	0.0	39	100.0
3.	32	29	90.6	3	9.4	1	3.1	2	6.3	14	43.8	15	46.9	1	3.1	0	0.0	32	100.0
4.	35	34	97.1	1	2.9	-	-	1	2.9	19	54.3	15	42.9	-	-	0	0.0	35	100.0
5.	15	15	100.0	-	-	-	-	-	-	12	80.0	3	20.0	-	-	12	80.0	3	20.0
6.	16	16	100.0	-	-	-	-	-	-	11	68.8	5	31.3	-	-	10	62.5	6	37.5
7.	16	16	100.0	-	-	-	-	-	-	12	75.0	4	25.0	-	-	10	62.5	6	37.5
8.	10	10	100.0	-	-	-	-	-	-	7	70.0	3	30.0	-	-	3	30.0	7	70.0
9.	26	26	100.0	-	-	-	-	-	-	2	7.7	17	65.4	7	26.9	6	23.1	20	76.9
10.	17	16	94.1	1	5.9	1	5.9	-	-	10	58.8	7	41.2	-	-	13	76.5	4	23.5
11.	44	41	93.2	3	6.8	1	2.3	2	4.5	26	59.1	14	31.8	2	4.5	23	52.3	21	47.7
12.	16	16	100.0	0	0.0	-	-	-	-	6	37.5	7	43.8	3	18.8	8	50.0	8	50.0
13.	25	25	100.0	0	0.0	-	-	-	-	13	52.0	12	48.0	-	-	14	56.0	11	44.0
14.	81	79	97.5	2	2.5	2	2.5	-	-	50	61.7	31	38.3	-	-	57	70.4	24	29.6
15.	29	29	100.0	0	00.0	-	-	-	-	25	86.2	4	13.8	-	-	16	55.2	13	44.8
Total	427	409	95.8	18	4.2	11	2.6	7	1.6	245	57.4	161	37.7	14	3.3	172	40.3	255	59.7

Cross Checking : 409+18=427 11+7=18 7+245+161+14=427 172+255 = 427

- Ch.5 is likely to communicate well to the readers as it contains 76% of the terms which are easily understandable.

- 93.8% of the terms in Ch.7 are included in the Index.

INADEQUACIES :

- Out of 301 terms identified in the whole textbook 25 (8.3%) terms have not been defined or their meanings have not been stated in the concerned chapters. Out of these 25, only 18 terms have been defined/ stated in later chapters of the Std.XI/XII textbook; remaining 7 terms (Laser, optical interferometer, unit of resolution, mechanics, gravitational wave, isotropic liquid, logarithmic scale) have been simply mentioned in the textbook which are likely to frustrate the readers, more than the former 18 terms.

- Out of 301 terms identified only 145 terms (48.1%) appear to be clear; though there are 139 terms (46.2%) which appear to be somewhat clear, there are some 10 terms (3.3%) which appear to be not at all clear; moreover the other 7 terms (2.3%) (as mentioned above) are just appearing in the textbook without being written something more about them.

- Out of 301 identified terms, 123 terms (40.9%) are altogether missing in the Index.

- Ch.1 seems to be the worst hit in terms of the communication strategies with respect to the status of terms; this chapter being the chapter on 'Introduction' to physics, is likely to communicate very poorly to the readers which may lead to 'starting trouble' or frustration.

- Ch.10 seems to be the longest chapter with the introduction of 55 new/important terms; out of these 32 terms (58.2%) are not included in the Index.

FOR STD.XII TEXTBOOK :

POSITIVE ASPECTS :

- In the case of Ch.5,6,7,8,9,12,13 & 15, all the identified terms have been defined or their meanings have been stated (as the case may be).

- In the case of Ch.1,4,5,6,7,8,10,13,14 & 15, all the identified terms appear to be clear or atleast somewhat (SW) clear.

- In the case of Ch.2,10 & 14, though they contain very few terms which have not been defined/stated in the respective chapters, they have been treated atleast in the later chapters.

- As 95.8% of the 427 terms identified are those whose definitions/meanings are given in the concerned chapters, the overall communication startegy with respect to the status of the terms are quite encouraging; moreover about 95.1% (57.4% + 37.7%) of the terms appear to be understandable to the readers.

- Among all the chapters, Ch.15 contains maximum number (86.2%) of terms which appear to be easily understandable.

- Out of the 15 chapters, in Ch.5, most of the terms (80%) are included in the Index.

INADEQUACIES :

- Out of 427 terms identified in the whole textbook, some 18 terms (4.2%) have not been defined or their meanings have not been stated in the concerned chapters; out of these 18 terms, only 11 terms have been defined/stated in later chapters; remaining 7 terms (Classical magnetism, positron, tolerance, relaxation time, thermoelectric coefficient, luminous intensity, corpuscular theory) have been simply mentioned in the textbook.

- Out of 427 terms, only 245 terms (57.4%) appear to be clear; though there are 161 terms (37.7%) which appear to be somewhat (SW) clear, there are some 14 terms (3.3%) which appear to be not at all clear; moreover, the other 7 terms (1.6%) (as mentioned above) are just appearing in the textbook without being written something more about them.

- In the case of Part.I (Ch.1-4), there is no Index available at the end.

- For Part.II, though there is an Index at the end, only 60.4% of the identified terms are present in it (of course, there are several other terms included in the index, which are not among the new/important terms identified by the investigator).

- Ch.9 appears to be a very poor communicator among all the chapters with respect to the status of the terms as it contains only 7.7% of the terms which can be considered as terms with clearly stated definitions/meanings; moreover, this chapter contains the maximum number of totally unclear terms (26.9%) and the least number of terms (23.1%) in the Index.

5.3.3:

FOR OBJECTIVE NO.3(c): i.e., TO STUDY THE COMMUNICATION STRATEGIES IN TERMS OF STATUS OF ILLUSTRATIONS; i.e., (i) FIGURES, (ii) TABLES & (iii) PHOTOGRAPHS:

Based on the content analysis of available figures in the textbooks [as shown on Table No.5.11(a) & (b)], Table No.5.12(a) & (b) have been prepared (pp.295-333) and the interpretations have been made For the Tables in the textbooks, Table No.5.13(a) & (b) (pp.334-337) have been prepared and interpretations have been made. In the case of photographs which are only very few in number separate Tables have not been prepared to record observations and interpretations):

FOR STD.XI TEXTBOOK :

POSITIVE ASPECTS :

- In the whole textbook, there are 392 figures for 344 pages with 120 sections; the average number of figures per page and per section are 1.1 and 3.3 respectively.

- 369 figures out of 392 (94.1%) are found to be relevant (p.332).

- 152 figures (38.8%) appear to be adequate (p.332) and 226 figures (57.6%) appear to be somewhat adequate.

- Ch.10 contains highest number of figures (91) with the average No. of figures per page being 1.9 and per section being 9.1.

- Ch.3,4,6,10 & 13 contain more than one figure per page on an average.

TABLE NO.5.11(a)

CONTENT ANALYSIS FOR OBJECTIVE NO.3 (c)(i): i.e., COMMUNICATION STRATEGIES IN TERMS OF STATUS OF ILLUSTRATIONS:(i) FIGURES (FOR STD.XI TEXTBOOK) :

Chapter No.	Book Reference P.No.	Book Reference Fig.No.	Nature of Figure	* Whether Relevant Yes/Somewhat/No. (Y/SW/N)	* Whether Adequate Y/SW/N
1	2	3	4	5	6
1.	-	-	Nil	-	-
2.	9	2.1	Sketch diagram	SW	SW
	10.11	2.2	Illustrative	Y	SW
	11	2.3	Geometrical	Y	SW
		2.4	"	Y	SW
	12	2.5	"	Y	Y
		2.6	"	Y	Y
	13	2.7	Illustrative	Y	SW(Not labelled)
		2.8	"	Y	"
		2.9	"	Y	N-(Not labelled)
	14	2.10	Graphical	Y	"
	16	2.11	Apparatus	Y	"
	17	2.12	"	N(For Sr.Sec.level)	SW "
		2.13	"	N(")	SW(Not properly labelled)
		2.14	Illustrative	Y	SW
		2.15	"	Y	SW
3.	30	3.1	Geometrical	Y	SW
	33	3.2	Graphical	Y	SW
		3.3	"	Y	SW
		3.4	"	Y	Y
		3.5	"	Y	Y

(* H.).

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6	
	36	3.6	Graphical	Y	Y	
	37	3.7	"	Y	Y	
		3.8	Illustrative	Y		SW
		3.9	Mathematical	Y		SW
	38	No No.	Illustrative	Y		SW
		3.10(a)	Graphical	Y	Y	
	39	3.10(b)	"	Y	Y	
	40	3.11	"	Y	Y	
	41	3.12	"	Y	Y	
	42	3.13	"	Y	Y	
	43	3.14	"	Y	Y	
	44	3.15	"	Y		SW
	50	3.16	"	Y		SW
	52	3.17	Illustrative	Y		N
		3.18	Graphical	Y		SW
		3.19	"	Y	Y	
		3.20	"	Y		SW
		3.21	"	Y	Y	
		3.22	"	Y	Y	
		3.23	"	Y	Y	
		3.24	"	Y	Y	
		3.25	"	Y	Y	
		3.26	"	Y	Y	
4.	56	4.1	Mathematical	Y	Y	
		4.2	"	Y	Y	
	58	4.3	"	Y		SW
	59	4.4	"	Y		SW
		4.5	"	Y		SW
		4.6	"	Y	Y	
	60	4.7	"	Y	Y	
		4.8	"	Y	Y	
		4.9	"	Y	Y	

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
	61	No No.	Mathematical	Y	Y
	62	"	"	Y	Y
	62	4.10	"	Y	Y
	63	4.11	"	Y	Y
	64	4.12	"	Y	Y
		No No.	"	Y	Y
	66	4.13	Graphical	Y	Y
	67	4.14	"	Y	SW
	69	4.15	"	Y	Y
	70	4.16	Mathematical	Y	Y
	71	4.17	"	Y	Y
	72	4.18	"	Y	Y
		4.19	"	Y	SW
	73	4.20	"	Y	Y
		4.21	"	Y	Y
	74	No No.	"	SW	SW
		4.22	"	Y	SW
	76	4.23	"	Y	SW
		No No.	"	Y	SW
	77	" (a)	Illustrative	Y	SW
		" (b)	"	Y	SW
5.	83	5.1	Illustrative	Y	Y
	84	5.2	"	Y	Y
	85	5.3	Graphical	Y	Y
	88	5.4	Mathematical	Y	Y
	90	5.5	Illustrative	Y	SW
	95	No No. (a)	Mathematical	Y	Y
		" (b)	"	Y	Y
	96	5.6	Mathematical	Y	Y
	97	No No.	"	Y	Y
		5.7	Illustrative	Y	SW
		5.8	"	Y	SW

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
	99	No No.	Mathematical	Y	SW
		"	Illustrative	Y	Y
	100	5.9	Illustrative	Y	N(Half diagram)
	102	No No.	"	Y	SW
	104	" (a)	Graphical	Y	SW
		(b)	"	Y	Y
		(c)	Illustrative	Y	Y
	105	" (a)	"	Y	Y
		" (b)	"	Y	Y
		" (c)	"	Y	Y
		" (d)	"	Y	Y
	106	" (a)	"	Y	SW (Should be on p.105)
6.	108	6.1	Mathematical	Y	Y
	109	6.2	"	Y	Y
	110	6.3	Graphical	Y	SW
	113	6.4	Mathematical	Y	Y
	114	6.5	Graphical	Y	SW
		6.6	Illustrative	Y	Y
	115	6.7	Graphical	Y	Y
		6.8	"	Y	SW
	116	6.9 (a)	Illustrative	Y	SW
		(b)	"	Y	SW
		(c)	"	Y	SW
		No No.	"	Y	Y
	119	6.10	Graphical	Y	Y
	120	No No.	Illustrative	Y	SW
	124	"	Mathematical	SW	Y
		"	"	Y	SW
	125	" (a)	"	Y	Y
		" (b)	"	Y	Y
		" (c)(i)	Graphical	Y	SW
		" (c)(ii)	"	Y	SW
		" (c)(iii)	"	Y	SW
		" (c)(iv)	"	Y	N
		" (d)	"	Y	SW

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
	126	No No.(i)	Illustrative	Y	Y
		(ii)	"	Y	Y
	127	(a)(i)	Graphical	Y	Y
		(b)(ii)	"	Y	Y
		(c)(iii)	"	Y	Y
		(d)(iv)	"	Y	Y
		(e)(v)	"	Y	Y
		(f)(vi)	"	Y	Y
		(g)	"	Y	Y
7.	132	7.1	Graphical	Y	Y
	134	7.2	"	Y	SW
		7.3	Illustrative	Y	SW
	135	7.4	"	Y	SW
		7.5	"	Y	SW
	136	7.6	Geometrical	N(For Snr.Sec.Level)	SW
		7.7	"	SW	Y
		7.8	Graphical	Y	SW
	137	No No.(a)	Mathematical	SW	Y
		(b)	"	Y	Y
	138	7.9	Graphical	Y	Y
	139	7.10	"	Y	SW
		7.11	Illustrative	Y	SW
	142	7.12	Graphical	Y	SW
		7.13	"	Y	SW
	144	7.14	Illustrative	Y	Y
		7.15	"	Y	SW
	145	7.16	Mathematical	Y	SW
	146	7.17	"	Y	SW
	149	7.18	"	Y	SW
	152	7.19	"	Y	SW
	153	7.20	"	Y	SW
	155	7.21	"	Y	SW
	156	7.22	"	Y	Y

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
	157	7.23	Mathematical	Y	SW
	158	7.24	"	Y	SW
	159	7.25	"	Y	SW
	160	7-26	"	Y	SW
	161	7.27	"	Y	SW
		7.28	"	Y	SW
	164	No No.	Illustrative	Y	SW
8.	168	8.1	Mathematical	Y	SW
	169	8.2	Illustrative	Y	SW
	171	8.3	Apparatus	Y	SW
	179	8.4	Geometrical	Y	SW
	180	8.5	"	Y	Y
9.	198	9.1	Photograph	Y	N-Poor Print
		9.2	"	Y	N "
	200	9.3	"	Y	SW
	201	9.4	Apparatus	Y	SW
		9.5	Photograph	Y	SW
	206	9.6	Graphical	Y	SW
		9.7	"	Y	SW
	207	9.8	Illustrative-Model	Y	SW
		9.9(a)	" "	Y	SW
		9.9(b)	" "	Y	SW
	209	9.10(a)	Geometrical	Y	Y
		9.10(b)	Illustrative	Y	SW
	210	9.11	Graphical	Y	SW
		9.12	Photograph	Y	SW
10.	216	10.1(a)	Geometrical-Model	Y	Y
	217	10.1(b)	"	Y	Y
		10.2	Illustrative	Y	Y

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
	217	10.3	Photograph	Y	N-Poor Print
		10.4	Geometrical-Model	Y	SW
		10.5	Experimental set-up	Y	SW(Not labelled)
		10.6	Graphical	Y	SW
		10.7	"	Y	SW
		10.8(a)	Illustrative	SW	SW
		(b)	"	SW	Y
		(c)	"	N	SW
	221	10.9(a)	Illustrative	SW	SW
		10.9(b)	"	SW	SW
	222	10.10(a)	Geometrical (a),(b),(c) -Not specified)	Y	SW
		10.10(b)	" "	Y	SW
		10.10(c)	" "	Y	SW
	223	10.10(d)	Apparatus	Y	N-Not properly numbered & not labelled
	224	10.11(a)	Illustrative	Y	Y
		(b)	"	Y	Y
		(c)	"	Y	Y
		(d)	"	Y	Y
	225	10.12	"	Y	SW
	226	10.13(a)	"	Y	SW
		10.13(b)	"	Y	SW
		10.14	"	Y	SW
		10.15	Apparatus-schematic	Y	SW-Partially & not properly labelled
	228	10.16	Illustrative	SW	SW
		10.17	Apparatus	Y	SW-(not properly labelled)
	229	10.18	Illustrative	Y	SW
		10.19	"	Y	Y
	230	10.20	Apparatus-schematic	Y	SW(Not properly labelled)
		10.21	"	Y	"

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
	231	10.22(a)	Apparatus-schematic	N(For Snr.Sec. Level)	SW (Not labelled & no supporting stand)
		10.22(b)	" "	Y	SW " "
	232	10.23	Graphical	Y	SW-Not properly labelled
		10.24	Schematic	Y	" "
	233	10.25(a)	Illustrative	Y	SW-Not properly drawn & not labelled
		(b)	"	Y	" "
		10.26	Illustrative	Y	SW "
		10.27	Experimental	Y	SW Not labelled
	237	10.28(a)	Schematic	Y	SW
		(b)	"	Y	SW
		10.29(a)	"	Y	Y(Should have been on p.238)
		(b)	"	Y	SW "
		(c)	"	Y	SW "
		(d)	"	Y Y	
		(e)	"	Y Y	"
		(f)	"	Y	SW "
	239	10.30	Device	Y	SW(Not labelled)
	240	10.31	"	N Y	" "
		10.32	Apparatus	Y	SW " "
	242	10.33(a)	Schematic	Y	SW
		(b)	"	Y	SW
		(c)	"	Y	SW
		10.34(a)	"	Y	N
		(b)	"	Y	N

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
	243	10.35	Illustrative	Y	N(Not labelled)
		10.36	Apparatus	Y	SW " "
	244	10.37(a)	Illustrative	Y	SW
		(b)	"	Y	SW
		10.38(a)	"	SW	SW
		(b)	"	Y	SW
		10.39(a)	"	Y	SW
		(b)	"	Y	SW
		(c)	"	Y	SW
		10.40(a)	Schematic	Y	SW
		(b)	"	Y	SW
	246	10.41	Illustrative	Y	SW-Different colours missing
		10.42	Graphical	Y	SW-Different temperatures not mentioned.
	248	10.43	"	Y	SW
	249	10.44	"	Y	SW-Different pressures--not mentioned.
	251	10.45(a)	Schematic	Y	SW
		(b)	"	Y	SW
		10.46	"	Y	SW
	254	10.47	Graphical	Y	SW
	255	10.48	Schematic	Y	SW
	256	10.49	Graphical	Y	SW
	257	10.50(a)	"	Y	Y
		(b)	"	Y	Y
		10.51(a)	"	Y	Y
		(b)	"	Y	Y

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
		10.52	Schematic	Y	Y
	258	10.53	"	Y	Y
		10.54(a)	Apparatus	Y	SW-Not labelled
		(b)	"	Y	SW "
	259	10.55(a)	Schematic	Y	SW
		(b)	"	Y	SW
		(c)	"	Y	SW
	260	10.56(a)	"	Y	Y
		(b)	"	Y	Y
		10.57	Graphical	Y	Y
11	265	11.1	Experimental	Y	SW-Not labelled
	266	11.2	Device	N	SW- "
	267	11.3	Schematic	Y	Y
		11.4	Graphical	Y	Y
	269	11.5	Illustrative	N	SW
	270	11.6	Graphical	Y	Y
	272	11.7	Experimental	Y	SW-Not labelled
	273	11.8	Graphical	Y	Y
	274	11.9	"	Y	Y
		11.10(a)	Schematic	Y	SW
		(b)	"	Y	SW
	278	11.11	Graphical	Y	SW
	279	11.12	"	Y	SW
		11.13	"	Y	SW
		11.14	"	Y	SW
	282	11.15	Graphical	Y	SW
	283	11.16	"	Y	SW
	285	11.17(a)	Device-working of	Y	SW
		(b)	"	Y	SW
		(c)	"	Y	SW
		(d)	"	Y	SW

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
	286	11.18(a)	Graphical	Y	SW-Too small
		(b)	Illustrative	Y	SW-small
	287	11.19	Device-working of	Y	Y-Small
		11.20	Graphical	Y	SW
	289	11.21	Schematic	Y	SW
	290	11.22	"	Y	Y
	291	11.23	Illustrative	Y	SW
	292	11.24	Graphical	Y	SW
	296	11.25	"	Y	SW
12	300	12.1	Graphical	Y	N
	305	12.2(a)	"	Y	Y
		(b)	"	Y	Y
	306	Not Numbered			
		12.3(a)	"	Y	Y
		(b)	"	Y	Y
	307	12.4	Schematic	Y	Y
		12.5	"	SW	SW
		12.6(a)	"	Y	Y
		(b)	"	Y	Y
	309	12.7	Illustrative	Y	Y
	311	12.8	"	SW	SW (No-Not Printed)
	313	12.9	Graphical	Y	Y
		12.10	"	Y	Y
		12.11	"	Y	Y
		12.12	"	Y	Y
	316	12.13	Schematic	N	SW
	317	12.14	Illustrative	Y	Y
		12.15	"	Y	Y
	319	12.16	Graphical	Y	Y
	324	No No. (a)	Graphical	Y	Y
		(b)	"	Y	Y
		(c)	"	Y	Y
		(d)	"	Y	Y

TABLE No.5.11(a) (CONTD.)

1	2	3		4	5	6	
	325	No No.	(a)	Illustrative	Y		SW
			(b)	"	Y		SW
			(c)	"	Y		SW
			(d)	"	Y		SW
		" "		"	Y		SW
		" "	(a)	Graphical	Y	Y	
			(b)	"	Y	Y	
		" "	(a)	Illustrative	Y	Y	
			(b)	"	Y	Y	
		" "	(a)	"	Y	Y	
			(b)	"	Y	Y	
			(c)	"	Y	Y	
			(d)	"	Y	Y	
		" "		"	Y	Y	
		" "		"	Y	Y	
		" "		Apparatus	Y	Y	
13	330	13.1		Illustrative	Y	Y	
	331	13.2	(a)	"	Y	Y	
			(b)	"	Y	Y	
			(c)	"	Y	Y	
			(d)	"	Y	Y	
			(e)	"	Y	Y	
	335	13.3	(a)	Illustrative	Y		SW
			(b)	"	Y		SW
			(c)	"	Y		SW
			(d)	"	Y		SW
			(e)	"	Y		SW
			(f)	"	Y		SW

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6	
	336	13.4 (a)	Illustrative	Y		SW
		(b)	"	Y		SW
		(c)	"	Y		SW
		(d)	"	Y		SW
		(e)	"	Y		SW
	337	13.5 (a)	"	Y		SW
		(b)	"	Y		SW
		(c)	"	Y		SW
		(d)	"	Y		SW
		(e)	"	Y		SW
	338	13.6	Graphical	Y		SW
	339	13.7 (a)	"	Y	Y	
		(b)	"	Y	Y	
		(c)	"	Y	Y	
	341	13.8 (a)	"	Y		SW
		(b)	"	Y		SW
		(c)	"	Y		SW
		13.9	"	Y	Y	
	343	13.10(a)	Illustrative	Y		SW
		(b)	"	Y		SW
		(c)	"	Y		SW
		(d)	"	Y		SW
		(e)	"	Y		SW
		(f)	"	Y		SW
	344	13.11 (a)	"	Y		SW
		(b)	"	Y		SW
		(c)	"	Y		SW
		(d)	"	Y		SW
		(e)	"	Y		SW
		(f)	"	Y		SW

TABLE No.5.11(a) (CONTD.)

