CHAPTER FOUR

TECHNICAL DISCOURSE
4.0 GENERAL

Discourse is a system of expressing ideas or knowledge. It deals with the strategies of either written or spoken communication. The term discourse has several definitions. It is often used in the study of syntax, semantics and discourse analysis. In the study technical English, discourse often refers to the precise impersonal technique of writing, usage of specific jargon, appropriate handling of syntax besides, the treatment of pertinent discourse markers which determine the style of the discourse.

*Studies on discourse have been carried out within a variety of traditions that investigate the relations between language, structure and agency, including feminist studies, anthropology, ethnography, cultural studies, literary theory and the history of ideas. Discourse can be observed in the use of spoken, written and signed language and multimodal/multimedia forms of communication, and is not found only in 'non-fictional' or verbal materials. (www.wikipedia.org)*

A discourse community can be defined as people who share similar thoughts and ideas. The discourse community mentioned in this study refers to the target group that comprised the students of engineering and technology of
various disciplines. The ratiocination of their technical English writing is the crux of this chapter.

4.1. TYPES OF DISCOURSE

The broader division of discourse exhibits the spoken and written facets. The written facet is further divided into formal and informal contexts. The formal discourse is subdivided into normal discourse and technical or scientific discourse. The classification of discourse is illustrated in Fig. 4.1.

![Fig. 4.1 Classification of discourse]

4.2. TECHNICAL DISCOURSE

The technical discourse exhibits systematic requisites such as the use of impersonal passive voice, imperative structures, complex sentences, and transcoded graphics. The occurrence of the purpose and function sentences, and
cause and effect sentences appear to be a common feature of technical discourse. Since, it is not easy to unambiguously clarify what a discourse is, it seems reasonable to describe the features which are mutual to all its kinds. Moreover, the technical discourse of the English language comprises technical vocabulary derived from other languages.

The technical discourse is usually plain without the usage of any figurative additions. It sticks to the point and exhibits the scientific facts. This chapter focuses on the analysis of written technical discourse of the target group with reference to the requisites of technical English.

4.3. ANALYSIS OF WRITTEN TEXTS

Language is used for a variety of functions and its use has a variety of consequences. It is both constructed and constructive. The same phenomenon can be defined obviously, through different ways. The structure and form of the discourse play a vital role in the analysis of the technical English writing of the target group.

The structure of technical discourse is a crucial component in both language interpretation and generation. In interpretation, it provides clues about how the target group infers the content that is linguistically implicit. In generation, it scrutinizes the need for planning the text to effectively
communicate the intended content besides expressing every bit of the content linguistically explicit.

Conjunctions, or discourse markers signal relationships between segments of a technical discourse. They organize and manage extended stretches of discourse, helping to make the text cohesive and coherent. The coherence of the discourse aids in the quick comprehension of the message intended in a technical text. If one fails to work out how the various bits of information in the discourse connect together into some coherent concept, theory, explanation, or whatever, then the discourse will become hard to interpret. The 'incoherence' in this sense can arise from a number of factors: the bits of information in the discourse may be presented in a misleading order; the discourse may convey too little information, or too much unnecessary information.

The focus of this chapter is the application of written discourse with special reference to technical English writing skill of the target group. The capacity of the target group's inference of the usage of technical discourse is examined. The discourse theories of writing are exclusively concentrated in this research. Writing is an important part of the engineering course and is an area where students often need plenty of training. Generally, the analysis of written discourse is based on the coherence, cohesion, and intentionality of the discourse as illustrated in Fig. 4.2.
4.3.1 COHERENCE

Coherence in a broader sense means the connectivity between the units of the linguistic components starting from phonological, morphological, and syntactical levels. Coherence in written text reflects the way and consistency in which the sentences are linked together.

4.3.2. COHESION

Cohesion in English is concerned with a relatively neglected part of the linguistic system: its resources for text construction, the range of meanings that are specifically associated with relating what is being spoken or written to its semantic environment. In fact, cohesion mainly arises from semantic relations between sentences. Reference from one to the other, repetition of word meanings and the usage of connectives / discourse markers are considered. Further, it describes a method for analyzing and coding sentences. The relation between
forms and patterns of a text is commonly titled as cohesion. The syntactic and semantic cohesion may be seen through anaphoric reference, cataphoric reference and exophoric reference.

4.3.2.1. ANAPHORIC REFERENCE

Anaphoric reference is the most common type of reference, used unknowingly in everyday conversation and writing. It occurs when the writer refers back to someone or something that has been previously identified, to avoid repetition.

e.g.

_The quality controller_ identified the _defective carburetors_ and _he_ kept _them_ separate.

In the above stated example, the replacement of the _quality controller_ with _he_ and the replacement of _the defective carburetors_ with the pronoun _them_ in the flow of discourse is a noteworthy anaphoric usage. The usage of _as stated previously_ or _the aforementioned_ is also commonly observed in scientific or technical derivations.

4.3.2.2. CATAPHORIC REFERENCE

Cataphoric reference is less common in technical English. Generally, it is used for entwining the dramatic effect in writing. It occurs when the audience is introduced to someone as abstract, before learning his or her name.
e.g.

"Here she comes, our award-winning host... it's Deepa Mehta!"

The cataphoric references are typically found in literary texts like drama, short stories, novels etc.

**4.3.2.3. EXOPHORIC REFERENCE**

Exophoric reference is uncommon in speech but it can be used to describe generic or abstract in writing. It occurs when the writer chooses not to introduce a character (or group of characters), but instead refers to them by a generic word such as 'everyone'. The persons or