1	2	3	4	5	6
Ch.13	344	13.12 (a)	Illustrative	Y	SW
		(b)	"	Y	SW
		(c)	"	Y	SW
		(d)	"	Y	SW
	345	13.13 (a)	Graphical	Y	SW
		(b)	"	Y	SW
		(c)	"	Y	SW
	346	13.14	Illustrative	Y	Y
	351	No No.(a)	"	Y	SW (Not in the proper space)
		" " (b)	"	Y	SW
		" " (c)	"	Y	SW
		" " (d)	"	Y	SW

TABLE NO. 5.11 (b)

CONTENT ANALYSIS FOR OBJECTIVE NO.3(c) i.e. COMMUNICATION STRATEGIES IN TERMS OF STATUS OF ILLUSTRATIONS : (i) FIGURES :

FOR STD.XII TEXTBOOK:

Chapter & Page No.	Figure No.	Nature of Figure	Whether Relevant Yes/Somewhat/No (Y/SW/NO)	Whether Adequate (Y/SW/N) With Reasons if any
1	2	3	4	5
1.5	1.1(a)	Illustrative	Y	Y
	(b)	"	Y	Y
7.	1.2	"	Y	Y
8.	1.3	"	Y	Y
9.	1.4	"	Y	SW
10.	1.5	"	Y	SW (Small in size)
11.	*NO No.(a)	"	Y	SW
12.	" (b)	"	Y	SW
13.	"	Mathematical	Y	Y
	"	"	Y	Y
14.	1.6	"	Y	SW
16.	1.7	"	Y	SW
17.	1.8	"	Y	SW
	1.9	"	Y	SW
18.	1.10	"	Y	SW
20.	1.11	"	Y	Y
	NO No. (a)	Mathematical	Y	Y
	" (b)	"	Y	Y

* Number-not given - NO No.

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
21.	1.12	Mathematical	Y	SW
22.	1.13	"	Y	SW
24.	NO No.(1)	Illustrative	Y	Y
	" 2 (a)	"	Y	SW
	" (b)	"	Y	SW
	" (c)	"	Y	Y
	" (d)	"	Y	SW
	" (e)	"	Y	SW
25.	" 3	"	Y	SW
	" 4	"	Y	SW
2.28	2.1	Graphical	Y	SW
30	2.2	Illustrative	Y	SW
31	2.3	"	Y	SW
35	2.4	"	Y	SW
36	2.5	Mathematical	Y	SW
37	2.6	"	Y	SW
	2.7	Illustrative	Y	SW
39	2.8	Mathematical	Y	SW
	2.9	"	Y	SW
40	2.10	Illustrative	Y	SW
41	2.11	Mathematical	Y	SW
42	2.12	"	Y	SW
	2.13	"	Y	SW
43	2.14	Illustrative	Y	SW
	2.15	Mathematical	Y	SW
44	2.16	"	Y	SW
47	2.17	Illustrative	Y	SW
48	2.18	"	Y	SW
49	2.19	"	Y	Y
51	2.20	"	Y	Y
	2.21	"	Y	Y
52	2.22	"	Y	Y

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
53	NO No.(1)	Illustrative	Y	Y
	" (2)	"	Y	Y
54	" (1)	"	Y	Y
	" (2)	Circuit diagram	Y	Y
55	" (a)	Circuit diagram	Y	Y
	" (b)	"	Y	Y
56	2.23 (a)	Illustrative	Y	SW
	(b)	"	Y	SW
57	NO No.	"	Y	SW
	2.24	Schematic	Y	SW
58	2.25	"	Y	Y
	2.26	"	Y	Y
62	2.27	"	Y	SW
63	2.28	"	Y	SW (Small in size)
64	2.29	Device (Schematic)	Y	SW (looks incomplete)
65	NO No. (a)	Illustrative	Y	N
	" (b)	"	Y	N
66	NO No. (a)	"	Y	Y
	" (b)	"	Y	Y
	NO No.	(For Ex. 2.16)	Y	Y
67	"	Circuit diagram	Y	Y
3.70	3.1 (a)	Circuit diagram	Y	Y
	(b)	Graphical	Y	Y
	(c)	Circuit diagram	Y	Y
71	3.2 (a)	Illustrative	Y	Y
73	3.3 (b)	"	SW	Y
74	3.3	"	Y SW	Y SW-(wrong numbering of fig.; lack of actual colours for colour codes)
		"		

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
75	3.4	Illustrative	Y	SW
76	3.5	Graphical	Y	SW (unit-not mentioned-scale sw improper)
78	3.6 (a)	"	Y	SW (Error:not but K only)
	(b)	"	Y	SW " "
80	3.7 (a)	Circuit diagram	Y	Y
	(b)	"	Y	Y
	(c)	"	Y	Y
81	3.8	Graphical	Y	SW(Units not mentioned)
	3.9 (a)(i)	Circuit diagram	Y	SW(Not properly numbered)
	(ii)	"	Y	SW " "
82	3.9 (b)	Graphical	Y	SW(Unit in X Axis-not mentioned -Not properly numbered)
	3.10	"	Y	SW (Units & scales-not mentioned)
83	3.11	Circuit diagram	N	N
	3.12	"	Y	Y
84	3.13 (a)	Illustrative	Y	Y
	(b)	"	Y	Y
85	3.14	Circuit diagram	Y	Y
85	NO No.	"	Y	Y
86	"	"	Y	SW
87	"	"	Y	SW
88	3.15 (a)	"	Y	Y
	(b)	Illustrative	Y	Y
	3.16	"	Y	Y (Not properly Numbered & spaced)

TABLE NO.5.11 (b) (CONTD.)

1	2	3	4	5
89	3.17	Circuit diagram-device	Y	Y
90	3.18	"	Y	Y
91	NO No. (a)	"	Y	Y
	" (b)	"	Y	Y
93	"	Graphical	Y	SW(Units-not shown)
94	" 1 (a)	Illustrative	Y	SW
	" (b)	"	Y	Y
	" (c)	"	Y	SW
	" 2.	Circuit diagram	Y	Y
95	" 1.(a)	Illustrative	Y	Y
	" (b)	"	Y	Y
	" 2.(i)	Circuit diagram	Y	Y
	" 2.(ii)	"	Y	Y
	" (iii)	"	Y	Y
96	" 1	"	Y	Y
	" 2	"	Y	Y
	" 3	"	Y	Y
4.102	4.1	Illustrative - device	Y	SW (not properly labelled)
103	4.2 (a)	Model	Y	Y
	(b)	Illustrative	Y	Y
104	4.3	Schematic experimental	Y	Y
105	4.4	"	Y	SW(looks incomplete-not labelled)
106	4.5	"	Y	SW(partly labelled)
108	4.6	Device	Y	SW (Not fully labelled)
109	4.7	"	Y	Y
110	4.8	"	Y	Y
112	4.9 (a)	Illustrative	Y	SW
	(b)	"	Y	SW

TABLE NO.5.11 (b) (CONTD.)

1	2	3	4	5
114	4.10	Illustrative	Y	N
	4.11	"	Y	SW
118	NO No. 1(a)	Graphical	Y	Y
	(b)	"	Y	Y
	(c)	"	Y	Y
Appe-ndix A.12	A.1	Illustrative	Y	Y
122	A.2	Graphical	Y	SW
123	A.3	"	Y	SW
125	A.4	"	Y	SW
126	A.5	"	Y	SW
127	A.6	"	Y	SW
5.138	5.1	Illustrative-experiment	Y	SW
139	5.2 (a)	Schematic	Y	SW
	(b)	"	Y	SW
140	5.3 (a)	Mathematical	Y	SW
	(b)	Schematic	Y	Y
	(c)	Illustrative	Y	Y
142	5.4	Mathematical	Y	Y
143	5.5 (a)	"	Y	Y
	(b)	"	Y	Y
144	5.6 (a)	Schematic-experimental circuit	Y	SW (Not labelled)
	(b)	"	Y	SW " "
147	5.7	Illustrative	Y	SW
148	5.8 (a)	"	Y	Y
	(b)	"	Y	Y
		- circuit diagram.		

TABLE NO.5.11 (b) (CONTD.)

1	2	3	4	5
150	5.9 (a)	Mathematical	Y	SW
	(b)	"	Y	Y
151	NO No.	Illustrative	Y	SW
	5.10 (a)	"	Y	Y
	(b)	Mathematical	Y	SW (Too small)
	(c)	"	Y	SW "
152	5.11 (a)	Schematic	Y	N (Not clearly printed not labelled)
	(b)	"	Y	N (Not clear, not labelled)
154	5.12	Mathematical	Y	SW
155	5.13	Illustrative	Y	SW
156	5.14	Schematic	Y	SW (Not labelled)
	5.15	Schematic	Y	SW
157	5.16 (a)	"	Y	SW
	(b)	"	Y	SW
158	5.17	"	Y	SW
160	NO No. (a)	"	SW	Y
	(b)	"	SW	Y
161	NO No.	Schematic	Y	SW
162	" (a)	"	Y	Y
	" (b)	"	Y	Y
	" (c)	"	Y	Y
	" (d)	"	Y	Y
	" (e)	"	Y	Y
	" (f)	"	Y	Y
6.166	6.1 (a)	Illustrative	Y	SW
	(b)	"	Y	SW
	6.2	"	SW	Y

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
167	6.3	Illustration	SW	Y
168	6.4	Schematic	Y	SW
169	6.5	" (Experimental)	N	SW
	6.6	Schematic	N	SW
171	6.7	"	Y	SW
172	NO No.	"	Y	SW
173	6.8	"	Y	SW
174	6.9	Illustrative	Y	SW
175	6.10	Schematic	Y	SW (Not labelled)
	6.11	"	Y	SW
176	NO No.(a)	Illustrative	Y	SW
	(b)	"	Y	SW
* 177	6.12	Schematic	Y	SW
181	6.13	Graphical	Y	SW
183	NO No.	Schematic	Y	SW (Not labelled)
184	NO No. (a)	"	Y	SW "
	" (b)	"	Y	"
	" (c)	"	Y	"
	" (d)	"	Y	"
	" (e)	"	Y	"
	" (f)	"	Y	"
	" (g)	"	Y	"
186	Wrong number (6.10)	" (Related to Fig.6.10)	Y	"
7.187	7.1	Schematic	Y	SW
188	7.2	"	Y	Y
189	7.3	"	Y	Y
	7.4	"	Y	Y

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
190	7.5	Schematic	Y	Y
	7.6	"	Y	Y
	NO No.	"	Y	SW
191	NO No.	"	Y	SW
	7.7	"	Y	SW
193	7.8	"	Y	Y
194	7.9 (a)	"	Y	SW
	(b)	"	Y	SW
	NO No.	"	Y	SW
195	7.10 (a)	Illustrative	Y	SW
	(b)	"	Y	SW
196	7.11	Schematic	Y	Y
	7.12	"	Y	Y
199	7.13	"	Y	Y
200	NO No.(a)(i)	"	Y	SW
	(ii)	"	Y	SW
	(iii)	"	Y	SW
	(iv)	"	Y	SW
	(For Ex.7.1)			
	NO No. (a)(i)	"	Y	SW
	(ii)	"	Y	SW
	(iii)	"	Y	SW
	(For Ex.7.2)			
	NO No. (a)	"	Y	SW
	(b)	"	Y	SW
	(For Ex.7.3)			
	NO No.(a)	"	Y	Y
	(b)	"	Y	Y
	(c)	"	Y	Y
	(d)	"	Y	Y
	(e)	"	Y	Y
	(f)	"	Y	SW
	(For Ex.7.4)			

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
201	No No. (For Ex.7.5)	Schematic	Y	SW
202	NO No. (For Ex.7.12)	"	Y	SW
	NO No. (For Ex.7.13)	"	Y	SW
203	NO No. (For Ex.7.19)	"	SW	SW
	NO No. (For Ex.7.20)	Circuit diagram	Y	Y
	NO No. (For Ex.7.20)	Circuit diagram	Y	SW- (Relation with the exercise - not indicated)
8. 205	8.1	Schematic	Y	SW
206	8.2	"	Y	SW
207	NO No.	Circuit diagram	Y	Y
	8.3	Graphical	Y	Y
208	8.4	"	Y	Y
209	8.5	"	Y	Y
	8.6 (a)	Schematic (Symbolic)	Y	Y
	(b)	"	Y	Y
	(c)	"	Y	Y
	(d)	"	Y	Y
210	8.7	Circuit diagram	Y	Y
211	8.8	Graphical	Y	SW
213	NO No. NO No. (For Ex.8.3)	Circuit diagram "	Y	Y
214	8.9	"	Y	Y
215	8.10	Graphical	Y	SW

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
216	8.11	Circuit diagram	Y	Y
218	8.12	Device	Y	SW (Not labelled)
	8.13	Circuit diagram	Y	SW
	8.14	Schematic	Y	SW
	8,15 (a)	"	Y	SW
	(b)	"	Y	SW
	(c)	"	Y	SW
220	NO No.	Circuit diagram	Y	Y
221	NO No.	Schematic	Y	Y
222	NO No. (For Ex.8.25)	"	Y	Y
	NO No. (For Ex. 8.26)	"	Y	SW
9.223	9.1	Schematic	Y	SW
225	NO No.	Circuit diagram	Y	Y
226	9.2	Schematic	Y	Y
229	9.3	"	Y	SW
230	9.4	Illustrative	Y	SW (Small)
	9.5	"	Y	SW
231	9.6	Schematic	Y	SW(Too small)
232	9.7	"	Y	SW "
233	9.8	"	Y	SW
234	9.9	"	Y	SW
	9.10	"	Y	SW
235	9.11 (a)	Illustrative	Y	Y
	(b)	"	Y	Y
	(c)	"	Y	Y
	9.12 (a)	Schematic	Y	SW
	(b)	Graphical	Y	SW

TABLE NO. 5.11(b) (CONTD.)

1	2	3	4	5
236	9.13	Schematic	Y	SW
	9.14 (a)	Graphical	Y	SW
	(b)	"	Y	SW
	9.15 (a)	"	Y	SW
	(b)	"	Y	SW
	9.16 (Not printed)	Circuit diagram	Y	Y
237	NO No. (For Ex.9.1)	Schematic	SW	Y
	NO No. (For Ex.9.5)	Circuit diagram	Y	SW
10.242	10.1	Geometrical	Y	SW
	10.2 (a)	"	Y	SW
	(b)	"	Y	SW
	(c)	"	Y	SW
243	10.3 (a)	"	Y	Y
	(b)	"	Y	Y
244	10.4 (a)	Schematic	Y	Y
	(b)	"	Y	SW(Not properly located)
	(c)	"	Y	SW "
	10.5	"	Y	SW
245	10.6	"	Y	Y
247	10.7 (a)	"	Y	SW (a,b,c Not printed & not referred to)
	(b)	"	Y	SW " "
	(c)	"	Y	SW " "
248	10.8 (a)	"	Y	SW " "
	(b)	"	Y	SW " "

TABLE NO. 5.11(b) (CONTD.)

1	2	3	4	5
248	10.9 (a)	Graphical	Y	SW
	(b)	"	Y	SW
	(c)	"	Y	SW
249	10.10 (a)	Schematic	Y	SW (Improper Sizes)
	(b)	"	Y	Y
250	10.11	"	Y	SW
251	10.12 (a)	Graphical	Y	SW (Axes-Not labelled-Not properly spaced)
	(b)	"	Y	SW " "
	(c)	"	Y	SW " "
252	10.13	Schematic	Y	SW
253	10.14 (a)	Graphical	Y	Y
	(b)	"	Y	Y
254	10.15 (a)	Geometrical	Y	SW
	(b)	"	Y	SW
255	10.16 (a)	Graphical	Y	SW (Axes - Not named)
	(b)	"	Y	Y
256	10.17	Schematic	Y	Y
257	10.18	Graphical	Y	Y
258	10.19	Illustrative	Y	SW
259	10.20 (a)	Schematic	Y	SW
	(b)	Graphical	Y	Y
260	10.21	Schematic	Y	SW
262	10.22	"	Y	SW
	10.23	"	Y	SW
11.268	11.1	Graphical	Y	SW (small size)
269	11.2	Schematic	Y	SW
270	11.3	" (Experimental)	Y	Y
	11.4	"	Y	SW

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
271	11.5	Illustrative	Y	SW
	11.6 (a)	Schematic (Ray diagram)	Y	SW (Not properly numbered & spaced)
	(b)	"	Y	" "
272	11.7 (a)	"	Y	N(Fig. details not given)
	(b)	"	Y	N " "
	11.8 (a)	"	Y	SW
	(b)	"	Y	SW
273	11.9	"	Y	SW (Direction - not properly printed)
274	11.10	"	Y	SW (Angles & water medium not properly shown)
	11.11	"	Y	SW (Too small)
275	11.12	"	Y	SW (")
	11.13	"	Y	SW
276	11.14	"	Y	SW (Denser medium - not properly shown)
276-7	11.15 (a)	"	Y	SW
277	(b)	"	Y	SW
	(c)	"	Y	SW
	11.16	"	Y	SW (Small size)
	11.17	"	Y	SW
278	11.18	Schematic-Ray diagram	Y	Y
	11.19	Graphical	Y	Y
279	11.20	Schematic-Ray diagram	Y	SW
280	11.21	"	Y	SW (Direction-not shown title-not worded properly)
	11.22	Illustrative	Y	SW

TABLE NO.5.11 (b) (CONTD.)

1	2	3	4	5
282	11.23	Schematic	Y	Y
	11.24 (a)	Schematic-Ray diagram	Y	SW(Not properly numbered)
	(b)	"	Y	SW "
	(c)	"	Y	SW "
	(d)	"	Y	SW "
	11.25	"	SW	SW "
283	11.26 (a)	"	Y	SW(Parts-not fully labelled)
	(b)	Device	Y	SW "
	(c)	Schematic	Y	SW "
284	11.27	Device-working of	Y	SW "
285	11.28	Schematic	Y	SW
286	11.29 (a)	"	Y	SW
	(b)	"	Y	SW
	11.30 (a)	Schematic-Ray diagram	Y	SW (not properly spaced & not titled)
	(b)	"	Y	SW "
	11.31 (a)	"	Y	SW (Not titled & not properly numbered)
	(b)	"	Y	SW "
287	11.32 (a)	Device	Y	SW (Not properly numbered)
	(b)	" - Parts	Y	SW "
	(c)	Schematic	Y	SW "
	(d)	" - Ray diagram	Y	SW "
	(e)	"	Y	SW "
288	11.33	Schematic - Ray diagram	SW	SW
289	11.34	"	Y	SW
290	11.35	"	Y	SW

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
290	11.36 (a)	Device	Y	SW (Not labelled)
	(b)	Schematic-Ray diagram	Y	SW (Not properly spaced)
291	11.37	"	Y	SW
292	NO No. (Ex.11.1)	"	Y	SW
293	NO No. (a) (Ex.11.9)	"	Y	SW (Misleading angles)
	(b)	"	Y	SW
	(c)	"	Y	SW
	NO No. (a) (b) (Ex.11.12)	Schematic	Y	Y
		"		Y
294	NO No. (Ex.11.15)	" - Ray diagram	Y	SW (Not properly spaced)
295	NO No. (Ex.11.28)	"	Y	SW (Not fully labelled)
12.305	12.1	Schematic	Y	SW
306	12.2	"	Y	Y
307	12.3	"	Y	SW
	12.4 (a)	"	Y	SW
	(b)	"	Y	SW
309	12.5	" - Experimental	Y	SW
312	12.6	" "	Y	SW(Not fully labelled)
314	12.7(a)	Graphical	Y	SW(Not properly numbered & spaced)
	(b)	"	Y	SW " "
	12.8	"	Y	SW (Not properly spaced)
315	12.9 (a)	Schematic	Y	SW
	(b)	"	Y	SW

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
316	12.10	Schematic	Y	Y
318	12.11	"	Y	Y
	12.12 (a)	Graphical	Y	SW(Axes-not named -not properly spaced)
	(b)	"	Y	SW "
	(c)	"	Y	SW "
	(d)	"	Y	SW "
	(e)	"	Y	SW "
321	NO No. (Ex.12.12)	"	Y	Y
13.329	13.1	Schematic-experimental	Y	Y
	13.2	Schematic	Y	Y
330	13.3	Graphical	Y	Y
331	13.4	"	Y	Y
	13.5	Device-Photograph	Y	SW
	13.6	Photograph-experimental arrangement	Y	N
332	13.7	Graphical	Y	Y
334	13.8	Illustrative	Y	SW
335	13.9	Schematic	Y	SW
337	13.10	Illustrative	Y	SW
338	13.11	Schematic	Y	SW
341	13.12	Graphical	Y	SW
343	13.13	"	Y	Y
346	13.14	Illustrative	Y	SW
	13.15	Graphical	Y	Y
353	13.16	"	Y	Y
355	13.17	Illustrative	Y	Y
356	13.18	Schematic	Y	Y
357	13.19	"	Y	SW
365	NO No. (Ex.13.31)	"	Y	Y

TABLE NO.5.11 (b) (CONTD.)

1	2	3	4	5
14.368	14.1 (a)	Schematic	Y	Y
	(b)	"	Y	Y
	14.2 (a)	"	Y	Y
	(b)	"	Y	Y
369	14.3 (a)	"	Y	Y
	(b)	"	Y	Y
	14.4 (a)	"	Y	Y
	(b)	"	Y	Y
370	14.5 (a)	"	Y	Y
	(b)	"	Y	Y
	14.6	" (demonstrational)	Y	SW
372	14.7	Schematic-graphical	Y	SW
373	14.8 (a)	Illustrative	Y	SW
	(b)	"	Y	SW
	(c)	"	Y	SW
374	14.9 (a)	"	Y	SW
	(b)	"	Y	SW
375	14.10	Schematic	Y	SW
376	14.11 (a)	"	Y	Y
	(b)	"	Y	Y
	(c)	"	Y	Y
	(d)	"	Y	Y
377	14.12	"	Y	SW
	14.13	Illustrative	Y	SW
378	14.14	Schematic	Y	SW
	14.15	Illustrative	Y	SW
380	14.16	Schematic	Y	SW
381	14.17	"	Y	SW
384	14.18	"	Y	SW
385	14.19	"	Y	SW
	14.20	" - Circuit diagram	Y	Y
	14.21	" "	Y	Y

TABLE NO. 5.11(b) (CONTD.)

1	2	3	4	5
386	14.22 (a)	Schematic-Symbolic	Y	Y
	(b)	Circuit diagram	Y	Y
	(c)	"	Y	Y
387	14.23 (a)	Graphical	Y	Y
	(b)	"	Y	Y
	(c)	"	Y	SW
	14.24	Schematic-circuit	Y	SW
388	14.25	"	Y	SW
389	14.26 (a)	Schematic	Y	SW
	(b)	"	Y	SW
	14.27 (a)	" -circuit diagram	Y	SW
	(b)	"	Y	SW
	(c)	"	Y	SW
	(d)	"	Y	SW
390	NO No. (Ex.14.3)	Circuit diagram	Y	Y
	14.28 (a)	Schematic	Y	Y
391	(b)	"	Y	Y
	14.29	" -circuit diagram	Y	SW
393	14.30 (a)	" "	Y	SW
	(b)	" "	Y	SW
	14.31 (a)	" "	Y	SW
394	(b)	" "	Y	SW
	(c)	" "	Y	SW
	14.32	Circuit diagram "	Y	SW
	14.33	Graphical	Y	Y
395	14.34	"	Y	SW
	14.35	Schematic	Y	SW
	14.36	Circuit diagram	Y	SW

TABLE NO. 5.11(b) (CONTD.)

1	2	3	4	5
397	14.37	Graphical-circuit diagram	Y	SW (Too small)
	NO No. (Ex.14.4)	Circuit diagram	Y	SW
	NO No. (Ex.14.5)	Schematic	Y	SW
398	14.38	"	Y	SW
	14.39	"	Y	SW
	14.40	Circuit diagram	Y	SW
	14.41 (a)	Graphical	Y	Y
	(b)	"	Y	SW
400	14.42 (a)	Symbolic	Y	Y
	(b)	Illustrative	Y	SW (Not included in the title)
	(c)	Symbolic	Y	SW "
	(d)	" -circuit diagram	Y	SW
401	14.43 (a)	Symbolic	Y	Y
	(b)	Illustrative	Y	SW (Not included in the title)
	(c)	Symbolic	Y	SW "
	(d)	" - circuit diagram	Y	SW
402	14.44 (a)	Symbolic	Y	Y
	(b)	Illustrative	Y	SW(Not included in the title)
	(c)	Symbolic	Y	SW "
	(d)	Symbolic-circuit diagram	Y	SW
	14.45 (a)	Symbolic-circuit diagram	Y	Y
	(b)	Illustrative	Y	Y (Not included in the title)
	(c)	Symbolic	Y	Y
	(d)	Illustrative	Y	SW (Not included in the title- not numbered)

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
403	14.46 (a)	Symbolic-circuit diagram	Y	Y
	(b)	Illustrative	Y	Y
	(c)	Symbolic	Y	Y
	(d)	Illustrative	Y	SW (Not included in the title-not numbered)
	14.47 (a)	Symbolic-circuit diagram	Y	Y
	(b)	Illustrative	Y	SW
404	14.48 (a)	Symbolic-circuit diagram	Y	Y
	(b)	Illustrative	Y	Y
	14.49 (a)	Symbolic-circuit diagram	Y	Y
	(b)	Illustrative	Y	Y
	14.50 (a)	Symbolic	Y	Y
	(b)	Illustrative	Y	Y (Not included in the title)
	(c)	Symbolic-circuit	Y	SW
	(d)	Illustrative	Y	SW(Not included in the title)
405	14.51 (a)	Symbolic-circuit diagram	Y	Y
	(b)	Illustrative	Y	SW(Wrongly sub-numbered)
	(c)	Symbolic	Y	SW " "
406	14.52 (a)	Symbolic-circuit diagram	Y	Y
	(b)	Illustrative	Y	SW(Not included in the title)
	(c)	Symbolic	Y	Y
	14.53	Illustrative	Y	SW
408	NO No. (Ex.14.4)			
	(a)	Symbolic-circuit diagram	Y	Y
	(b)	"	Y	Y
	(c)	"	Y	Y
	(d)	"	Y	Y
	(e)	"	Y	Y

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
408	NO No. (Ex.14.5)	(a) Symbolic-circuit diagram	Y	Y
		(b) "	Y	Y
	NO No. (Ex.14.6)	Circuit diagram	Y	Y
409	NO No. (Ex.14.15)	"	Y	Y
	NO No. (Ex.14.16)	"	Y	Y
410	NO No. (Ex.14.17)	"	Y	Y
	NO No. (Ex.14.18)	"	Y	Y
		(a) "	Y	Y
		(b) Graphical	Y	Y (Not properly numbered)
		(c) "	Y	Y "
		(d) "	Y	Y "
		(e) "	Y	Y "
	NO No. (Ex.14.19)	Symbolic-circuit diagram	Y	SW
	NO No. (Ex.14.20)	" "	Y	SW
	NO No. (Ex.14.21)	(a) " "	Y	SW
		(b) " "	Y	SW
411	NO No (Ex.14.22)	" "	Y	SW

TABLE NO.5.11(b) (CONTD.)

1	2	3	4	5
15.416	15.1 (a)	Illustrative	Y	Y
	(b)	"	Y	Y
	(c)	"	Y	Y
417	15.2	Model	Y	Y
419	15.3	Geometrical	Y	Y
429	15.4	Schematic	Y	Y
431	15.5	Direct and spectrum photographs of galaxies	Y	SW- Small Size, not coloured -need not be titled as Figure (can be considered as plates)
432	15.6	Graphical	Y	Y

TABLE NO.5.12(a)

CONTENT ANALYSIS FOR OBJECTIVE NO.3(c)(i): i.e. FOR COMMUNICATION STRATEGIES IN TERMS OF STATUS OF ILLUSTRATIONS: (i) FOR FIGURES (BASED ON TABLE NO. 5.11(a))

FOR STD.XI TEXTBOOK

CHAPTER NO.	TOTAL NUMBER OF FIGURES	TOTAL NUMBER of PAGES	AVERAGE No.OF FIGURES PER PAGE	TOTAL NO.OF Sections	AVERAGE No.OF FIGURES PER SECTION	WHETHER THE FIGURES ARE RELEVANT/NEEDED YES/SOMEWHAT/NO (Y/SW/N)						WHETHER THE FIGURES ARE ADEQUATE (Y/SW/N)					
						Y	% of Y	SW	% of SW	N	% of N	Y	% of Y	SW	% of SW	N	% of N
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1	0	6	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
2	15	22	0.7	13	1.2	12	80.0	1	6.7	2	13.3	2	13.3	10	66.7	3	20.0
3	28	26	1.1	9	3.1	28	100.0	-	-	-	-	17	60.7	10	35.7	1	3.6
4	30	26	1.2	8	3.8	29	96.7	1	3.3	-	-	19	63.3	11	36.7	-	-
5	23	26	0.9	10	2.3	23	100.0	-	-	-	-	15	65.2	7	30.4	1	4.4
6	32	22	1.5	8	4.0	31	96.9	1	3.1	-	-	19	59.4	12	37.5	1	3.1
7	31	38	0.8	9	3.4	28	90.3	2	6.5	1	3.2	8	25.8	23	74.2	-	-
8	5	20	0.3	9	0.6	5	100.0	-	-	-	-	1	20.0	4	80.0	-	-
9	14	20	0.7	5	2.8	14	100.0	-	-	-	-	1	7.1	11	78.6	2	14.3
10	91	48	1.9	10	9.1	81	89.0	6	6.6	4	4.4	22	24.2	64	70.3	5	5.5
11	30	36	0.8	8	3.8	28	93.3	-	-	2	6.7	7	23.3	23	76.7	-	-
12	39	30	1.3	15	2.6	36	92.3	2	5.1	1	2.6	30	76.9	8	20.5	1	2.6
13	54	24	2.3	13	4.2	54	100.0	-	-	-	-	11	20.4	43	79.6	-	-
	392	344	1.1	120	3.3	369	94.1	13	3.3	10	2.6	152	38.8	226	57.6	14	3.6
						369+13+10=392						152+226+14=392					

TABLE NO. 5.12(b)

CONTENT ANALYSIS FOR OBJECTIVE NO.3(c)(i): i.e.,FOR COMMUNICATION STRATEGIES IN TERMS OF STATUS OF ILLUSTRATIONS:

(i) FOR FIGURES : (BASED ON TABLE NO.5.11(b)) FOR STD.XII TEXTBOOK :

CHAPTER NO.	TOTAL NUMBER OF FIGURES	TOTAL NUMBER OF PAGES	AVERAGE NO. OF FIGURES PER PAGE	TOTAL NO.OF SECTIONS	AVERAGE NO. OF FIGURES PER SECTION	WHETHER THE FIGURES ARE RELEVANT/NEEDED (YES/SOMEWHAT/NO (Y/SW/N)						WHETHER THE FIGURES ARE ADEQUATE (Y/SW/N)					
						Y	% of Y	SW	% of SW	N	% of N	Y	% of Y	SW	% of SW	N	% of N
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1	28	26	1.1	6	4.7	28	100.0	-	-	-	-	11	39.3	17	60.7	-	-
2	43	42	1.0	10	4.3	43	100.0	-	-	-	-	16	37.2	25	58.1	2	4.7
3	46	30	1.5	5	9.2	45	97.8	1	2.2	-	-	30	65.2	15	32.6	1	2.2
4	16	22	0.7	4	4.0	16	100.0	-	-	-	-	8	50.0	7	43.8	1	6.2
5	38	28	1.4	6	6.3	36	94.7	2	5.3	-	-	17	44.7	19	50.0	2	5.3
6	26	62	0.4	6	4.3	22	84.6	2	7.7	2	7.7	2	7.7	24	92.3	-	-
7	39	18	2.2	10	3.9	38	97.4	1	2.6	-	-	15	38.5	24	61.5	-	-
8	27	18	1.5	6	4.5	27	100.0	-	-	-	-	16	59.3	11	40.7	-	-
9	24	18	1.3	5	4.8	23	95.8	1	4.2	-	-	7	29.2	17	70.8	-	-
10	40	26	1.5	7	5.7	40	100.0	-	-	-	-	14	35.0	26	65.0	-	-
11	63	34	1.9	19	3.3	61	96.8	2	3.2	-	-	6	9.5	55	87.3	2	3.2
12	20	26	0.8	10	2.0	20	100.0	-	-	-	-	4	20.0	16	80.0	-	-
13	20	40	0.5	17	1.2	20	100.0	-	-	-	-	11	55.0	8	40.0	1	5.0
14	126	48	2.6	14	9.0	126	100.0	-	-	-	-	61	48.4	65	51.6	-	-
15	8	48	0.2	5	1.6	8	100.0	-	-	-	-	7	87.5	1	12.5	-	-
TOTAL	564	486	1.2	130	4.3	553	98.0	9	1.6	2	0.4	225	39.9	330	58.5	9	1.6
						553+9+2=564						225+330+9=564					

TABLE NO. 5.13(a)

CONTENT ANALYSIS FOR OBJECTIVE NO.3 (c)(ii) i.e., COMMUNICATION STRATEGIES IN TERMS OF STATUS OF ILLUSTRATIONS : (ii) TABLES (FOR STD.XI TEXTBOOK) :

Chapter No. & Page No.	Table No.	Whether Relevant/ Needed Yes/Somewhat/No (Y/SW/N)	Whether Adequate (Y/SW/N)
1	2	3	4
1. -	-	-	-
2. P.9	2.1	Y	SW
15	2.2	Y	SW
19	*(2.3)	Y	Y
3. P.35	*(3.1)	Y	Y
4. P.72	*(4.1)	Y	Y
73	*(4.2)	Y	Y
74	*(4.3)	Y	Y
75	*(4.4)	Y	Y
5.	-	-	-
6.	-	-	-
7. P.151	*(7.1)	Y	Y
154	*(7.2)	Y	Y
8. -	-	-	-
9. P.199	*(9.1)	Y	Y
9. P.201	9.1	Y	Y
204	9.2	Y	Y
209	9.3	(Too elementary)N	Y
211	*(9.4)	Y	Y
	*(9.5)	Y	Y
212	*(9.6)	Y	Y
213	*(9.7)	Y	SW

(* : No Nos. GIVEN IN THE TEXT)

TABLE No.5.13(a) (CONTD.)

1	2	3	4
10. P.219	10.1	Y	SW (No ascending/descending order)
222	10.2	Y	SW "
223	10.3	Y	SW "
	10.4	Y	Y
235	10.5	Y	SW (No aescending/descending order)
246	10.6	Y	Y
254	10.7	Y	SW (No aescending/descending order)
11. P.268	11.1	Y	Y
274	11.2	Y	SW (No ascending/descending order)
275	11.3	Y	" SW "
281	11.4	Y	Y
290	11.5	Y	Y
294	11.6	Y	Y
295	11.7	Y	Y
	11.8	Y	Y
12. P.316	12.1	Y	Y
13. P.334	13.1	Y	Y SW (No ascending/descending order)
348	13.2	Y	Y

TABLE NO.5.13(b)

CONTENT ANALYSIS FOR OBJECTIVE NO.3(c)(ii) i.e.,COMMUNICATION STARTEGIES IN TERMS OF STATUS OF ILLUSTRATION: (ii) TABLES.

FOR STD.XII TEXTBOOK:

CH.NO. & PAGE NO.	TABLE NO.	WHETHER RELEVANT/ NEEDED : (YES/SOMEWHAT/NO) (Y/SW/N)	WHETHER ADEQUATE (Y/SW/N) & REMARKS IF ANY
1	2	3	4
1&2	1.1	Y	Y
4	1.2	Y	Y (gives advanced information)
2&44	NO NUMBER (After para.3 -starred	Y	N (Not given proper tabular form)
61	NO NUMBER	Y	SW (Unit not specified in the 3rd column)
3&73	3.1	Y	SW (seems to be incomplete, for which the reason is not given in the text)
74	3.2	Y	SW (" ")
93	NO NUMBER (Ex.3.11)	Y	SW (In 2nd column 2nd decimal is not shown as zero in the case of the last 4 observations)
4&113	4.1	Y	SW (No ascending or descending order).
117	NO NUMBER (Ex.4.9)	Y	SW (In last coloumn, common unit may be given at the top)
5&159	1.1	Y	SW(No ascending or descending order -units may be given in brackets.

TABLE NO.5.13(b) (CONTD.)

1	2	3	4
6	-	-	-
7	-	-	-
8	-	-	-
9	-	-	-
10	-	-	-
11&269	11.1	Y	Y (Units may be given in brackets)
276	NO NUMBER	Y	SW (NO ascending or descending order)
282	11.2	Y	Y
12&302	NO NUMBER	Y	SW-No column headings.
303	" "	Y	Y
311	" "	Y	SW
13&332	" "	Y	SW(Units may be given in brackets)
352	" "	Y	SW(No proper column heading)
	" "	Y	SW(" ")
353	" "	Y	SW(" ")
354	1 (13.1)	Y	SW(Units may be given in brackets) -not properly numbered)
359	2 (13.2)	SW(Could have been given in Appendix)	SW (Not properly numbered - full reference of the source is not given)
14&369	14.1	Y	Y
375	14.2	Y	Y
15 Epilogue	-	-	-
-	-	-	-

- In Ch.3,5,8,14 & 13 all the given figures are relevant.

- Ch.12 contains highest number of figures (76.9%) which appear to be adequate and Ch.13 contains highest number of figures (79.6%) which appear to be somewhat (SW) adequate.

- Ch.9 contains highest number of Tables (9) followed by Ch.11(8).

Except Table 9.3 in Ch.9, all other tables appear to be relevant or needed for illustration.

- Out of 34 Tables in the whole textbook 25 (73.5%) are adequate.

- Some of the biographical and other details given about scientists (along with the photographs) are interesting.

INADEQUACIES :

- Only two figures (Ch.5, p.105 of the textbook, numberless for Ex.5.23 (a) & (b) are being 'Indianised' in their outlook (with a turban and 'dhoti') in the whole textbook.

- Only two figures (p.105 of the textbook, for Ex.5.24 & p,134 - Fig.7.2) appear to be somewhat interesting in the whole textbook.

- There are several figures which are not properly labelled; some of them lack certain details; some are too small in size; and some are not properly spaced; all these details can be easily read from the detailed Table No.5.11(a).

- All the figures are only in black and white and graphic work is also not very attractive.

- Ch.1 does not contain any figure.

- Ch.8 contains the least average number of figures per page.

- Ch.2,5,7,8,9, & 11 contain less than one figure per page on an average.
- Ch.8 contains less than one figure per section.
- Ch.2 among all the chapters contains highest number of figures (13.3%) which are irrelevant or not needed; and the same chapter contains highest number of figures (20.0%) which are not adequate.

- Ch.10 contains 13 figures which are not labelled (out of 91); and Ch.2 & 11 also contain a few (5 & 3 out of 15 & 30 respectively) figures which are not labelled.

- Most of the tables are prepared neither in ascending nor in descending order.

- Many tables have not been numbered and some of them have been numbered without referring to the concerned chapter (for better reference).

- In Table 2.1 (p.9 of the textbook), though 10^{-15} and 10^{-18} are mentioned at the end, 10^{18} (era, E) and 10^{15} (peta, P) are missing in the beginning.

- In Table 2.2 (p.15 of the textbook), the word 'On' and the unit N are being repeated everytime, instead of getting appeared on the top/heading row.

- There are only 34 photographs in the whole textbook containing 344 pages and 120 sections.

- Almost all the photographs of scientists are of very poor print.

FOR STD.XII TEXTBOOK :

POSITIVE ASPECTS :

- In the whole textbook, there are 564 figures for 486 pages with 130 sections; the average number of figures per page and per section are 1.2 and 4.3 respectively.

- 553 figures out of 564 (98.0%) are found to be relevant.

- 225 figures (39.9%) appear to be adequate and 330 figures(58.5%) appear to be somewhat adequate.

- Ch.14 contains highest number of figures (126) with the average number of figures per page being 2.6 and per section being 9.0.

- Out of 15 chapters 10 chapters contain more than one figure per page on an average.

- Most of the chapters contain more than two figures per section on an average.

- In Ch.1,2,4,8,10,12,13,14 & 15, all the given figures are relevant.

- Ch. 13 contains highest number of Tables (6) followed by Ch. 11 & 12 (3 each.).

- All the Tables (except Table 2, in p.359) appear to be relevant or needed for illustration.

- Out of 24 Tables, 7 (29 %) appear to be adequate.

- Some of the biographical and other details given about scientists (along with their photographs) are interesting.

INADEQUACIES :

- There are 330 figures (58.5%) which are not fully adequate due to several specific reasons such as, inadequate size, incomplete, wrongly numbered/not numbered, not labelled/not properly labelled, not properly spaced, not clear, not included in the title, etc.

- All the figures are only in black and white and not very attractive.

- Ch.15 contains the least average number of figures per page.

- Ch.4,6,12,13 & 15 contain less than one figure per page on an average.

- Ch.6 contains 9 figures which are not labelled (out of 26).

- Sxiteen Tables out of 24 are somewhat inadequate based on the remarks (Table No.5.13(b), pp.336-337) such as improper tabular form, incomplete, no descending or ascending order, units missing, etc.

- There are only 30 photographs in the whole textbook containing 564 pages and 130 sections.

- Almost all the photographs of scientists are on very poor print.

5.4: FOR OBJECTIVE No.4 i.e.,TO MAKE A DETAILED STUDY OF LANGUAGE ASPECTS IN THE TEXTBOOKS i.e.,(a) LANGUAGE SPECIALITIES, (b) VOCABULARY (c) MAJOR ERRORS :

As discussed in Ch.II and Ch.IV, language aspects have been analysed by keeping in mind the following :
(a) Language specialities - analogies,phrases, idioms and exclamatory statements, (b) Vocabulary - high sounding/ interesting words and difficult words and (c) Major Errors. Chapter-wise detailed information have been shown on Table No.5.14 & 5.15 for (a) & (c) respectively (pp.343-347); from the prepared Tables and from the text directly, the following major findings have been arrived at :

FOR STD.XI TEXTBOOK :

POSITIVE ASPECTS :

- Ch.3,7,8 & 10 contain atleast one analogy in each.

- There are totally 133 exclamatory statements in 344 pages of the textbook; which appear to contribute to the communicative aspect.

- Ch.8 & 10 contain a few high sounding/interesting/exciting vocabularies such as contemplative mood, temporal behaviour of the universe, spectacular and mysterious behaviour of elastomers, hydrostatic paradox, etc. Except very few, almost all the vocabularies used in the textbook appear to be not so difficult at Snr. Sec. level.

TABLE NO. 5.14

CONTENT ANALYSIS FOR OBJECTIVE NO.4 i.e., FOR LANGUAGE ASPECTS: (a) LANGUAGE SPECIALITIES: ANALOGIES, PHRASES & IDIOMS

FOR STD.XI TEXTBOOK:

Chapter No.	Page & Paragraph No.	Nature of Specialities (Only Main Aspects)	Whether Relevant To Physics Yes/Somewhat/No (Y/SW/N)	Whether Adequate Y/SW/N
1	2	3	4	5
1	-	-	-	-
2	-	-	-	-
3.	32-6	Analogy: -ve, o & +ve with B.C., Birth of Lord Jesus Christ & A.D.	SW	SW
4.	-	-	-	-
5.	-	-	-	-
6.	-	-	-	-
7.	159-5	Analogy: Precession of a spinning top and motion of moon.	Y	Y
8.	182-2	Analogy: An ant travelling from one point to another on a flat sheet of paper four dimensional space time.	SW	SW (Not very clearly stated)
9.	-	-	-	-
10.	243-4	Analogy: Surface tension & strateched rubber sheet.	Y	Y
	251-2	Idiom: pitter patter of molecues raining on any particular patch of the wall of the container		Y
11.	-	-	-	-
12.	-	-	-	-
13.	-	-	-	-

TABLE NO.5.14 (CONTD.)

FOR STD.XII TEXTBOOK :

1	2	3	4	5
1.	5-2	Analogy: Electrical analogue of Newton's gravitation law - i.e. Coulomb's law.	Y	Y
2.	31-3	Analogy: Electrostatic potential and work done while lifting a mass upward.	Y	Y
3.	71-3	Analogy : Mechanical analogy for emf and current flow - m a man dropping iron ball at a steady rate through a vertical column of liquid.	Y	SW
4.	-	-	-	-
5.	140-Fig.5.3(c) & 141-2	Analogy: Direction of electric current in a straight long conductor and of produced magnetic field. Grasping the conductor in right hand with the thumb up along the current in conductor, and the other four finger curving in the direction of magnetic field.	Y	Y
6.	166-2 172-4 & 5 (last)	Idiom : Easy come easy go Analogy: The field of a magnetic dipole - the analogue of Gauss theorem.	Y Y	Y SW
7.	-	-	-	-
8.	217-1	Analogy: a freely oscillating LC circuit and a pendulum.		
9.	-	-	-	-
10.	-	-	-	-
11.	-	-	-	-

TABLE NO.5.14 (CONTD.)

1	2	3	4	5
12	303-2	Phrase: 'tour de force'	Y	Y
	31143	Analogy: Historical Linking between Thomson's e/m and Millikan's fundamental charge with the discovery of an empty butter jar and the almost coincident observation of a small boy leaving the kitchen with a twinkle in his eyes and a smear of butter on his face.	SW	SW (but very much interesting)
	317-3	Idiom: Acid test for the wave character of light - interference & diffraction.	Y	Y
	317-3	Idiom: It will be easier for a camel to pass through the eye of a needle than for arranging and experiment which manifests the wave character of macroscopic objects.	Y	Y (interesting)
	328-2	Analogy : Thomson's atomic model and seeds in a watermelon.	Y	Y
13	-	-	-	-
14	-	-	-	-
15	-	-	-	-

FOR STD. XII: TEXTBOOK : TABLE NO.5.15 (CONTD.)

1	2	3	4
1	-	-	-
2	61-2	The conductivity of the atmosphere is very variable	The conductivity of the atmosphere is highly variable.
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-
7	-	-	-
8	-	-	-
9	-	-	-
10	247-1 (Section title)	The Polarisation of light.	Polarisation of light.
	252-5	One of the most beautiful demonstrations of the wave nature of light.....	Better way : One of the most striking demonstration.....
	260-5 (Section title)	The Doppler effect for light	Doppler effect for light.
11	278-5	Refraction at a spherical surface (Section heading)	Refraction through a spherical surface.
	285-3	This scattering is known as Rayligh scattering and we shall not try to explain it here.	Better way: This scattering ..... and this has little scope to be explained here.
12	-	-	-
13	-	-	-
14	-	-	-
15	420-1	In recent years the radar has been	In recent years radar has been .....
	EPILOGUE & APPENDICES	—	—

- Ch.3,4,6,7,8,9,12 & 13 do not show any sign of having errors within the language aspects.

INADEQUACIES :

- Ch.1,2,4,5,6,9,11,12 & 13 do not contain any analogy.

- Totally there are 7 cases of errors in language aspects in the whole textbook.

FOR STD. XII TEXTBOOK :

POSITIVE ASPECTS :

- Ch.1,2,3,5,8 & 12 contain atleast one analogy in each.

- There are totally 144 exclamatory statements in 486 pages of the textbook, which appear to contribute to the communicative aspect.

- Ch.12 contains several high sounding/interesting/exciting vocabularies such as credence, perfect child of physics, admirable decorum, etiquette, privacy of the atom, well-behaved system, apology for perversity, fidelity, surrealist, etc.; of course, some of these terms may appear strange to readers who may not be having high stock of vocabularies in English language.

- The vocabularies used in the textbook seem to be not so difficult at Snr. Sec. level.

- Ch.3,4,5,6,7,8,9,12,13,14, Epilogue and Appendices do not seem to contain any error as far as language aspects are concerned.

II. INADEQUACIES :

- Ch.4,7,9,10,11,13,14 & 15 do not contain any analogy.

- Totally there are 7 cases of errors in language aspects in the whole textbook.

5.5 FOR OBJECTIVE NO.5 : i.e. TO STUDY THE FOLLOWING PHYSICAL ASPECTS OF THE TEXTBOOKS: TYPE SIZE, TYPE FACE, SIZE OF THE TEXTBOOKS, PRINT AREA, INTERLINE SPACING, MARGINS, PAPER, COVER, INK & COLOUR USED, STRENGTHENING THE TEXTUAL MESSAGE, ATTRACTION, BULK AND STYLE OF BINDING:

As discussed in Ch.II,(pp.74-80), even the physical aspects of textbooks play a special role in their academic usability; hence they cannot be ignored by textbook agencies. As pointed out in Ch.IV (pp.153-155) on Methodology, the following data have been collected for this objective mainly with the help of an expert in printing technology; i.e., the Manager of the M.S.University Press at Baroda, and also by keeping in mind the standards specified by NCERT :

I. POSITIVE ASPECTS:

- In printing, standard type sizes have been used for the textbooks for both the classes; i.e., for chapter number: lower capital 18 Pt. bold (1"=72 Point=6 empicas or 6 ems; 1 ems = 12 Pt; 'pica' is printer's unit for the size of type); for chapter headings: 24 Pt bold; for section headings: 12 Pt bold; for sub-section headings: 10 Pt bold; and for actual text : 10 Pt light.

- The size of all the four textbooks is approximately that of double crown 8VO, which is suitable. The size of the textbooks for Std.XI (PART.I & II) and for Std,XII (PART.I)

is 7.0" x 9.2"; this seems slightly less because of improper binding and trimming. In the case of PART II for Std.XII, the size is slightly larger, i.e.,7.0" x 9.5".

- The print area in all the four textbooks is approximately 34 ems x 46 ems, which is suitable.

- Interline spacing in all the textbooks is 2 Pt. which is sufficient for Snr. Sec. level.

- Only in the case of PART.II of Std.XII textbook, the margins are within the acceptable standards, the top margin being about 6 ems and the bottom one being about 7 ems.

- Based on the number of pages, the bulks of the textbooks for Std.XI (PART.I: 14+194 pages; PART.II: 4+176 pages) and Std.XII (only PART I : 16+136 pages) seem to be quite convenient for Snr. Sec. level students to handle.

- The prices of the textbooks (Std.XI- PART. I:Rs.10.00; PART.II: Rs.11.50;Std.XII-PART I: Rs.10.00, PART II: Rs.17.00) seem to be quite fair compared to the size of the textbooks.

II. INADEQUACIES :

- In all the four textbooks, solved examples, starred portions,footnotes and end-of-chapter exercises are all printed with 8 Pt.type size and Roman type face; though this size is in order, the content is very tiresome to the eyes of (even adult) readers due to poor reproduction and unsuitable type face; technically, instead of Roman type face, 'Halvitica' is better for exercises, additional notes, etc.

- In the case of textbooks for Std.XI, PART I & II and Std.XII, PART I, the average top margin is less than expected 6 ems and the bottom one is less than the expected 7 ems; moreover the margin sizes are varying much from page to page, due to poor binding.

- Gutter margin in all the textbooks is about 4 ems which is somewhat low compared to the standard of 5 ems and it is not uniform for all the pages. The fore-edge margin also is not upto the standard (of 6 ems) as it is only about 3-4 ems in all the textbooks and again varying in the case of a few pages.

- The paper used for the actual text is machine finish/ newsprint type, whereas the expected standard is S.C. (Super Calender).

- The paper used for the actual text is in 60 GSM substance . (Grams per Square Metre) and the standard is supposed to be in 70 GSM substance; moreover, the bad quality of the paper with its poor opaqueness disturbs readers' concentration on content; and also, the papers do not seem to be very strong, as it can be easily torn.

- The paper used for the cover pages is in 200 GSM substance, whereas the standard expected is about 250 GSM, especially for thicker books; so in the case of the textbook for Std.XII, PART II, which contains 4+368 pages, the cover page is too thin; hence it is not at all durable.

- The colour of the paper used is not sufficiently white; of course the colour is slightly better in the case of the textbook for Std.XII, PART.I, whereas in other textbooks it is below the standard and doesn't seem to be pleasant to readers' eye.

- The density and the quality of ink used for printing is not upto the standard; the printing is not good and not even uniform.

- The printing of photographs especially of most of the scientists is very poor; those photographs appear as if the poor quality xerox copies have been pasted to the textbooks, due to their poor reproduction. The printing of other diagrams too is not good; throughout all the textbooks, there is not even a single diagram or plates (for spectroscopy) with colours.

- Not all the new technically important terms and the terms from other languages are printed in italics; and at times, certain terms have been printed in italics unnecessarily. There are several printing/editorial errors in the textbooks, as shown on Table No.5.16 (pp.353-358).

- No underlinings, boxes and or colours, are used throughout both the textbooks, for strengthening the textual message or to produce isolation effects for better retention (as discussed in Ch.II pp.78-80), even in the case of important formulae, theories, laws, etc.

- The cover pages of all the textbooks do not exhibit attractive features (as already discussed under Objective No.1 pp.174,177); moreover, they should have been laminated, atleast with very thin layer of plastic cover to protect them as well as to make them attractive.

- The textbook for Std.XII, PART.II with 4+368 pages is too bulky (the ideal is to have about 200 pages) especially because of low quality binding.

TABLE No.5.16

FOR OBJECTIVE No.5, i.e.,FOR PHYSICAL ASPECTS OF THE TEXTBOOKS : SOME OF THE MAJOR PRINTING/EDITORIAL ERRORS & THEIR CORRECTIONS :

FOR STD.XI TEXTBOOK :

S.No.	REFERENCE (Ch./PAGE/PARA/ LINE, ETC.)	ERROS (WITH REMARKS IF ANY)	CORRECTION (WITH REMARKS IF ANY)
1	2	3	4
1.	COVER PAGE (PART I)	After Class XI, 'PART I' - Not Printed.	CLASS XI, PART I.
2.	2/16/6/1	Newton (Unit of force)	newton: This printing error is present in several pages throughout the book.
3.	2/19/6 (2.10)/21	Watt (unit of power)	watt : "
4.	2/19/1 - Data	Table No. - not given	Table 2.3.
5.	3/29/Content of the chapter.	* Differential calculus (Large & thick asterisk mark)	*3.9 Differential calculus. (small, ordinary asterisk mark as in the case of other chapters -for consistency sake); the size and inking of the asterisk mark is not uniform throughout the book.
6.	& 3/48/2 - Section heading.		
7.	4/61/For example 4.1	Fig.Nos.-not given	Fig.4.10(a) & (b) (Accordingly, the numbers for other figures in the chapter would change - in all chapters too).

NOTE: ABBREVATIONS USED: Fig.- Figure
Ex - Exercise

TABLE NO.5.16 (CONTD.)

1	2	3	4
8.	4/61/Last para: Answer	Subquestion Nos.- not given	(a) The displacement..... (b) The position..... (c) The total path..... (d) The displacement of a man...
9.	4/62/Example 4.2	Fig. No. not given	Fig.4.11.
10.	4/64/Example 4.3	"	Fig.4.15.
11.	4/72/2/ 3-6	Can't read properly due to excess ink (probably may not be in all copies)	-
12.	4/72/5- Data (After Fig.4.19)	Table No. - not given	Table 4.1 (Accordingly, the numbers for other Tables in the chapter would change - in all chapters too.)
13.	4/74/1 - Data	"	Table 4.2.
14.	4/74/Example 4.5	Fig. No. - Not given.	Fig. 4.25
15.	4/75/2 - Data	Table No.- not given	Table 4.4.
16.	4/76/Last figure	Fig. No. - not given	Fig.4.28.
17. & 18.	4/77/Ex.4.8 & 4.9	Fig. Nos. - not given	Fig.4.29 & Fig.4.30
19. & 20.	5/99 - 2 figures	Fig.Nos. - not given	Fig.5.9 & Fig.5.10
21.	5/102 - 4 figures	"	Fig.5.12,(a),(b),(c)& (d).
22. to 28	5/104 - 106:7 figures	"	Fig.5.13 - 5.19

TABLE No.5.16 (CONTD.)

1	2	3	4
29.	6/116 - Examole 6.3	Fig. No. - not given	Fig.6.10
30.	6/120 - Example 6.6	"	Fig.6.12
31. to 39.	6/124 - 127: 9 figures	Fig. Nos. - not given	Fig.6.13 -6.21.
40.	7/137 - Examole 7.1	"	Fig.7.9. (a) & (b).
41.	7/140 - Last.	Fig./Diagram No.-not given	Fig.7.13
42.	7/151/3	Table No.-not given	Table 7.1
43.	7/154/1	"	Table 7.2
44.	7/164/Ex.7.27	Fig. No.- not given	Fig.7.31.
45.	9/199/Example 9.1 - Data	Table No. - not given	Table 9.1
46.	9/201/Table	Table 1	Table 9.1 (To specify the 9th chapter, as in the case of figures - for consistency sake & for easy reference; this type of mistake is seen throughout Part II)
47.	9/209/2/3 & 4	Excess ink	-
48. & 51.	9/211-213: Exercises	Table Nos. - not given	Table 9.4 - 9.7
52.	11/267 - Fig.11.3	oK (Throughout)	K (And even in other pages).
53. to 55.	11/294 - 295	Table Nos.-not given	Table 11.6 - 11.8

1	2	3	4
56. -57.	12/299 - content	12.14 & 12.15	*12.14 & *12.15 (Starred)
58.	12/305-306 - Example.12.2	Fig. No. - not given	Fig.12.3.
59.	12/311 - Example 12.3	"	Fig.12.8
60.	12/320/Section 12.14	12.14	*12.14
61.	12/323/ " 12.15	12.15	*12.15
62-70	12/324-328 Exercises (9 Figures)	Fig. Nos.-not given	Fig.12.17 - 12.25
71.	13/333/last para	Not properly printed.	—
72.	13/351/Ex. 13.21	Fig. No. - not given	Fig.13.15.
73.	Bibliography	Text Books.	Textbooks.

FOR STD.XII TEXTBOOK :

1.	PRE-TEXT PAGE No.(iv): Information for Cover: 2nd line.	Thus images shows.....	These images show.....
2.	PRE-TEXT PAGE No. : CONTENTS : FOR NOTE:	Chapters 5-17	Chapters 5-15.
3.	1/11/Example 1.2	Fig. No.- not given	Fig.1.6(a) & (b)
4.	1/13/Example 1.3 & 1.4	Fig. Nos. - "	Fig.1.7 & 1.8
5.	1/20/Example 1.5	Fig. Nos. - "	Fig.1.15.
6-9	1/24 & 25/Exercises	Fig.Nos. - "	Fig.1.18-1.21
10.	2/40/1 - After the figure	Another way not using....	Another way of not using.....

TABLE No.5.16 (CONTD.)

1	2	3	4
11-15	2/53-55: 5 Figures	Fig. Nos. - not given	Fig.2.23-2.27
16.	2/57 - 1st figure	Fig. No. - "	Fig. 2.29.
17.	2/61/1	Table No.- "	Table 2.1
18-21	2/65-67 - 4 Figures	Fig. Nos. - "	Fig.2.36 - 2.39.
22.	3/74 - Figure	Fig. 3.3	Fig. 3.4
23.	3/85 - Examole 3.4	Fig. No. - not given	Fig. 3.15
24-25	3/86-87 - Examples.	Fig. Nos. - not given	Fig. 3.16 & 3.17
26.	3/91 - Example 3.8	Fig. No. - "	Fig. 3.23
27-35	3/93-96 - Exercises (9 Figures)	" "	Fig.3.24 - 3.32
36.	4/118 - For Ex.4.18	" "	Fig.4.12 (a),(b) & (c).
37.	5/159 - Table	Table. 1	Table 5.1
38-40	5/160-162 : Exercises: 3 figures	Fig.Nos.- not given	Fig.5.18 - 5.20
41.	6/175/1/last word.	Trivandrum.	Tiruvananthapuram (now officially accepted name)
42-43	6/183-184 : 2 figures	Fig.Nos. not given	Fig.6.14, 6.15 (a) - (g)
44-45	7/190-191 - Figures for Examples	" "	Fig.7.7 & 7.8
46-56	7/200-203 - 11 Figures.	" "	Fig.7.16 - 7.26
57-60	8/220-222 : 4 "	" "	Fig.8 16- 8.19
61.	9/236 - Last figure	Fig. No. - "	Fig. 9.16
62-63	9/237 - 2 figures	Fig. Nos.- "	Fig.9.17 & 9.18.
64.	11/276 - last para	Table No.- "	Table 11.2

TABLE NO. 5.16 (CONTD.)

1	2	3	4
65.	11/277/3/ last but one	liught -	light
66-70	11/292-295: 5 figures	Fig. Nos.- not given	Fig.11.38- 11.42. (Fig.11.39(a) & (b) - angles: not appropriate)
71-72	12/302-304: Tables	Table Nos.- "	Table 12.1 & 12.2
73.	12/311 - Table	Table No - "	Table 12.3
74.	12/321 - Fig.	Fig.No. "	Fig.12.13
75.	13/332 - After Fig.13.7	Table No. "	Table 13.1
76.	13/354	Table 1.	Table 13.2
77.	13/359 - Table	Table 2.	Table 13.3
78.	13/365 - fig.	Fig. No. - not given	Fig. 13.20
79-80	14/397 - for Examole 14.4 & 14.5	Fig. Nos.- "	Fig. 14.38 & 14.39
81-83	14/400 - 403: 3 figures	Titles for(b) & (c) are missing in all.	(As given in the respective figures).
84-85	14/402-403 - Fig. 14.45 & 14.46	Titles for (b) in both, are missing. In 14.45,(d)-not titled.	(As given in the respective figures) "
86.	14/404 - Fig.14.50	(b) - not titled.	"
87.	14/405 - Fig.14.51	(c) - "	"
88.	14/406 - Fig.14.52	(b) - "	"
89-100	14/408-411: 12 figures	Fig.Nos.-not given	Fig.14.56 - 14.67.
101	BIBLIOGRAPHY - 1st word.	TextBooks	Textbooks.

- The style of binding in all the textbooks is with side stitching which takes too much of gutter margin; technically, all the textbooks are supposed to be section-sewn with thread, cover creased and end-paper pasted with full cloth on the spine and flush.

- The distribution of the textbooks seem to be very much disappointing almost throughout the country (based on Book-sellers', students' and teachers' reports).

5.6 FOR OBJECTIVE NO.6 i.e., TO MAKE A DETAILED STUDY OF END-OF-CHAPTER EXERCISES :

As discussed in Ch.IV on Methodology, all the 426 exercises in Std.XI and 432 in Std.XII textbooks were carefully solved or their expected answers were determined as the case may be, and they were classified systematically based on their structure (Table No.5.17, p.360) and nature (Table No.5.18 p.361); the following interpretations were made mainly based on the scanning of vertical and horizontal components of the prepared tables and a few other important considerations specifically to particular chapters:

POSITIVE ASPECTS :

GENERAL FOR BOTH THE TEXTBOOKS :

- Answers given to the numerical problems at the end of the textbooks agree with the answers obtained by the investigator in the case of most of the problems, except of course some discrepancies in decimal places in the case of a few problems.

- Out of 426 problems, 47 (11%) in STD.XI and out of 432 problems 106 (25%) in STD.XII are starred problems specially

TABLE NO. 5.17

FOR OBJECTIVE NO.6: i.e., TO MAKE A DETAILED STUDY OF END-OF-CHAPTER EXERCISES - STRUCTURE (FORMAT) OF END-OF-CHAPTER EXERCISES

TYPE OF EXERCISES	NUMBERS IN STD. XI TEXTBOOK						NUMBERS IN STD. XII TEXTBOOK					
	GENERAL		STARRED		COMBINED		GENERAL		STARRED		COMBINED	
	Total	%	Total	%	Grand Total	%	Total	%	Total	%	Grand Total	%
1. MATHEMATICAL	238	62.80	34	72.34	272	63.84	245	75.15	70	66.04	315	72.92
2. ACTIVITY-ORIENTED	8	2.11	0	0	8	1.87	1	0.31	3	2.83	4	0.93
3. ESSAY (LONG ANSWER)	13	3.43	3	6.38	16	3.76	9	2.76	6	5.66	15	3.47
4. ESSAY (SHORT ANSWER)	85	22.43	10	21.28	95	22.50	54	16.56	22	20.75	76	17.59
5. TRUE/FALSE-YES/NO	4	1.06	0	0	4	0.94	10	3.07	5	4.72	15	3.47
6. COMPLETION	4	1.06	0	0	4	0.94	0	0	0	0	0	0
7. MATCHING	3	0.79	0	0	3	0.70	0	0	0	0	0	0
8. MULTIPLE CHOICE	11	2.90	0	0	11	2.58	3	0.92	0	0	3	0.69
9. OTHER OBJECTIVE TYPES	4	1.05	0	0	4	0.94	4	1.23	0	0	4	0.93
10. MIXED (OBJECTIVE) TYPE	9	2.37	0	0	9	2.11	0	0	0	0	0	0

TABLE NO. 5.18

FOR OBJECTIVE NO.6: i.e., TO MAKE A DETAILED STUDY OF END_OF_CHAPTER EXERCISES -

NATURE OF THE END_OF_CHAPTER EXERCISES

EXERCISES WHICH	NUMBER OF EXERCISES IN STD.XI TEXTBOOK						NUMBER OF EXER CISES IN STD.XII TEXTBOOK					
	GENERAL		STARRED		COMBINED		GENERAL		STARRED		COMBINED	
	Total	%	Total	%	Grand Total	%	Total	%	Total	%	Grand Total	%
1. ARE RELATED TO KNOWLEDGE OBJECTIVES	8	2.11	0	0.00	8	1.88	2	0.62	0	0.00	2	0.41
2. ARE RELATED TO COMPRE_ HENSION OBJECTIVES (UNDERSTANDING)	117	30.87	13	27.66	130	30.52	79	24.23	35	33.02	114	26.39
3. ARE RELATED TO APPLIC_ ATION & OTHER HIGHER ORDER OBJECTIVES	254	67.02	34	72.34	288	67.60	245	75.15	71	66.98	316	73.15
4. SEEM CHALLENGING/ INTERESTING	97	25.59	19	40.43	116	27.23	21	6.44	8	7.56	29	6.71
5. HELPFUL TO DEVELOP PROCESS ASPECTS OF PHYSICS	41	10.82	11	23.40	52	12.20	15	4.60	10	9.43	25	5.79
6. SEEM BEYOND THE LEVEL OF STUDENTS/VERY DIFFICULT	77	20.32	10	21.28	87	20.42	119	36.50	20	18.87	139	32.18
7. SEEM VERY EASY/NOT WORTH INCLUDING	7	1.85	0	0	7	1.64	4	1.23	6	5.66	10	2.31
8. SEEM NOT DIRECTLY RELATED TO THE CHAPTER/PREVIOUS CHAPTERS	15	3.96	9	19.15	24	5.63	9	2.76	7	6.60	16	3.70

meant for above-average students; i.e., in the case of STD.XII textbook, number of starred problems are almost doubled.

(—) There are maximum numbers of mathematical problems (64% & 73% respectively in STD.XI & STD.XII) in both the textbooks.

(—) Among the essay type questions, most of the questions are short answer type (86% & 84% in STD.XI & STD.XII respectively) in both the textbooks.

(—) Exercises related to the objectives under application and other higher objectives (pp. 80 - 81) have been found to be very high in the case of both the textbooks (68% & 73% in STD.XI & STD.XII, respectively).

(—) Exercises related to the objectives under comprehension or understanding have been found to be about 31% and 26% respectively in STD.XI and STD.XII textbooks.

POSITIVE ASPECTS SPECIFICALLY FOR STD.XI TEXTBOOK:

(—) Ch.3,4 & 5 contain several interesting problems related to daily life situations and sports & games; in addition, Ch.4 contains problems related to military science and Ch.5 related to Indian rural and urban life.

(—) Ch.11 contains some exercises related to Engg/Technology/ Industries and Health/Medical Education.

POSITIVE ASPECTS SPECIFICALLY FOR STD.XII TEXTBOOK :

(—) Ch.2 contains exercises related to advanced information on quarks and to electrical/technical aspects.

– Ch.3 contains some exercises (i) which are helpful in development of process skills and practical physics and (ii) on medical physics.

– Ch.4 contains some exercises related to electrical engineering.

– Ch.13 contains an exercise related to history, i.e., Archaeology of Indus Valley Civilization.

– Ch.15 contains exercises giving very much exciting information.

INADEQUACIES :

GENERAL FOR BOTH THE TEXTBOOKS :

– In STD.XI textbook end-of-chapter exercises, the following discrepancies (Table No.5.19) were observed in the answers given in the textbook and the answers obtained by the investigator :

TABLE NO.5.19

DISCREPENCIES IN THE ANSWERS FOR END_OF_CHAPTER EXERCISES

Sr. No.	Ch. No.	Exercise No.	Textbook Answer	Answer obtained by the Investigator
1.	2	20	0.7×10^{-3} Kg m^{-3}	0.6×10^{-3} Kg m^{-3}
2.	8	15	3×10^{11} J	5.95 x 10 J
3.	11	3	$T_A = \frac{4}{7} T$	$T_A = \frac{7}{4} T_B$
4.	11	32	15.9 J	16.9 J

In the case of STD.XII textbook exercises, the above type of discrepancies were not observed. Several other discrepancies were only in terms of slight difference in decimal places which can be ignored; because, after all, these differences can be due to the considered value of physical constants or the way in which the problems were solved (by using calculators of different digits or using logarithm table).

- Activity-oriented exercises are the lowest in number (2% & 1% in STD.XI & STD.XII textbooks, respectively).

- Compared to essay type questions (26% and 21% in STD.XI & STD.XII textbooks respectively), numbers of objective type questions (8% and 4% in STD.XI & STD.XII textbooks respectively) are too low; but within these low numbered objective type questions emphasis appears to be on multiple choice in both the textbooks (by considering all the sub-questions of Ch.14 in STD.XII i.e., Exercise No.14.23); incidently this chapter contains maximum number of objective type sub-questions.

- Some 4 chapters in STD.XI textbook and 11 chapters in STD.XII textbook, do not contain any objective type question at the end-of-chapters.

- Only about 2% of the exercises in STD.XI textbook and less than a percent in STD.XII belong to the objectives under knowledge sub-domain.

- Among non-starred (general) exercises, 27% of the exercises in STD.XI textbook and only 7% in STD.XII textbook seem to be challenging/interesting; in the case of starred exercises the percentages are 40% and 8% respectively.

Only 12% and 6% of the exercises respectively in STD.XI and STD.XII textbooks seem to be helpful in the development of process skills of science (pp.57-62).

About 20% and 37% of the exercises respectively in STD.XI and STD.XII textbooks, seem to be beyond the level of/ very difficult for average students; among starred exercises also about 20% of them in both the textbooks seem to be difficult even for above-average students.

About 2% of the exercises in both the textbooks appear to be very easy hence there may not be much meaning in including them in the Snr. Sec. level physics textbook; of course this percentage is negligible compared to other aspects.

Some 6% of the exercises in STD.XI textbook and some 4% in the STD.XII textbook, appear to be, not directly related to the content of the concerned chapter or previous chapter; hence such problems might frustrate student-readers.

INADEQUACIES SPECIFICALLY IN STD.XI TEXTBOOK:

Some of the exercises in Ch.1 Introduction, could have been given at the end of the last chapter or at the end of the relevant chapters in STD.XII. textbook.

In Ch.2, students are likely to get frightened while going through some of the exercises/problems, as they do not have much theoretical background.

Ch.6 contains several, even non-starred problems from nuclear physics; but this is not the right place for them; they could be relevant in chapters of STD.XII textbook; and it is better to denote the following exercises as starred ones: 6.31, 6.32, 6.34 - 38.

As Ch.7 is not well-written, even easier problems may appear to be difficult for student-readers.

Some of the exercises in Ch.9 & 10 would be better appreciated by students only at STD.XII level (i.e., after Ch.13., in Std.XII textbook).

In Ch.11, there should have been more numerical problems related to the application of laws of thermodynamics.

In Ch.12 and 13, most of the problems are dull and uninteresting.

INADEQUACIES SPECIFICALLY IN STD.XII TEXTBOOK:

In Ch.11, there are too many problems, though the textual matter in the chapter does not contain much information.

In Ch.12, it appears that some of the starred problems are simply taken from higher claases.

5.7: FOR OBJECTIVE NO.7: i.e., TO STUDY OPINIONS OF STUDENTS, TEACHERS AND SOME EXPERTS REGARDING THE SUITABILITY OF THE PHYSICS TEXTBOOKS.

5.7.1: OPINIONS OF STUDENTS AND TEACHERS :

Concerned students and teachers are important in this study as they form the main clientele of the textbooks, in their learning and teaching process respectively. At times one may doubt the usability of responses from students due to either lack of maturity or language problem on their part; but in this study the concerned students are from Snr. Sec. level, that too who have been learning science/physics

and mathematics through English medium throughout; so, these students were expected to give reasonably good responses especially when the chosen respondents to the questionnaires were all among bright and average students.

Regarding the sample for this objective, as mentioned in the previous chapter (Ch.IV, p.165) all the 108 Snr. Sec. Schools using CBSE syllabus in the western region of India were chosen; in these schools physics teachers for STD.XI & STD.XII (normally only one/two teachers in most of the schools) and physics students (-one bright and one average -from STD.XI as well as STD.XII- normally only one section in each Std.) were requested to respond to the concerned questionnaires (Appendices C & D). Out of 108 Snr. Sec. Schools, only 60 schools responded inspite of two additional reminders and personnal visits/telephone calls in some cases wherever possible; out of these, only responses from 41 schools were useful (other schools who responded wrote that they could not get the questionnaires filled up due to one reason or the other- such as schools do not have any PG teacher for physics - do not offer physics/science at STD.XI, etc.). Out of 41 schools whose responses were useful 14 are from Maharastra, 9 from Gujarat and 18 from Rajasthan; and among these schools, 30 are under KVS/Public Sectors and the rest are run by certain private organisations. Totally 81 students from Std.XI, 96 students from Std.XII and 41 teachers responded to the concerned questionnaires.

As discussed in the previous chapter, the methodology for analysis for students' responses as well as for teachers' responses were the same: i.e., after determining the frequencies for YES (Y-favourable), NO (N-unfavourable) and UNDECIDED (U-uncertain), average rating scores were calculated for each item, by rating the responses 1, -1 and 0 respectively; and the interpretations were made based on the

following criteria :

(1) The values of average rating scores within the range of -1.00 to -0.50 were considered unfavourable for the different aspects of the textbooks.

(2) The values of average rating scores within the range of -0.49 to + 0.49 were considered uncertain or undecided.

(3) The values of average rating scores within the range of 0.50 to 1.00 were considered favourable for the different aspects of the textbooks.

5.7.1.1: SNR. SEC. PHYSICS STUDENTS' RESPONSES:

Questionnaire for Snr. Sec. physics students (Appendix-D) had 21 items with sub-items in the case of a few, i.e., with a total of 40 responses in the form of Yes/No/Undecided (Y/N/U); in the case of item number 2,3,5,6,12 and 15, Y represented unfavourable and N represented favourable responses; for the starred items, 3,5,6,13,15,16,19 and 20, the respondents were requested to supply additional information on enclosed sheets of papers.

Categories of items have not been shown intentionally on student's questionnaire as they may not make much meaning to the students and unnecessarily might confuse them; however, while analyzing and interpreting, the seven categories were made, keeping in mind the objectives as in the case of teacher's questionnaire (Appendix. C.).

Data presented in Table No.5.20 (pp.369-371) have been interpreted categorywise and aspectwise in the following sub-sections:

I. REGARDING THE CONTENT OF THE TEXTBOOKS (ITEM NO.1-8):

Average rating scores for the items 1-3, 6,8(a), 8(c) and 8(d) for both the classes clearly show that the students

TABLE NO.5.20

AVERAGE RATING SCORES OF THE STUDENTS' OPINIONS REGARDING THE SUITABILITY OF THE TEXTBOOKS

ASPECTS/ITEMS	AVERAGE RATING SCORE FOR STD.XI (N=81)	AVERAGE RATING SCORE FOR STD.XII (N=96)
1	2	3
I: REGARDING THE CONTENT OF THE TEXTBOOKS:		
1. Enthusiasm in your reading the physics textbooks.	0.23	0.17
2. Difficulties in understanding due to lack of knowledge of		
(a) Physics/Science in the previous Classes.	-0.16	0.00
(b) Mathematics in the previous Classes.	0.35	0.30
(c) Mathematics in XI/XII Classes.	0.16	-0.02
(d) Chemistry in XI/XII Classes.	0.44	0.49
3. Presence of new terms whose meanings are not given.	0.30	-0.45
4. Relation between physics and other branches of science.	0.81	0.84
5. Presence of difficult topics for majority of the students.	-0.52	-0.68
6. Presence of mistakes.	0.12	-0.11
7. Presence of adventures and other details about physicists.	0.42	0.55
8. Usefulness of		
(a) A Note for students	0.43	0.43
(b) Index	0.54	0.45
(c) Bibliography	0.31	0.23
(d) Appendices.	0.25	0.28
II: REGARDING THE REFLECTION ON NATURE & STRUCTURE OF PHYSICS/SCIENCE:		
9. Inspiration to become a a physicist in future.	-0.30	-0.18

TABLE NO.5.20 (CONTD.)

1	2	3
III. REGARDING THE COMMUNICATION STRATEGIES :		
10. Interesting questions.	0.63	0.58
11. Specific and practical suggestions for study.	0.00	-0.06
12. Complete dependability on the textbooks instead of attending regular or tutorial classes.	— 0.59	— 0.71
13. Quality of diagrams/pictures.	-0.01	0.00
IV. REGARDING THE END-OF-CHAPTER EXERCISES :		
14. Usefulness of worked out examples to solve the problems at the end of chapters.	0.31	0.08
15. Errors		
(a) in the questions/problems given in the exercises.	0.27	0.11
(b) in their answers given at the end of the books.	0.14	0.14
16. In the exercises, ability to solve		
(a) all the general/non-starred problems.	0.12	0.11
(b) all the starred problems.	-0.52	-0.51
17. Grading (simple to complex) in the exercises.	0.25	0.36
VI. REGARDING PHYSICAL ASPECTS :		
18. Suitability of the		
(a) get-up (Quality of cover pages).	0.19	0.16
(b) durability.	0.27	0.22
(c) size of letter	0.55	0.49
(d) interspace between the lines	0.68	0.64
(e) quality of ink used in printing.	0.58	0.65
(f) size.	0.63	0.70
(g) quality of the paper used.	0.43	0.25

TABLE NO. 5.20(CONTD.)

1	2	3
(h) bulk	0.41	0.13
(i) over all attractiveness.	-0.01	-0.04
(j) price.	0.51	0.67
(k) distribution in the market.	-0.10	-0.01
VII. REGARDING OVERALL SUITABILITY OF THE TEXTBOOKS :		
19. Comparison with the previous (XI & XII) textbooks produced by NCERT.	0.04	0.05
20. Use of other physics books.	0.74	0.85
21. Overall usefulness :		
(a) to learn higher physics.	0.12	0.00
(b) to pass final year examination in physics.	0.27	0.22

were uncertain about their opinions about the connected issues such as their liking for the books, the relation between their difficulties in understanding the text and the needed prerequisites, errors in the textbooks, and the use of pre- and post-textbook pages except that of index. The high scores of above 0.80 favour the opinions of the students from both the classes, that they had found relation between physics and other branches of science while studying their physics textbooks; whereas the negative high scores of both the classes for item No.5 clearly show that the students found certain topics in the textbooks which were very difficult for the majority of the students. The students of STD.XII agreed that they found many accounts and other details about physicists in their textbooks whereas their juniors were uncertain; but in the case of opinion about the use of index in the textbooks, as reflected in item No.8(a), juniors found it useful whereas the seniors were unable to show sufficient commonality of agreement.

II. REGARDING THE REFLECTION ON NATURE AND STRUCTURE OF PHYSICS/SCIENCE: (ITEM NO.9):

In this case only item No.9, partially reflects on the development of the processes of scientific inquiry, which are supposed to be taking place in a scientist's career; though both the groups have favoured item No.4, which is very much related to item No.9, here both the groups have shown their uncertainty of opinions.

III. REGARDING THE COMMUNICATION STRATEGIES (ITEM No.10-13):

Average rating scores for item No.10 for both the classes show that students liked the questions in the text-books; and the scores for item No.12 for both the cases show the students' disagreement with the assumption that they

could study physics by seriously going through the textbooks instead of attending regular or tutorial classes. Almost negligible average rating scores for item No.11 suggest that the students from both the classes were altogether uncertain about the availability of specific and practical suggestions for their study in the textbooks; the scores for item No. 13 also show the uncertainty regarding their satisfaction with quality of diagrams/pictures given in the textbooks.

IV. REGARDING THE END-OF-CHAPTER EXERCISES:(ITEM NO.14-17):

Except the average rating scores for 16(b), for all other items students from both the classes showed their indecisions; hence the students were not sure about the usefulness of worked out examples to solve the problems at the end of chapters, about the errors involved in the exercises; about their confidence in solving atleast all non-starred problems and about the gradation in the exercises; both the groups had indicated their inability to solve all the starred problems.

V. REGARDING LANGUAGE ASPECTS :

As such, intentionally no item was framed in the students' questionnaire regarding language aspects, thinking that the students would not be in a position to judge these aspects properly; but indirectly these aspects were reflected in other items i.e. No. 3& 5 based on the overall understanding of the textbooks.

VI. REGARDING PHYSICAL ASPECTS: (ITEM NO.18(a)-(k):

For item No.18(d), (e),(f), and (j), the average rating scores for both the groups favoured the students' opinions, on satisfaction with the interspace between the lines, the quality of ink used for printing, the size of the books and

the pricing. Regarding the size of the letters used, though STD.XI students were satisfied,STD.XII were somewhat doubtful, the score 0.49 being in the border. The average rating scores for all other sub-items show that both the groups were uncertain about their satisfaction with the physical aspects of get-up (quality) of the cover pages, durability, quality of the paper used, the bulk, the overall attractiveness and the distribution of the textbooks.

VII. REGARDING OVERALL SUITABILITY (ITEM No.19,20,21 and also ITEM No. 1 & 12):

High average rating scores for both the groups for item No.20, suggest that majority of the students have used other physics textbooks other than the present NCERT textbooks. The average rating scores indicating indecisive responses for item No.19 and 20 show that the students were doubtful about the overall superiority of the present textbooks compared with the old textbooks both produced by NCERT and the usefulness of the present textbooks to learn higher physics and to pass examinations. As indicated earlier, the average rating scores for item No.1 for both the classes, show uncertainty regarding the interest students have developed to go through the present physics textbooks; the response to item No.12 also goes against the overall dependability of these textbooks.

On the whole, Table No.5.20 shows some 26 cases of indecisive scores for both the groups indicating that the sampled students as a group, perceived very less number of of aspects connected with the in-depth as well as overall suitability of their present textbooks; perhaps this may be due to the type of response indicated in the case of item No.12 and 20 which clearly showed that these textbooks under study could not take the position of totally dependeable aid for learning, to the students.

SUMMARY OF ADDITIONAL RESPONSES MADE BY THE STUDENTS:

As pointed out in the previous chapters, within the restricted response type (Y/N/U) questionnaire, students were requested to give additional responses especially in connection with the following starred items: 3,5,6,13,15,16,19 and 20.

Some 53 students (65%) from STD.XI and 67 students (70%) from STD.XII had kindly given a few general additional comments, but not all of them were systematic in giving their comments itemwise, After a very careful analyses of the descriptive responses based on relevant but majority views, the investigator found that the following were worth reporting :

I. REGARDING THE CONTENT OF THE TEXTBOOKS:

(i) FOR ITEM No.3 :

- Though meanings are given for most of the terms, their clearcut and short definitions are missing in some cases.

- Definition of terms should be stated in the beginning followed by their explanation; giving lengthy explanation before giving the exact definitions confuse the students.

(ii) FOR ITEM No.5: IN STD.XI TEXTBOOKS: i.e.,DIFFICULT TOPICS :

Motion in two and three dimensions, Potential energy, Rocket propulsion, Torque, Collisions, Precision of spinning top, Circular motion with variable speed, Banking of roads, Work done by a variable force, Resolution of friction into their components, Centre of mass, Rigid bodies, Rotational Motion, Centrifugal force, Oscillations, Relative velocity, Viscosity, 1st law of thermodynamics and Calculus (given as supplement).

FOR STD.XII : DIFFICULT TOPICS :

Electrostatics, Dielectrics, Electrostatic potential, Magnetic effect of current, Kirchhoff's law, Use of Complex number in A.C., LCR circuit, Modulation, Demodulation, Wave optics, Interference and Diffraction of waves, Doppler effect, Illuminance and Luminous flux, Transistor and Calculus - given in Appendix.

FOR ITEM NO.6 : NIL

GENERAL :

- Elements of calculus could have been taught in Std.X or atleast in Std.XI mathematics instead of starting it in STD.XII mathematics course; calculus taught in Std.XI physics course is not at all enough for the students, and it is very difficult to understand.

- As physics topics were not there in Std.X it becomes very difficult for students to study high level physics at Std.XI; instead, elementary ideas of Std.XI physics syllabus should be included in Std.X itself, so that the students get prepared.

- Derivations should contain all the needed mathematical steps.

- Derivations are frustrating to the students- this is where the students cannot depend on NCERT textbooks; they have to read other books for their better explanations and higher knowledge.

- There is no co-ordination between mathematics and physics courses - this creats a lot of problems for students.

- As many students do not understand mathematical portion in the textbooks, the only alternative is to memorize them without understanding.

- Many of the Greek and Latin symbols look very strange to the students as they were not used in previous classes.

- The textbooks should be rewritten so that the students understand the topics easily.

- The textbooks contain so many topics but they have not been discussed in detail.

- In some of the chapters, explanation is not straight forward - it is like beating round the bush.

- More details should be given about the life of scientists, as in the case of NCERT Chemistry textbooks.

- Latest information, inventions, discoveries, techniques, etc.,connected directly or indirectly with the content of the course should be provided at the end of textbooks in the form of supplementary sheets and these should be changed every year.

- Summary of chapters should be given at the end of each chapter.

- Most of the books recommended for further reference in bibliography are not available in school library and even in book-stalls;a few of them which are available are very costly.

- The 'Index' should be enlarged to contain all the terms.

II. REGARDING THE REFLECTION ON NATURE AND STRUCTURE OF PHYSICS/SCIENCE:

Some students felt that they woudn't like to become physicists at all.

III. REGARDING THE COMMUNICATION STRATEGIES:

(i) FOR ITEM NO.13 :

- Some questions are diagrammatically explained; these are very helpful in solving the problems.

- Some of the diagrams and pictures of scientists are very helpful in understanding physics and getting general knowledge.

- Many diagrams are too small in size and very difficult to understand; students have to refer other books to take help from similar diagrams.

- Some of the diagrams require proper labelling and they should be followed by good discussions.

- There are certain, very much needed diagrams which are missing in NCERT textbooks but available in other reference books.

- It is boring and dull to go through these textbooks which do not contain coloured pictures and photographs, but only black and white throughout.

- These textbooks do not help students to develop curiosity as the questions and theory discussions are not based on common day-to-day life experiences and observations at their age level.

- The diagram for Millikan's oil-drop experiment in Ch.12, is not clear.

- There should be many more photographs instead of only schematic diagrams to enable the students to understand better.

IV. REGARDING THE END_OF_CHAPTER EXERCISES :

(i) FOR ITEM No.15 :

- The most interesting part of end-of-chapter exercises is that on giving scientific reasons for certain happenings.

- Some of the starred questions are extremely difficult but the non-starred ones are very interesting and challenging.

- Most of the worked out examples are very simple whereas the problems given at the end-of-chapters are very difficult.

- Number of solved problems should be increased.

- Students do not get much help from the text of the chapter in solving problems at the end-of-chapters; hence they have to refer other textbooks to solve the problems; as such, many times, theory portions are not related to the problems given.

- Among the starred questions, past questions asked in popular entrance examinations such as IIT, JEE, etc., should be included, to attract the attention of the students.

- Some of the solved problems are difficult to understand as the textbooks have used short-cut methods.

- Answers should be given to all exercises, to enable the students to check their answers.

- Some of the starred problems are difficult to solve because the connected concepts are not clearly explained in the textbooks.

- There should be problems related to engineering courses.

- There should be more problems related to graphical analyses.

- Hints given to solve certain problems are not easily understandable.

(ii) FOR ITEM NO. 16 : NIL

V. REGARDING LANGUAGE ASPECTS :
(Indirectly connected with item No.3 & 5):

- Language should be easy to understand in the textbooks.

- As the language used in the books is a bit tough, students have to read twice or thrice before they can understand.

- In order to make the discussion, brief, the textbooks have used very complicated language.

- There are certain new words in these textbooks which require reference to the dictionary every now and then.

VI. REGARDING PHYSICAL ASPECTS:

- The cover of the textbook should be laminated and strong as the students have to use it everyday.

- The quality of the paper should be improved.

- The size of the letters should be large; otherwise it is very difficult to read especially for those who have eye defects.

- In some pages printing is very dark and in some very light.

- The quality of printing of photographs of scientists, is very poor.

- There should be coloured photographs and pictures in the textbooks.

- Poor printing and small size of letters make the students to get tired and bored while reading and make them close the books.

- Bright coloured interesting pictures or photographs should be used to make the book very attractive for young students.

- The quality of the paper used is not good; they should use milky white papers.

- Textbooks provide no excitement as the colour of the papers used is very dull.

VII. REGARDING OVERALL SUITABILITY OF THE TEXTBOOKS:

(i) FOR ITEM No.19 :

- Most of the students have not seen the previous textbooks.

- Some of those who have used the previous textbooks felt that they were far better in terms of detailed discussion and the language used.

- Based on the opinions of their seniors, some students have felt that the previous textbooks carried a heavier and tougher load of syllabus.

(ii) FOR ITEM No.20.

*LIST OF OTHER PHYSICS TEXTBOOKS USED: (By ALMOST ALL THE STUDENTS, WHOEVER RESPONDED) NOTE: ALL THE PARTICULARS OF THE BOOKS USED, HAVE NOT BEEN SUPPLIED BY THE STUDENTS)

1. Kohil, B.J., Mittal R.S. & Singhal, "Physics", Arya Book Depot.
2. Mahendrove, K.K. et al "Basic Concepts of Physics" (Refresher Course).
3. Gupta, S.K., "ABC of physics" (Refresher Course).
4. Bajaj, N.K., "Physics" (Refresher Course).
5. Halliady, D. & Resnick, R., "Physics Part-I and II", 3rd Ed., New York: John Wiley (1982).
6. Bajpai & Bajpai "Refresher Course in Physics", New Delhi: Dhanpat Rai.
7. Narinder Kumar, "Comprehensive Physics".
8. Sehgal, N.K., Sehgal, D.I., & Chopra, K.L., "Senior School Physics"

*FROM 1-14: RANKS BASED ON POPULARITY/USE BY NUMBER OF STUDENTS.

9. Subramaniyan, N., and Brij Lal, "Fundamentals of physics".

10. Young, H.D., Zeemansky, M.W. and Sears, F.W., "University Physics", 6th Ed. New York: Narosa Publishing House, 1982.

11. Nelkon, M. and Parker, P., "Advanced Level physics" London: Heineman Educational Books.

12. Irodon, I.E., "Problems in General Physics".

13. Brilliant Tutorials Materials.

14. Agarwal, V.K., "Numerical Physics " Pitamber Publication.

15. Dhar, B.L., "Numerical Physics".

16. Kikon, I.K., & Kikon, A.K. "Senior Physics".

17. Bahl & Bahl, "Physics Refresher".

18. Convent Digest.

19. Frank brothers, "Secondary School Physics".

20. Bantra & Khanna, "Physics for Class XI".

21. PSSC Physics Course: D.C. Heath & Co.(1965), Indian Edition, New Delhi: NCERT (1967).

22. Banerjee, "Certificate Physics - I.C.S.E.".

23. Sinhal, O.P., "Textbook for Physics - I.C.S.E.".

24. Gupta, R.S., Chopra, P.C., Saini, B.R. & Kavathekar, A.G., "Physics".

25. Feynman, R.P., "Lectures on Physics", New York: Addison & Wesley Pub. Co. (1965).

(iii) GENERAL :

- NCERT physics textbooks are quite helpful for knowledge but not for getting help to pass competitive examinations after STD.XII.

- The textbooks are good but only for very bright students.

- Though one may like to go through the physics textbook he may have to skip over several topics.

- Though the additional information given in the textbooks are useful sometimes, they are not useful in getting good marks in examination.

- Some of the Refresher courses in Physics are better than the NCERT textbooks.

- Students can't just think of depending on NCERT physics textbooks to pass final examination and other competitive examinations; in addition to attending the regular and tutorial classes, they have to take help from refresher course books, to pass these examinations.

- These textbooks provide no excitement.

- NCERT must revise the present edition of physics textbooks.

- Students must be encouraged to write open letters to the authorities regarding their problems in making use of the present NCERT textbooks.

- In other textbooks solutions to the problems and derivations are given in a way which is easy to understand and with reasons for each step, whereas in NCERT textbooks, this systematic approach is missing.

- Teachers' guidance and help from other textbooks are highly needed in understanding the content from NCERT textbooks.

- Biology and chemistry textbooks published by NCERT are better than their physics textbooks.

- As many students like physics book by N.K. Bajaj instead of NCERT textbook, a comparative critical analysis must be made of these two books.

- Students cannot afford to buy several refresher books for one single subject and it wastes time to refer several books; so, NCERT should make an attempt to rewrite their physics textbooks to make them useful in all respects, so that students can depend on them fully.

- The textbooks make the students to depend more on teachers for help instead of developing self-study habits or force to use other reference books.

- It is good to raise the standard; but the physics textbooks have gone beyond limit.

- The present textbooks have disappointed and discouraged the students even those who have a lot of interest in physics.

- NCERT physics textbooks have failed to attract physics students due to several reasons such as, difficult language, lack of explanation, derivations without giving all the steps,

use of mathematical concepts and formulae which are not taught to students at the appropriate time, etc.

- Some students never touch their NCERT physics textbooks; they have to depend on tutorials and other reference materials.

- NCERT textbooks are written with several brief statements, as if they have used certain 'Secret Codes' to decade the language;and then to understand the content, it takes a lot of time and energy.

- The textbooks should be rewritten in such a way that the concepts studied earlier can be used in understanding the following/ present chapters; it should be based on what the students already know.

5.7.1.2 : TEACHERS' RESPONSES : SNR. Sec. Sch. PHYSICS

Analysis of the general information on background of the teachers based on the responded questionnaires, revealed the following important details :

- Thirtyseven percent of the teachers possess M.Sc.,B.Ed. qualifications which are the minimum for post graduate teachers in Snr. Sec. schools.

- Another 37% of the teachers possess higher additional qualifications such as M.Ed. (22%), M.Phil-Physics (3), Ph.D-Physics (2), and Ph.D.-Edu.(1).

- Fiftysix percent of the teachers possess more than 5 years of teaching experience at Snr. Sec. level (and about 17%-more than 20 years) and 73% of the teachers used the new experimental physics textbooks for almost two years.

In determining the average rating scores of teachers' responses, item numbers, I-7,8(a),8(b), IV-2(a),2(b), and V-1(a),1(b),3 were considered negative as their 'Y' represented unfavourable and 'N' favourable.

From Table No.5.21 (pp.388-391) on average rating scores of each item in teachers' questionnaire, the following interpretations were made :

I: REGARDING THE CONTENT OF THE TEXTBOOKS:

- Only Item No.13(a), 15(a), (b),(f) and (h) appear to be marginally favourable with a range of average rating scores of 0.54 to 0.68; these figures show that the teachers were somewhat satisfied with the accuracy of the content and what is given in foreword, preface, index and bibliography.

- Item No.2, 8(b) and 13(c), are the three items for which the average rating scores clearly represent unfavourable opinions of the teachers; hence it was interpreted that the knowledge of mathematics from the previous classes was not enough for the students to grasp physics discussed in the textbooks; the textbooks do not contain extraordinarily short topic/chapters which lack very much needed details; and the concepts and facts given in the textbooks are not easy to understand for the students.

- The average rating scores of all other items show that the teachers' opinions were inconclusive or uncertain; however, the negative signs of average rating scores for item No.1,4,6,9 and 10 ranging from -0.05 to 0.44 show that more teachers disagreed than those agreed about the questions asked in these items; hence, especially in the case of item No.1, it would be difficult to say whether the prerequisites

TABLE NO. 5.2.1

AVERAGE RATING SCORES OF THE TEACHERS' OPINIONS REGARDING THE SUITABILITY OF THE PHYSICS TEXTBOOKS:

ASPECTS/ITEMS	AVERAGE RATING SCORE (N=41)
1	2
I. REGARDING THE CONTENT OF THE TEXTBOOKS:	
1. Consideration of the prerequisites from the previous classes.	-0.44
2. Consideration of the knowledge of mathematics from previous classes.	-0.80
3. Systematic introduction of the topics.	0.10
4. Systematic development of the major concepts.	-0.17
5. Emphasis on the development of the concepts rather than on description of facts and details.	0.37
6. Adequacy of illustrations.	-0.10
7. Inclusion of the topics that are very difficult for majority of the students.	-0.37
8. Inclusion of (a) unnecessarily detailed topics.	0.17
(b) extraordinarily short topics/chapters which lack very much needed details.	-0.59
9. Inclusion of technical/scientific meanings immediately after the introduction of the new terms.	-0.05
10. Presence of clear pictures of all major themes/concepts in the textbooks.	-0.37
11. Proper connections of the concluding paragraphs with the introductions for the next chapters.	0.00
12. Integrated science approach.	0.15
13. (a) Accuracy,	0.63
(b) Up-to-dateness,	0.46
(c) Easy to understand for the students.	-0.73

TABLE NO.5.2.1 (CONTD.)

1	2
14. Inclusion of enough references to the concerned physicists, their original works and the history of physics.	0.24
15. Suitability of	
(a) Foreword.	0.54
(b) Preface.	0.54
(c) A Note for Students.	0.49
(d) A Note for Teachers.	0.44
(e) Epilogue.	0.39
(f) Index.	0.68
(g) Erratum.	0.34
(h) Bibliography.	0.56
(i) Appendices.	0.44
II. REGARDING THE REFLECTION ON NATURE & STRUCTURE OF PHYSICS/SCIENCE:	
1. Reflection on the philosophy of science/physics.	0.56
2. Reflection on assistance to the development of scientific attitude and scientific method.	0.22
3. Reflection on assistance to the development of the process skills of scientific inquiry.	0.10
III. REGARDING THE COMMUNICATION STRATEGIES :	
1. Presence of thought-provoking and interesting questions.	0.12
2. Inclusion of specific and practical suggestions for activities (a) inside	-0.17
(b) outside the school	-0.37
3. Direct address to the students.	-0.49
4. Inclusion of self-instructional passages in the textbooks.	-0.07
5. (a) The adequacy of; diagrams/labelling/pictures given in the textbook.	-0.41
(b) The quality of; diagrams/labelling/pictures given in the textbooks.	-0.22

TABLE NO.5.2.1 (CONTD.)

1	2
IV. END-OF-CHAPTER EXERCISES :	
1. Usefulness of the worked out examples in the text.	-0.37
2. Presence of errors	
(a) in exercises.	-0.05
(b) in answers for the exercises.	0.15
3. Suitability to differentiate between 'dull', 'average' and 'bright' students.	0.44
4. Grading (Simple to Complex)	0.07
5. Adequacy of problems/activities/questions under	
(a) Knowledge level.	0.12
(b) Understanding (or comprehension) level and	0.20
(c) Application & other higher levels.	0.32
6. Suitability of the starred problems for bright students.	0.63
V. LANGUAGE ASPECTS :	
1. Presence of (a) grammatical errors.	0.46
(b) spelling errors.	0.51
2. Suitability of the vocabulary used.	0.27
3. Lack of clarity in an attempt to achieve brevity.	-0.54
4. Overall suitability of the language used with certain literal usages such as humour, comparisons to funny incidences in life, etc.	-0.27

TABLE NO.5.2.1 (CONTD.)

1	2
VI. PHYSICAL ASPECTS :	
1. Suitability of the	
(a) get-up (quality) of cover pages.	0.44
(b) durability.	0.10
(c) size of letters.	0.37
(d) interspace between the lines.	0.41
(e) quality of ink used.	0.78
(f) quality of paper used.	0.49
(g) size of the textbooks.	0.63
(h) bulk of the textbooks.	0.17
(i) price of the textbooks.	0.80
(j) distribution of the textbooks in the market.	-0.32
VII. OVERALL :	
1. Confirmity to the prescribed syllabus.	-0.05
2. Suitability of the standard of the textbooks with the level of the students at Snr. Sec. Schools.	-0.07
3. Overall reflection on the :	
(a) nature and structure of science/physics	0.37
(b) goals and broad objectives of teaching science/physics curriculum at Snr. Sec. Schools.	0.20
(c) National Policy an Education-1986 and Programme of Action-1986.	-0.17
4. Comparison of the present textbooks with the previous (XI & XII) textbooks produced by NCERT.	0.32
5. Overall usefulness for the day-to-day teaching work.	-0.24

from the previous classes were taken care of in the present textbooks (as the average rating score was -0.44 which is almost nearer to -0.50, i.e., for unfavourable opinion).

II. REGARDING THE REFLECTION ON NATURE AND STRUCTURE OF PHYSICS/SCIENCE :

- Responses to item No.1, clearly show agreement regarding the reflection of philosophy of physics/science in the textbooks.

- Responses to item No.2 & 3 show that the teachers were uncertain regarding the role of the present textbooks in the development of scientific attitude, scientific method and the process skills of scientific inquiry.

III. REGARDING THE COMMUNICATION STRATEGIES :

- The average rating scores for all items except item No.1, were found to be under 'undecided' but with negative direction, showing that the teachers who disagreed about the communication strategies adopted in the textbooks, were more in number compared to the number those who agreed. Average rating score for item No.3 being -0.49 (almost nearer to 0.50, i.e., score for unfavourable opinion), it could be interpreted that most of the teachers (68%) felt that the textbooks could not directly address to the students.

IV. REGARDING END_OF_CHAPTER EXERCISES :

- Only item No.6 was found to be favourable by teachers; this meant that the teachers agreed that the starred problems were really challenging for bright students.

- Opinions for all other items reflected indecision on the part of the teachers; negative direction especially in the case of item No.1 with -0.37 score indicates that most of the teachers (66%) were doubtful about the usefulness of worked out examples in solving the problems at the end of the chapters.

- Though item No.3 had the average rating score of 0.44, as it is nearer to 0.50 (from which 'favourable' opinion starts) and as 68% of the teachers favoured this item, perhaps it would be altogether wrong to interpret that it would be somewhat possible for the teachers to differentiate between dull, average and bright students by making them to solve the problems at the end-of-chapters.

V. REGARDING LANGUAGE ASPECTS :

- Item No.1(b) was the only item which indicated the favourable opinions of the teachers; i.e., they didn't find spelling mistakes in the textbooks.

- Item No.3 was the only item which indicated unfavourable opinions; i.e., teachers have found cases of lack of clarity in an attempt to achieve brevity in the textbooks.

- All other items reflected indecision on the part of the teachers.

VI. REGARDING PHYSICAL ASPECTS :

- Item No.1 (e) and (i) indicated higher favourable opinions from the teachers with relatively higher average scores compared to all other items in the questionnaires and the highest (0.80) score was for 1(i); the teachers seem to be very much satisfied with the quality of the ink used in

the printing of the textbooks and the price of the textbook; the score for item No.1(g) also indicates that the teachers were happy with the size of the textbooks too.

- The scores of all other items show that the teachers were not in a position to come out with their opinions about quality of the cover pages, durability, size of the letters, interspace between lines, quality of the paper used, the bulk and the distribution of the textbooks.

VII. REGARDING OVERALL SUITABILITY OF THE TEXTBOOKS:

The average rating scores for all the items indicated uncertainity of teachers' opinions with negative directions for four items; comparatively lower absolute magnitudes of their average rating scores may not allow to interpret anything more about the teachers' opinions regarding the overall suitability of the textbooks indicating that the teachers in the used sample were very much doubtful on either side or in both the directions.

From the above interpretations, in all the sections from I-VII, it is somewhat clear that the teachers perceived very less number of aspects connected with the in-depth as well as overall suitability of the textbooks; as a group, they were not able to judge whether the textbooks were altogether suitable or not, though their collective responses for certain items revealed some important information.

SUMMARY OF ADDITIONAL RESPONSES MADE BY THE TEACHERS:

As pointed out in the previous chapter, within the restricted response type (Y/N/U) questionnaire, teachers were requested to give additional responses especially in connection with the following starred items; I-7,8,13, IV-2, V-1,3, VI-1, VII-4.

Some 18 teachers had kindly given a few general additional comments but not all of them could give their comments itemwise. It is of some interest to note that most of the teachers who had given the comments were with additional higher qualifications such as M.Ed. and Ph.D.

After a very careful analyses of the descriptive responses and the relevant views of the majority, the investigator found that the following were worth reporting:

I. REGARDING THE CONTENT OF THE TEXTBOOKS:

(i) FOR ITEM NO.7: i.e., TOPICS/CHAPTERS THAT ARE VERY DIFFICULT FOR MAJORITY OF THE STUDENTS TO GRASP : IN STD.XI TEXTBOOKS:

(1) Derivation in Ch.3.
(2) Mathematical aspects in Ch.7.
(3) Topic: Determination of acceleration of centre of mass of a cylinder rolling down on an inclined plane without slipping (Ch.7).
(4) Topic: General Theory of Relativity has not been treated properly (Ch.8).
(5) Topic : Excess pressure in drops and bubbles Ch.10.
(6) Mathematical aspects in Ch.13.

IN STD.XII TEXTBOOK :

(1) Ch.2 Introduction quite complicated; many topics in this chapter are beyond the understanding capacity of average students; Gauss' theorem has not been treated properly.

(2) Ch.8: A.C. Circuits: Phase relationship between voltage and current.

(3) Ch.9: Electromagnetic waves: In this chapter, students get confused and loose interest; calculation of the velocity of e.m. waves and transverse nature of e.m. waves are very much confusing.

(4) Doppler effect in Ch.10.

(ii) FOR ITEM NO.8 IN THE QUESTIONNAIRE :

(a) UNNECESSARILY DETAILED TOPICS/CHAPTERS.

(1) Chapt. No.7 in STD.XI.

(b) EXTRAORDINARILY SHORT TOPICS/CHAPTERS WHICH LACK VERY MUCH NEEDED DETAILS:

(1) Wave nature of matter in Ch.12 STD. -XII

(2) α -particle scattering in Ch.13-STD.XII

(iii) FOR ITEM NO.13:

(a) Comments on Accuracy : Nil

(b) Comments on up-to-dateness: Nil

(c) Concepts/Chapters easy to understand: Chapters:3, 4,11 in STD.XII.

(iv) GENERAL COMMENTS REGARDING THE CONTENT :

- There is no relation between the content of the STD.X textbook and STD.XI textbook; students study physics topics only upto STD.IX; hence the students in STD.XI, find it difficult to recall all that they had studied in STD.IX, two years ago.

- Major mathematical topics such as Differentiation & Integration, Vector Algebra, etc., which are needed for STD.XI physics are treated in STD.XII mathematics and these topics are very briefly treated in STD.XI physics; instead, it is better that these mathematical concepts are treated partially in STD.X mathematics and fully in STD.XI mathematics.

- Mathematical steps and formulae have not been explained properly in the textbooks; as they have been introduced directly, students find them difficult to understand.

- There are several terms that have been introduced, but either never have been defined or defined later somewhere else; eg., polarizability (p.56 STD.XII) and susceptibility (p.59 STD.XII) have not been defined: Brewster angle (p.249, STD.XII, which has been introduced in connection with Fig.10.10, has been defined only later in p.250 while solving Example 10.2.

- Generally, so many new concepts have been introduced in the textbook, but without giving the needed explainations; these concepts were studied by the teachers during their M.Sc., a few years ago and they find it difficult to simplify and teach the same at Snr. Sec. level.

- Most of the chapters have not been presented systematically.

- Concepts of Quntum mechanics could be further strengthened, in the textbook.

II. REGARDING THE NATURE AND STRUCTURE OF SCIENCE/ PHYSICS: NIL

III. REGARDING THE COMMUNICATION STRATEGIES:

- Diagrams should be somewhat larger in size; eg.,Fig.10.20 for hydraulic brake (STD.XI. p.230) is not clear as it is very small in size.

- In p.305 (STD.XII) different figures are needed to show the discharge of electricity through gases at different low pressures.

- Photographs such as Fig.13.5 and Fig.13.6 in p.331 (STD.XII) are of no use due to their very poor quality.

- Different colours could have been used for three dimensional figures, plates and optical diagrams.

IV. REGARDING END-OF-CHAPTER EXERCISES :

(i) FOR ITEM NO.2 : Nil

(ii) GENERAL :

- In exercises, 50% of the questions should be theoretical.

- Exercises at the end of chapters are not always based on topics discussed in the chapters/textbooks.

- Hints and answers to the end-of-chapter exercises are too brief.

- Number of solved problems are very few and they are much easier than the unsolved ones.

- Some of the starred problems can't be solved by bright students also.

- Exercises do not appear to be useful for average students.

V. REGARDING LANGUAGE ASPECTS :

(i) FOR ITEM NO.1 (a) GRAMMATICAL: Nil
(b) SPELLING ERRORS: Nil

(ii) GENERAL: STD.XI Part.I should be rewritten in more clear and simple English.

VI. REGARDING PHYSICAL ASPECTS :

FOR ITEM NO.1(a) & (b) : Nil

1(c): Size of the letters especially in exercises is very small.

1(d) - (j): NIL.

VII: OVERALL:

(i) FOR ITEM NO.4: Previous (NCERT) textbooks are better than the present experimental editions (1988).

(ii) GENERAL :

- The textbooks are not written based on the principles of simple to complex.

- The authors of the textbooks assumed that the readers are equally knowledgeable like them while writing the textbooks.

- The textbooks should be written, mainly based on CBSE syllabus.

- Generally teachers and students do not make use of NCERT physics textbooks as they have found some of the private authors' textbooks more useful, interesting, systematic and written using simple language.

- These textbooks seem to be based on very broad syllabus; students cannot depend on these books for getting very good marks in examinations.

- As the present educational system is examination oriented, textbooks also should be written to help the students to shine well in examinations; but the present textbooks do not serve this purpose; hence students do not like these textbooks.

- CBSE board should not allow any student to take physics without mathematics course.

- These textbooks need complete revision.

- Textbooks are mainly for students, hence they are the best judges; so while revising the textbooks much importance should be given to the students' opinions.

5.7.2 : OPINIONS OF EXPERTS :

As mentioned in Ch.IV on Methodology, five experts in the field of physics were requested to respond to the constructed opinionnaire (Appendix E); three of them are senior members of the Dept. of Physics of the M.S.University, Baroda teaching at undergraduate as well as postgraduate level; one of them is a retired member of the above Dept. of Physics; and the last one who did doctoral research in Physics Education; is a senior physics teacher and has been working as Vice Principal for several years in a Snr. Sec. School at Baroda, where the present NCERT physics textbooks are used. Though the experts from the University have been teaching at higher level, they all have had the opportunity to make use of the present Snr. Sec. physics textbooks produced by NCERT in certain occasions; moreover they have gone through the textbook thoroughly for about six months before responding to the opinionnaire and a few semi-structured interviews by the investigator. Though the written responses for the questions asked in the opinionnaire were very brief and sometimes too general, these semi-structured (mainly based on the items in the opinionnaire itself) interviews could bring out several important issues related to the study. The following were their major responses for the 12 questions in the opinionnaire :

- Regarding the first question, three of the experts felt that the topics in the textbooks were somewhat adequate and more or less systematically developed.

- Though one of the experts by and large agreed to the 2nd question the other two experts felt that the emphasis on development of concepts should have been more than on description of facts and details, in the physics textbooks under study; (one of the experts opined that the emphasis should be equal).

- All the five experts agreed that the illustrations/ diagrams/pictures were adequate in number.

- Four of the experts agreed that the concepts and facts given in the textbooks were accurate and up-to-date; but they clearly indicated that they were not easy to understand, though the Std.XI textbook was found to be slightly better and in every chapter they found some topics which were not properly covered.

- All the five experts opined that the textbooks would not help the students to get training in the scientific method.

- Three of the experts agreed that there were some assignments for self-study in the textbooks; (one of them didn't agree).

- Four of the experts were of the opinion that the examples worked out in the textbooks were not very useful in solving the problems at the end of the chapters, as they were found to be mainly simple ones without typicality and variation in their formulation.

- Though they have noticed enough number of problems in the end-of-chapter exercises, the experts opined that there were not enough activities and questions in the exercises.

- For the question, "Do you think that the language used in the textbooks is clear and interesting for communication?", two of the experts agreed and the other two disagreed.

- None of the experts were satisfied with the get-up and the print of the textbooks and wondered why the producers did not make use of the advanced knowledge available in the field of Printing Technology in the country.

- For the 11th question which is very important, i.e., "On the whole, do you think that the textbooks reflect the nature and structure of science in general and physics in particular?" two responses were positive; one of them agreed hesitatingly with a suggestion that the reflection should have been done in a better way.

As a response to the last question, two of the experts opined that the textbooks were really useful for planning of day-to-day teaching; two of them didn't respond; and the 5th one felt that these textbooks were useful only as a frame-work and one would always need many other books too for the actual planning of day-to-day teaching.

Some of the important/additional as well as responses based on a few semi-structured interviews (i.e. mainly on elaborations of the questions in the opinionnaire) :

POSITIVE ASPECTS :

- The textbook starts with the introduction for observation and measurement in physics.

- There are several discussions on historical developments as well as latest/future applications in the textbooks.

- There are ample data from material science in the textbooks to enable the readers to appreciate the value of quantitative aspects in physics.

- The treatment of the concept of 'Magnetism' is very good as the textbook first treats magnetic field produced by electric current (Ch.5, Std.XII) rather than field produced by a bar magnet on earth as the former is the basic.

- Graphical illustrations are good in these textbooks.

- End-of-chapter exercises are the best part of the textbooks, though they are of very high difficulty level.

- There are a few multiple-choice questions at the end of the chapters.

- Serious mistakes are not there in the textbooks.

II. INADEQUACIES :

- There are many typographical/printing errors, turning out to be serious mistakes; these have not been taken care of by the publishers, as there is no 'Errata' at the end of the textbooks.

- The authors are very ambitious in introducing even difficult topics such as 'General Theory of Relativity' at Snr. Sec. level, but without developing proper background; 'Special Theory of Relativity' is also not properly treated.

- Some of the papers used in the textbooks are so bad that they have already turned yellow within one or two years.

- The ink used in the printing is very bad in quality.

- The Chapters on 'Optics' (i.e., Ch.10 & 11 in Std.XII) could have been presented immediately after Chapter on Waves (i.e., Ch.13 in Std. XI.).

- Textbooks need not be always cheap in price in Higher Education; instead it is better to produce high quality books for slightly higher price.

- Though reflection on spiral curriculum is good in textbooks, it is difficult to practise.

- The chapter on 'Ray Optics and Optical Instruments' (Std.XII, Ch.11) needs a thorough revision as the explanation of concepts are inadequate.

- The historical discussion is too much in Ch.12 (Std.XII); too much dwelling on non-technical details may lead to strange and non-professional approach.

- Ch.4, STD.XII needs thorough review to avoid certain repetitions from Chemistry at Snr. Sec. level.

- NCERT's old textbooks for physics are better than the present ones.

- These textbooks may not help the students to score high marks in examinations.

- There is an emphasis on the development of concepts throughout the textbooks; but at many places, it is at the cost of continuity in development of topics; the effort at times gives an impression of a diagression from the development of the topic, itself.

- There is a need to relate physics to daily life situations and to the knowledge explosion brought about by the revolutionalized technology; through suitable textbook write-up, readers have to be motivated to develop scientific method.

- There is a need to improve the communication through illustrations available in the textbooks.

- Chapter on 'Wave Optics' (Ch.10, Std.XII) has not been developed properly; this has been prepared very hurriedly, it seems.

- It appears that the author who prepared the textual matter is different from the one who prepared the end-of-chapter exercises.

- End-of-chapter exercises are not suitable for average students.

- There is a need for use of simple language in the textbook write-up.

- The number of major concepts per chapter/section/page (i.e., density of concepts) seems to be very high and the explanations are needed for many.

- The textbooks expect very high standard of mathematics among the learners, which is very difficult to achieve; advanced mathematical concepts such as line and surface integrals, differential equations, complex exponentials should be avoided especially for unstarred sections of the textbooks.

- There are several starred sections which begin and end abruptly.

- Starred portions are difficult even for bright students.

- There is a strong need for coordination of physics with other subjects, i.e., mathematics, chemistry and even biology at Snr. Sec. level.

- Starred portions are too difficult to the learners, as they are highly mathematical; so, there is a need to introduce more non-mathematical starred sections and exercises to cater to the needs of good students.

- Content on Gauss theorem should be reviewed to make it simple.

- There can be some non-mathematical discussions on higher concepts such as Uncertainity Principle, Superconductivity, Solar Energy, etc., atleast within starred sections.

- There is a need to revise and reorganise physics portion in Std. IX & X to enable students to equip well for Std.XI.

- Derivations in electromagnetic waves are too long.

- Standarized Unit texts, Teacher's Guide, Laboratory Kits, Films, etc., should be produced along with the textbooks.

5.8: FOR OBJECTIVE No.8: i.e., TO CARRY OUT AN OVERALL EVALUATION OF THE PHYSICS TEXTBOOKS ON THE BASIS OF:

(a) PRESCRIBED CBSE SYLLABUS FOR SNR. SEC. SCH. PHYSICS COURSE.
(b) NATURE AND STRUCTURE OF SCIENCE IN GENERAL AND PHYSICS IN PARTICULAR.
(c) GOALS AND BROAD OBJECTIVES OF EDUCATION/SCIENCE EDUCATION IN GENERAL AND SNR. SEC. SCHOOL PHYSICS CURRICULUM IN PARTICULAR.

Analysés and interpretationsof data in the case of this objective has to depend on thorough content analyses of certain documents as well as the analysed data and their interpretations for the previous 7 objectives; however because of the nature of this objective, the treatment here has to be eclectic in nature.

5.8.1: FOR OBJECTIVE No.8(a): i.e., ANALYSIS BASED ON PRESCRIBED SYLLABUS:

In this case, the data is clearly based on the comparison between the various topics included in each chapter in the textbooks and the syllabus prepared by the Central Board of Secondary Education (CBSE), New Delhi (Appendix - F) in 1987; the present physics textbooks produced in 1988 have had to be based on the syallabus of 1987, though the CBSE had slightly modified its syllabus in 1991 (Appendix - G) and once again in 1993 (Appendix - H) but the differences are not very many.

FOR STD. XI TEXTBOOK :

CBSE syallabus contains 8 Units for Std.XI. viz., Measurement, Motion, Circular motion, Kinetic Theory of Gases, Thermodynamics, Liquids, Electricity and Universe.

Introductory topics such as, "What is Physics? Scope and excitment of physics, physics in relation to Science, Technology and Society (STS issue)" are not found in 1987 CBSE syllabus; but they have been included in subsequent revisions of the CBSE syllabus in 1991 and again in 1993; but the present textbook for STD.XI produced in 1987 has got a 1st chapter with the title of 'Introduction', though this chapter is defective as shown on p.185 in connection with the 1st objective of this study.

The various sections of Ch.2, of the text (Std.XI) i.e.,'Physical World and Measurements' cover almost all the topics given under Unit-1 /2/1 i.e. 'Measurement' in all the three syllabi; here many concepts are mere repetitions from previous classes, which could have been avoided in the syllabus as well as in the textbook; the topic on concept of mass and its measurement is missing in the syllabus, but the textbook authors were careful enough to include it. The syllabus topic on 'Atomic to astronomical range of variation of length, mass and time quantities' has been very well dealt with, in the textbook with the help of illustrations through Table 2.1, Fig.2.2, Fig.2.14 and Fig.2.15; but this very topic is surprisingly missing in the revised syllabi of 1991 and 1993. Another syllabus (1987) topic, i.e., 'conversion of CGS system units into SI units' is not specifically included as one of the sections in the textbook; however this topic is somewhat easy at Snr. Sec. level and the syllabus mentions that it is not be evaluated (i.e.,like starred ones). Though this chapter is not without demerits (as shown in the analyses of Objective No.1 & others), it contains topics which are not in 1987 syllabus (but in 1991 & 1993); they are in Section 2.12: 'Accuracy, precision of instruments and errors in measurement, significant figures and rounding off'; and in 2.13: 'Classification and combination of errors'. CBSE - 1993 syllabus under its Unit.1 i.e.,

'Introduction and Measurement' includes the followings : Graphs, Trigonometric functions, simple ideas of differentiation and integration (of course these are not included in 1987 syllabus); in the present Std.XI textbook, (the expected revisions of) graphs and trigonometric functions are not included anywhere, whereas the topic, 'Differential Calculus' under starred section, has been treated, through a $2\frac{1}{2}$ page write-up at the end of Ch.3, i.e.,'Motion in one dimension'; critical comments on this write-up have already been given under Objective No.1 (p.186); this section on differential calculus cannot be under starred section, if all learners have to follow the non-starred sections of the later chapter in Std.XI as well as in Std.XII. Without developing very good background in calculus, the learners are likely to get frustrated if they have to sincerely depend on these physics textbooks under study. In terms of overall evaluation of the textbooks, one could boldly conclude that, because of the treatment of physics through rigorous calculus, the textbooks are not in a position to communicate effectively, especially to its less fortunate non-mathematics group of learners. CBSE-1993 syllabus states, 'simple ideas of differentiation and integration'; but it is very difficult to define these simple ideas; the investigator, based on his several years of teaching experience having gone through the textbooks several times and having received the opinions of teachers, students and experts, strongly feels that mere simple ideas of calculus will not be enough for the learners to digest the high dose of physics in the two volumes of textbooks. If full justice has to be done to the syllabus (CBSE-1993) and if learners have to appreciate fully physics in the present textbooks, there is a strong need for rigorous training in calculus in the beginning of Std.XI especially through co-ordination and co-operation of mathematics department in terms of textbook content treatment

and teaching-learning, mainly in the case of non-mathematics students. In the case of 'simple ideas of integration', which is mentioned in CBSE-1993 syllabus, it is unfortunate that the textbook does not contain any write-up anywhere, but made use of it in Ch.12 (Std.XI) in a non-starred section. Once again in Std.XII textbook, integral calculus has been used in some chapters, of course by providing atleast some notes in Appendix-A at the end of Part-I; but this appendix is not likely to help to develop confidence to understand fully this complicated language of physics especially in the case of non-mathematics students.

If we look at the 1987 syllabus, Unit.2 - 'Motion' and Unit.3 - 'Circular Motion' cover almost everything about 'Mechanics' in the syllabus; here the 2nd Unit starts with the vectors by omitting a general introduction to 'Motion'/ 'Mechanics'. Regarding 'Mechanics' in the Std.XI textbook, Ch.3 - 'Description of Motion in one Dimension', Ch.4 - 'Description of Motion in Two and three Dimensions', Ch.5- 'Laws of Motion',Ch.6 - 'Work, Energy and Power', Ch.7 - 'Centre of Mass, Rigid Bodies, Rotational Motion'and Ch.8 - 'Gravitation' are almost perfectly reflected respectively by Unit 2,3,4,5,6 & 7 of the 1993 syllabus (or the respective Units 2-8 in 1991 Syllabus). All the needed aspects about vectors have been included in Unit 3 of the 1993 syllabus (cooresponding to Ch.4 in the textbook); but the textbook authors are wise in introducing properties of vectors as and when required instead of frightening the learners all at a time; i.e., general introduction about vectors are present in Ch.4 (corresponding to Unit. 3 of the 1993 syllabus), scalar products of vectors in Ch.6 (corresponding to Unit.5) and elementary treatment of vector product of vectors in Ch.7 (corresponding to Unit. 6); and more about vector product of vectors are given as starred

portion at the end of Ch.7. A heavy dose of starred section titled, 'Rigid body rotation in three dimensions', consists of topics such as 'Angular velocity vector, Mass point on string, Precession of a spinning top, Rolling coin', etc., in addition to the 'vector product of vectors'. The 1987 syllabus does not mention specifically about 'Motion in one, two and three dimension', whereas the textbook and the 1991/ 1993 Syllabus rightly deal with them, to give a better shape to this most basic and important major Unit on 'Mechanics'; moreover, though the former syllabus includes discussion on 'Gravitation' within its Unit on 'Circular Motion', the textbook and the latter syllabi have rightly shown the same on a separate chapter/unit, with more and interesting elaborations. Discussion on 'Mechanics' end with, about a two page starred write-up on special and general theories of relativity, at the end of Ch.8 in the textbook; of course these are included as non-starred topics in STD.XII in the 1987 syllabus. The 1991 syllabus includes the topic on 'general theory of relativity' in the Unit on 'Gravitation' whereas in the 1993 syllabus even this is not included.

In physics, after 'Mechanics' the next major Unit of study is 'Properties of Matter'; in the 1987 syllabus this is improperly covered by Unit.4 - 'Kinetic theory of gases' and Unit.6 - 'Liquids', whereas in the 1991 syllabus this is covered systematically by two Units i.e., Unit.9 - 'Molecules' and Unit.10 'Properties of Matter' and the textbook has followed this pattern through Ch.8 and Ch.9; in the latest syllabus-1993, these two Units/chapters are merged together to form Unit.8 - 'Properties of Matter'; in this latest syllabus, the three topics, i.e., Section 9.1, Atomic hypothesis and its development, 9.2.Brownian Motion and 9.3. Avogadro Number and Avogadro's hypothesis are missing, though the textbook and even the 1991 syllabus specify these

topics, Ch.9 on, 'Molecules' in the textbook, though with a few repetitions from previous classes and from Chemistry portions, is exciting to go through especially because of the references such as, ancient Indian contributions to the development of atomic hypothesis (i.e., reference to 'Vaisheshika' school of thought - Kanada, 'Lalitavistara' etc., contributions by Greek - concept of atom and soul atom by Democritus, detailed picture of atom using the latest scanning tunnelling microscope (for which Nobel Prize was awarded in 1986) etc., Ch.9, with the title 'Molecules' appears to be somewhat unnecessary and its content is nothing but a good introduction to the major Unit on 'Properties of Matter'; so it is not altogether wrong to include the topics of 'Inter-atomic & Inter-molecuar Forces and States of Matter' (which are at the end of Ch.9) in the beginning of Unit.8.

The traditional approach in organisation of any textbook is to have a number of major Units split into different chapters; somehow, the present textbook authors preferred to have only Chapters which are further split into section; however, in the case of Ch.10, the authors rightly decided to spilt the content of 'Properties of Matter' in to four major divisions or sub-chapters i.e. A. Solids, B. Fluids, C. Liquids and D. Gases, which are further split into sections. If we look at the 1st syllabus - 1987, there are many topics, which are not properly shown in the syllabus but found in the textbook. In 1991 syllabus, there is a topic on 'crystalline and glassy solids', which is treated in Section 10.1 in the text, but this topic is surprisingly not included in the 1993 syllabus. Again in 1991 syllabus, there is a topic on 'Friction and lubrication' which is not included in Ch.10 of the text (but in Ch.5 on 'Laws of Motion') and nor in the

Unit.8 of the 1993 syllabus (but rightly in its Unit.4 on 'Laws of Motion'); of course there is nothing wrong in including the topic on 'friction' under 'Properties of Matter' too. On the whole, Ch.10 in the textbook looks too lengthy and elementary information on some of the topics such as Hookes' law, hydrostatic paradox, barometer, Archimedes' principle, gas laws, etc., appear to be unnecessary as they are covered in lower classes in physics or chemistry sections; for these topics, only advanced ideas are needed.

Discussion on the next major Unit of 'Heat and Thermodynamics' has rightly followed that, on 'Properties of Matter'. All the three syllabi, by and large, agree with what is given in Ch.11 on 'Heat and Thermodynamics'. However, topics such as ordinary mercury thermometer (that too with a diagram), elementary treatment of coefficients of thermal expansion, etc.,appear to be somewhat unnecessary; but the topic on 'Thermodynamic processes' (especially adiabatic) is on starred section in the text, though it is non-starred in the latest syllabus. The 1991 Syllabus puts the topic on 'van der Waals' equation of state' under starred section and in the textbook also it is under starred section. Black body radiation which is in the 1987 [illegible] and [illegible] in the 1993 syllabi, has not been treated properly in the textbook - as such 'Wein's law' has not been specified. 'Newton's law of Cooling' which is included in the 1993 syllabus is not found in the textbook.

Ch.12 on 'Oscillations' and Ch.13 on 'Waves' are based on Unit 1. on 'Wave Motion' of Std.XII in 1987 syllabus; in the 1991 syllabus these are shown as Unit.12 & 13 and in 1993 syllabus as Unit 10 & 11 respectively both in Std.XI and with the same title as in the textbook. The content of these two related chapters by and large agree with the syllabi;

though the 1st syllabus does not show any starred portion, 1991 syllabus shows topics on 'Harmonic motion using calculus' and 'Forced oscillation' under optional starred sections; and the textbook also follows this demarkation. In the 1993 syllabus, only one topic, i.e.,'Acceleration in general one dimentional motion' in Unit 2 is a starred one; but in the textbook it is not starred.

FOR STD.XII TEXTBOOK:

The first edition of this textbook came out in the market in March 1989; this means that this textbook also must have been written based on CBSE's 1987 syllabus (Appendix - F); but contrary to this finding the textbook reflects more on CBSE's syllabi in 1991 and 1993 (Appendices G & H) The 1987 syllabus consists of Units, viz., Wave Motion, Optics, Electromagnetic Induction, Physics of the Atom, Solids, Characterisation of Materials, Concept of space-Time and Mass in Relativity, Nuclear Physics and Electronic Devices. In this, the 1st Unit is already included in Std.XI textbook; Unit 7 on 'Electricity' and Unit.8 on 'Universe' which are in Std.XI syllabus, are included in Std.XII Textbook; when we look at this syllabus, it is difficult to appreciate the serial order in which they are given, because of the non-continuity of major concepts especially in the Units related to Modern Physics; the continuity is far better in the 1991 and the 1993 syllabi;as far as Units are concerned, the latter two syllabi are almost similar.

There are 15 chapters in the textbook corresponding to the 13 Units in the 1991 syllabus; and the titles of both more or less agree, with a few minor changes. In this textbook also, the traditional concept of Units-subdividend into chapters, is missing; as such these 15 chapters are for the major Units such as Magnetism, Electricity, Electromagnetism, Light and Sound, Modern Physics and Astronomy.

The textbook has followed only Chapterwise distribution of content. Ch.1 & Ch.2 of the textbook, more or less correspond to the Unit.1 of the 1991 as well as 1993 Syllabus; incidently 1987 syllabus does not contain the content of these two chapters any where in the syllabus; the 1993 syllabus puts the topics on 'Gauss' law in simple geometrics' and 'Atmospheric electricity' under starred sections, whereas the textbook has overlooked this; moreover the teratment given to Gauss' Law in the textbook does not seem to be simple; Ch.3 on 'Current Electricity' is partly reflected in the 1987 syllabus in Std.XI Unit.7 content, but fully and systematically reflected in 1991 as well as 1993 Syllabus in Std.XII Unit.2.

A brief mentioning about 'Superconductivity' which is of present day interest is available in Ch.3, though this non-starred topic is not included in the syllabus. Ch.4 on 'Thermal and Chemical Effects of Current' reflects almost all the topics given in Unit.3 of the 1993 syllabus. Ch.5 on 'Magnetic Effetcs of Current' more or less agrees with Unit.4, 1993 syllabus; but 'Hall effect' which is discussed in the text, is not specifically mentioned in the Syllabus; the topics on 'Ammeter and Voltmeter' which are mentioned in the Syllabus in this Unit are not in Ch.5, but in Ch.3, on 'Current Electricity'.

Ch.6 on 'Magnetism' corresponds to Unit.5 in the 1991 and 1993 syllabi; though most of the topics agree with the Syllabus, the topic on 'vibration magnetometer' which is shown under starred section in 1991 Syllabus (but general category in the 1993 Syllabus) is not discussed in the text; and the topics on 'para, dia & ferromognetism' which are shown under starred sections in the 1991 Syllabus as well as in the textbook, is not starred in the 1993 Syllabus.

Ch.7 on 'Electromagnetic Induction' and Ch.8 on 'Alternating Current Circuits' jointly reflect Unit.6 of 1991 as well as 1993 syllabus, with most of the topics included in the text; however, use of complex numbers in Ch.8 is uncalled for as all the three syllabi do not specify it. The topics on "Induction coil (which is of course starred in the 1993 syllabus), simple motors and starter" are not specifically included in the text, though they appear in the 1991 as well as the 1993 Syllabus. The topic on 'Choke', which is included in both the Syllabi is discussed (perhaps by mistake), in the form of a solved example (i.e., Example 8.2 pp.212-213).

Ch.9 on 'Electromagnetic waves' corresponds to Unit.7 in the 1991 as well as 1993 syllabus; the latter syllabus rightly specifies only qualitative treatment of Electromagnetic waves; but the textbook has given quantitative treatment (using high dose of calculus) in Section 9.1 & 9.2. Alpha and beta rays which appear (perhaps by mistake) in the 1993 syllabus in Unit.7 are rightly not included in the text in this chapter. 'Green House Effect' which is one of the important topics in 'Environmental Awareness' is not suitably specified in the syllabus, but the textbook has given some idea on it through the last topic in the chapter. Starred Sections on pp. 233-236 actually do not suitably fit into this chapter; it looks better if it is transferred to Ch.14 in the text.

If we look at the first syllabus of 1987, everything about 'Electricity, Magnetism & Electromagnetism' are dumped very unsystematically and briefly into Unit. 7 on 'Electricity' of Std.XI and Unit.3 on 'Electromagnetic Induction' of Std.XII; of course one has to appreciate the fact that these major Units in the physics course is spread for both

the classes of the Snr. Sec. School unlike in the later syllabi as well as in the textbooks; but the latter syllabi and the textbook, (only in Std.XII) made these major Units more systematic and elaborate as far as the contentwise structure of the Units/Chapters, are concerned.

Regarding the major Unit on 'Light & Sound' through its sub-units on Geometrical Optics, Wave Motion and Physical Optics, the 1987 syllabus covers this, in its Units 1 and 2 in Std.XII; whereas, the textbooks and the later framed syllabi, systematically developed these sub-units through a careful dose of background in 'Waves' in Std.XI (Ch.11 & 13) and more or less systematically continued the work in Std. XII through Ch.10 & 11 (For Optics) which are reflected in Unit.9 of the 1993 Syllabus. The 1st Syllabus mentions about topics on "Lloyd's mirror, single slit diffraction, application of laser beams, production of different types of spectral lines - continuous and absorption" in optics; but neither the latter syllabus nor the textbook deals with these topics under Optics. The topic on 'Diffraction Grating' is shown under starred section in the 1993 Syllabus ~~in~~ whereas in the textbook, it is under general section. In the 1991 as well as 1993 syllabus, one topic on 'Ray Optics' i.e., on 'Ray Optics as a limiting case of wave optics' is not specifically found in the textbook; the textbook starts Ch.11 on 'Ray Optics and Optical Instruments' (Continuation of Unit.8 & 10 in the 1991 syllabus or Unit.9 in the 1993 syllabus) with topics on 'Photometry and Velocity of light', these topics, though needed for Snr. Sec. level, are not included in all the three syllabi. The topics on 'human eye, effects on vision and camera' are included in 1991 syllabi as well as in the textbook but not in the latest syllabus of 1993. All other topics under 'Optics' by and large agree with the latest syllabus.

Though the term 'Modern Physics' is very broad, it may rightly be said to be beginning with the topic on 'Discharge of Electricity Through Gases' and end somewhere in the discussion of atomic nuclei; in 1987 syllabus, Unit.4, on 'Physics of the Atom' and Unit.8 on 'Nuclear Physics' deal with the main content given in Ch.12 & 13 of the textbook. The important topics on "X-Rays - production and properties; X-Rays spectra, Elementary particles and Cosmic Rays" which are given in the 1987 syllabus are missing in the textbook as well as in the latter two syllabi.

The topic on 'Wave Nature of Matter' is in the starred list in the 1991 syllabus but given as a non-starred one in Ch.12 (12.10) in the textbook, though not included in the latest syllabi. Though most of the topics of Ch.12 & 13 are within the concerned Units of 1991/1993 syllabus, the non-starred sections, 13.14 and 13.15 on 'Molecules' and 'Bondings in Molecules' respectively, in Ch.13 of the textbook, do not seem to appear directly in these two syllabi; of course the title of the Unit in both the syllabi reflect clearly on 'Molecules', too; but these two topics are included in Unit.5 on 'Solids' in the 1987 syllabus.

In Ch.14 of the textbook, discussion on the first two divisions, viz., A. Solids and B. Semiconductor Devices, by and large reflect the content given in Unit.5 on 'Solids' and Unit.9 on 'Electronic Devics' in the 1987 syllabus. These are somewhat briefly mentioned in Unit 13/12 of the later two syllabi. The non-starred topics on 'Transistor as an amplifier and oscillator' in Unit.12 of the 1993 Syllabus are starred in the textbook. The non-starred topics of the Section on 'Digital Circuits' (Section - C) are included only in the latest syllabus. The topics on 'C.R. Tube - its application in Radar and Television' are in the 1987 syllabus but not in the textbook and the other syllabi.

The last Chapter in the textbook, i.e.,Ch.15, on 'The Universe' is somewhat based on Unit.8 of the 1987 syllabus, (For Std.XI), Unit.14 of 1991 and Unit 13 of 1993 (both of Std.XII). The topic on 'Stellar Spectra' is starred in the 1993 syllabus but not in the text.

The first syllabus i.e., of 1987 based on which the textbooks were supposed to be written, consists of two more Units i.e., Unit. 6 on 'Characterisation of Materials' and Unit.7 on 'Concepts of Space, Time and Mass in Relativity'; in these, Unit.6, consists of four Characterisation, viz., Mechanical, Thermal, Electrical and Magnetic; as such the 1^{st} and the 2^{nd} are included in Std.XI textbook in Ch.10 & Ch.11 respectively; the 3^{rd} and the 4^{th} are included in Std.XII Textbook in Ch.2 & 3 and Ch.6 (but starred) respectively. In fact the textbooks have not done any justice to Unit.7 on 'Concepts of Space, Time and Mass in Relativity' either in Std.XI or Std.XII as there is no separate chapter on 'Relativity'; the 1991 syllabus includes a topic on 'General Theory of Relativity' in its Unit.8 on 'Gravitation', whereas the 1993 syllabus, just touches on 'relative velocity', with reference to Unit 2, on 'Description of Motion in one Dimension'. Std.XI textbook covers the concept of 'relative velocity' in Ch.3 and includes a 'tough' writing about Special (very briefly) as well as General theories of Relativity (but under starred section); other terms such as Galilean transformation, Michelson and Morley experiment, etc., which are there in 1987 syllabus, are altogether missing in both the textbooks and in both the later syllabi.

Based on the above content analyses, it may be concluded that the two volumes of the textbooks for Std.XI & XII written in 1988 and 1989 respectively, do not reflect much on CBSE-1987 syllabus but incidently more on CBSE-1993 syllabus; as such, it appears that this latest syllabus was reframed based on these NCERT textbooks contents by the CBSE authorities, perhaps to coordinate and cooperate with each other, in good faith.

5.8.2: FOR OBJECTIVE NO.8(b): i.e., TO CARRY OUT AN OVERALL EVALUATION OF THE PHYSICS TEXTBOOKS IN TERMS OF NATURE AND STRUCTURE OF SCIENCE IN GENERAL AND PHYSICS IN PARTICULAR:

This sub-objective has been tackled by recalling some of the major points in Ch.I & II regarding the nature and structure of science/physics and relating them to the concerned major findings. Science is a systematized body of knowledge and so is physics; by and large the content arrangement in the textbooks under study, are systematically arranged, starting with the chapter on 'Physical World and Measurement' (of course after the Ch.1 on 'Introduction') followed by chapters related to Mechanics, Properties of Matter, Heat and Thermodynamics, Waves-sound, Electricity, Magnetism, Electromagnetism, Optics, Atomic & Nuclear Physics, Solid State Physics & Electronics and Astronomy; these major units in the textbooks begin with easily conceivable ideas on macroscopic phenomena, enter into more deeper aspects of microscopic phenomena and finally lead the young learners to highly imaginative picture of very far away, but mighty, huge, creations of nature in the cosmos; but compared to the micro and macro aspects, cosmological aspects are not fully and satisfactorily covered (just one chapter at the end) to quench the thirst of knowledge of the young learners in this highly exciting field. By nature and structure, physics is the study of matter and energy; and all the chapters have no doubt, treated physics based on these two components together but without much emphasis to enable the learners to appreciate this deep theme.

Science is a product as well as process; in physics also these two aspects have to be emphasized. As far as product or the content aspect is concerned, in both the volumes (Std. XI & XII) of textbooks, there are totally (352+446) pages, (13+15)Chapters,

(122+133) Sections and (301 + 427) new terms with several starred pages; by and large, the mistakes in the content are almost negligible; the content includes latest information in several cases. True scientific products are expected to be integrated and interdisciplinary in nature; though it is not possible to relate all topics in physics to other branches of pure and applied science as well as other branches of knowledge, as such the situations in both the textbooks are very much disappointing (Objective 1 (b) (iv)- Table No.5.6 P.222). Product aspects of science can always be effectively introduced with reference to concerned scientists and history of science; as noted in the analyses of Objective No.1(b),(v) all the chapters in both the textbooks contain reference to physicists/scientists and atleast one direct or indirect reference to history of physics. Most of the above information on product aspect are the only salient features which mainly look positive as far as the content is concerned; but there are several pedagogical inadequcies in the presentation of the content which have been pointed out in detail in the numerous Tables in connection with the other Objective (especially No.1) reported previously.

Regarding the process aspect of physics, the findings from Objective No.2 have to be referred. Process aspect has been conceptualised in terms of scientific attitude, scientific method and scientific process skills. All the chapters in both the textbooks made certain references to physicists, their contributions and to the history of physics which are likely to create interest and hence to develop scientific attitude; but developing interest by referring to the major applications and uses of principles of physics in daily life situations is seen only in very few cases; moreover the development of other dimensions of scientific attitude, viz.,

curiosity, open-mindedness, critical thinking, suspended judgement, etc., are very rarely referred to in the textbooks. Though most of the chapters in both the textbooks refer to atleast 2/3 steps (but not all steps, which are needed(pp.241-242, pp.244-251) in scientific method, on the whole, they are inadequate and may not help much to develop scientific method; there are only some 14 cases of the step, 'theorisation' and some 23 cases of the step, 'experimentation' in the development of scientific method, but most of them in Std.XII textbook. In both the textbooks, cases of completely planned experimentation, followed by careful observation, inference and prediction, which lead to the collection of a lot of information, are altogether inadequate; as such, additional (suggested) activities along with the textual content, which may be carried out at home or in the school laboratory independently or in a group (or partly guided) and which would have strengthened the development of scientific method, are very rarely given in the textbooks. This is because the producers decided to produce the laboratory manuals separately (which also contain a number of activities in addition to traditional laboratory experiments), instead of integrating with the text; as such, this step is against the spirit of scientific method. However, surprisingly, all chapters in both the textbooks contain atleast a few cases of direct or indirect support to the development of atleast a few process skills; the number is low, again due to lack of suggested activities within the textbooks. The investigator is aware of the fact that the textbooks themselves cannot independently do full justice to the development of process aspects of physics; textbooks are mainly for product aspects; however, they are definitely supposed to help effectively in this development, at least to some extent.

Because of the very nature and structure of physics, it requires a special language to communicate; i.e., mathematics and especially the branch of calculus; unfortunately this is somewhat overlooked by the textbooks when we think of non-mathematics students trying to digest physics with the help of the present physics textbooks. And the other usual language or the media, is English language in the case of the present textbooks - in this case, the language used in the textbooks seems, by and large, simple. Both the textbooks contain a few cases of language specialities such as analogies, phrases, exclamatory statements, etc.; these are likely to help the learners to look at some of the complicated concepts in physics with facility and to conceptualise better.

As discussed in Ch.I (p.7) nature of science is related to philosophy; philosophy of science is preoccupied with question and answers - posing critical questions and seeking rational answers. In both the textbooks, higher order questions are the highest in number (about 80%); but most of the chapters have less than one question per section. Activity-oriented questions are too low in both the textbooks and none in the case of several chapters.

For better dealings nature and structure of physics demand good communication between the textbook and the learner through illustrations; i.e., Figures & Tables; though there are large number of figures in both the textbooks, quite often they lack the effective impact due to spacing, colouring, etc. Many figures and tables are not numbered; photographs presented are of very low quality.

As discussed in Ch.II, there are several research evidences to show that there is a need to look at the physical aspects of the textbooks; in both the textbooks, except the size, the other physical aspects such as typographic complexity, design, attraction, colour, nature of materials, etc., are all totally disappointing.

5.8.3: FOR OBJECTIVE NO.8(c): i.e., TO CARRY OUT AN OVERALL EVALUATION OF THE PHYSICS TEXTBOOKS ON THE BASIS OF GOALS AND BROAD OBJECTIVES OF EDUCATION/SCIENCE EDUCATION IN GENERAL AND SNR. SEC. SCHOOL PHYSICS CURRICULUM IN PARTICULAR:

As discussed in Ch.I, broadly speaking, the term 'Education' is safely referred to a state of desired change in an individual's behaviour; development of scientific temper is one of the major signs of change in behaviour in the right direction; and ideal Education aims at adjustment too- adjustment of an individual not only within one's family, community, state and country but also at the global level; this psychologically strong and bold adjustment is highly needed especially because of the fast changing world through science and technology; through this adjustment for happy survival, it is possible to conceptualise highly desirable National and International understanding. Based on the proceedings (p.162 of this Report) of the "All India Seminar of the Teaching of Science" at Simla (Taradevi Report, 1956)", one of the broad objectives of teaching of science at High and Higher Secondary stage should be :

> To familiarise to pupil with the world in which he lives and to make him understand the impact of science on society so as to enable him adjust himself to his environment.

The above statement also emphasizes on adjustment; this concept is meaningful in locating oneself with the present by remembering the glorious past of ancient India, her present label as a developing Nation and the anticipation of future bright days. Among the values of Education that are stressed in the previous Education Commissions' Reports as well as the present NPE(1986) (p.6 of this Report), the following are very relevant to Science Education programme too: Inculcation of the scientific temper,

protection of the environment, national identity, national integration, cultural heritage, etc. It may be noted that as such, NPE(1986) does not always provide statements/information separately for (Jnr) Sec. and Snr. Schools and almost everything is under Secondary Education in general; as stated in Art. No.5.13 on 'Secondary Education' in NPE(1986), it (Secondary Education) begins to expose students to the differentiated roles of science, the humanities and social sciences; after this stage the students at Std.XI would choose a particular stream, either science or arts or any other depending on his serious interest in the field by keeping in mind what he would like to become in future. In reality, at times, a quick look at the prescribed textbooks would enable him to get help to some extent to join a particular stream, of course, in addition to guidance given by teachers and parents. Art.8.18 and 8,19 of NPE (1986) speaks boldly about the strengthening of science education in schools so as to develop in an individual well defined abilities and values such as spirit of inquiry, creativity, objectivity, the courage to question and an aesthetic sensibility; this Policy further states that science education programme will be designed to enable the learner to acquire problem-solving and decision-making skills and to discover the relationship of science with health, agriculture, industry and other aspects of daily life.

Now, to come to the question of anxiously searching for the fulfillment of the above goals and broad objectives of Education/Science Education, in the present National physics textbooks for the Snr. Sec. School level, one should always remember the limitations of the textbooks; textbooks alone, though they are major teaching-learning tools, may not fulfill the above goals and broad objectives; the overall responsibility is that of the whole curriculum whereby

teacher's teaching in the classroom takes the major role. No doubt, the major goal of Education is to acquire knowledge - this is reflected well (including the relevant latest/ advanced knowledge) in the present physics textbooks for Snr. Sec. School level, as shown in the previous sub-objective 8 (b) (of course based on the findings of previous objectives, especially 1 (b) & 3(b); this mere knowledge alone may not help the individual to adjust in the society. National goals rightly point out the development of abilities related to problem-solving and decision-making; based on the nature and structure of physics these abilities have to be developed indirectly; there are some opportunities for the indirect development of these abilities in the textbooks through series of end-of-chapter exercises, though these have their own limitations as pointed out in the analyses of Objective No.6 (pp.359-366), The value of spirit of inquiry, which is the backbone of physics is not much strengthened in the textbooks as pointed out in the analysis of 8(b); and so is the development of scientific temper - scientific attitude, though this is one of the major aspects in the scientific inquiry. Regarding creativity, it is doubtful, whether the textbooks under study can cater to its nurture mainly because these books do not contain creative activities - however, the starred portion exercises might help to some extent in this connection. The value of objectivity which is also inherent in scientific inquiry is not reflected specifically in the textbooks; if one can subscribe to the idea that the objective questions are likely to develop objectivity indirectly, even then, the textbooks do not contain enough objective questions in their end-of-chapter exercises. The value of courage to question might have been developed indirectly through the textbooks, especially because of the presence of large number of higher order questions (as shown under objective No.3(a), pp.255-259).

The value of aesthetic sensibility does not seem to get specifically reflected in the textbooks, as they could not impress much through illustration, the intrinsic beauty of nature especially in micro and cosmo worlds; NPE (1986) stresses on discovery of relationship of science with health, agriculture, industry and other aspects of daily life- the present physics textbooks could not take care of this multi-disciplinary approach seriously, as reflected in the finding of Objective No.1(c). Regarding reference to the glorious past and cultural heritage of ancient India, in connection with scientific development, it is quite encouraging to see atleast some details about 'Vaisheshika' school of thought and the development of the concept of atom, 'Lalithavistara', etc., (Ch.9, Std.XI textbook); regarding national identity, atleast a few Indian physicists and India's contribution to physics are referred to in the textbooks, but the emphasis seems to be less. There does not seem to be any serious attempt to connect physics and economic development of the nation through the textbooks, in an attempt to join the race along with the developed Nations of the world; and anticipation of the bright future is also not emphasized as such. A physics textbook may not be in a position to contribute much to National Integration; but indirectly there is an altogether minor attempt for this in the textbooks by referring to the technical details of a few important places (such as Bombay, Tiruvananthapuram, Delhi, etc.) in different parts of the country. The textbooks could have easily touched on the issue of International Understanding through the topics such as nuclear energy, green house effect, solar energy, etc., but the investigator is of the opinion that these are not related properly in the textbooks.

Now coming to the textbooks' fulfillment of objectives of teaching and learning of physics at Snr. Sec. level, the available document to refer is the syllabi from the Central Board of Secondary Education, Delhi which were referred to in the analysis of Objective No.8(a); CBSE - 1987 Syllabus does not specify any objective to begin with; and also as noted in the findings for Objective No.8(a), the textbooks do not appear to follow this 1987 Syllabus. In subsequent Syllabi of 1991 and 1993, CBSE specifies objectives, to start with (Appendices, F, G & H).

The textbooks produced in 1987/88, also, to start with, did not specifically list down the objectives as such, except giving certain ideas about the same, through 'Preface' and refering to NPE (1986) & POA (1986). Though NCERT had published 'Guidelines and Syllabi' for Upper Primary stage and Secondary stage, in 1988, based on NPE (1986) and POA (1986), the investigator was told by the concerned NCERT authorities in 1991 that such document for Snr. Sec. School level was not available. Recently, this has been reconfirmed by approaching some of the Principals where NCERT textbooks are being used; as at present these schools have the documents containing objectives and syllabi only from the CBSE. However, as the produced textbooks have to oblige by fulfilling the objectives of the National Examination Body, i.e., CBSE, it is reasonable in the fitness of things to examine the following objectives for physics programme at Snr. Sec. School, as shown in CBSE-1991[4] as well as 1993 syllabi : Through the course in physics, the learner should :

(i) develop competence to pursue professional courses like enginnering, medicine, dentistry in his future career;

(ii) get knowledge, understanding and application abilities about different aspects of physics;

(iii) strengthen his foundations for further study of physics;

(iv) develop enough interest in the study of physics and

(v) acquire necessary manipulative and experimental skills.

The present study of the textbooks need not go into the details of framework of objectives of the syllabi, as the main concern here is to see whether the textbooks fulfill these objectives or not; however, it may be noted that the above objectives do not appear to be in perfect serial order of preference; eg., it is debatable whether the 1st objective is in the right position or should it be the last objective in the order of preference. Another question is whether the above objectives sufficiently reflect upon goals and broad objectives of the Nation.

In any case, if we have to accept the CBSE objectives as they are, it is somewhat doubtful whether the textbooks can really take care of the 1st objective; of course, as far as basic physics that is needed for some of the professional courses, the textbooks' fulfillment of the requirement is more than enough; in fact especially for medicine it may be too much as students those who intend to do only medical courses may not even bother to study so much of physics if they have an idea already in their mind how much physics is needed for them in future. The content in some of the chapters is too much even for engineering students. But in this connection, the deficiency of the textbooks lies in not providing a good number of references/illustrations/examples in the field of engineering/medicine etc. From Table No.5·6 (p.222)

in the analyses of Objective No.1(b)(iv), one can see very few references to engineering, medicine, etc. Moreover, based on the findings under Objective No.6, on end-of-chapter exercises, only Ch.11 (std.XI) and Ch.2 & 4 (Std.XII), specially contain, but very few, end-of-chapter exercises related to engineering/technical aspects; and in the case of medical physics, it is only in Ch.3 (Std.XII) but this too, very few cases. Again, the nature of end-of-chapter exercises in the textbooks appear to be somewhat different from the summative examination conducted by CBSE as well as admission tests for various professional courses; from the findings of Objective No.7, students opined that the present textbooks are not useful for them to pass neither the CBSE examination nor the highly competitive examinations such as IIT/Medical entrance examinations, etc. It appears that the textbooks are written in such a way, as if all students after Std.XII would pursue a career in physics by joining B.Sc. and later on to other higher courses in physics; but in reality this is not true.

CBSE's 2nd objective has to get feedback mainly based on the findings of Objective No.1(a) & (b), 2,3,4,6 and 7; but only the major aspects will be recalled here. Certain findings have already been given while dealing with the previous sub-objective No.8 (b) in this report, in this study; out of (13+15) Chapters in both the textbooks, (9+8) chapters have somewhat good introduction to enable the student-readers to make a good beginning to achieve CBSE's 2nd objective; and in other chapters, introduction itself is found to be somewhat defective, in both the textbooks, most of the sections are well-written more or less and the details may be seen from Table No.5.3 of this report (pp.191-216); but chapterwise, it is very difficult to note even a single chapter, in both the textbooks, which seem

/ Regarding the academic content sections in esch chapter,

perfect in all respects to achieve CBSE's 2nd Objective; notably, the question of lack of enough background in calculus will definitly come in the way of achieveing CBSE's 2nd Objective, as discussed in Objective No.8(a) of this report; this view is being supported by students' and teachers' opinions too in Objective No.7 of this report. From learners' points of view, the investigator has come to the conclusion that Ch.7,12 & 13 in Std.XI and Ch.1,2,5 & 9 in Std.XII textbooks could be considered as difficult, dull and uninteresting in many respects and may not help much in the learning process. Though many of the solved/ answered examples within the chapters are useful in overall understanding of the sections/chapters in the textbooks, as such they have not been provided for every section; moreover, the nature of examples need to be more of mathematical in nature rather than essay/short answer type, if they have to benefit the students- this view is supported by experts' opinions also (p.401). End-of-chapter exercises are likely to help more than textuall matter, to the students to understand physics and to apply the same in different new situations, provided they have sufficient background in mathematics; most of the exercises are related to application and other higher order objectives with reference to Bloom's taxonomy of educational objectives.

Now coming to CBSE's 3rd objective, it appears that the textbooks might achieve this, provided the students get proper attention especially in the mathematics department. Above-average students, if they decide to pursue a career in physics, are likely to get a lot of benefits from this textbook and especially from the starred sections and starred exercises, in spite of other defects in the textbooks as illustrated in the various tables for the previous 7 objectives of this study.

Regarding CBSE's 4th objective in connection with the development of enough interest in the study of physics, findings have already been elaborated upon through Objective No.8(b) of this report, in connection with scientific attitude (pp.421-422); the presentation of the content in the textbooks may not be helping much to develop serious interest in physics and scientific attitude.

Finally CBSE's last objective regarding the development of manipulative and experimental skills, cannot be talked about in connection with the present physics textbooks under study as the publishers took a wrong decision in separating the activities/experimentations (Laboratory Manuals) from the theoritical textbooks they produced, as discussed under Objective No.8(b) in this report.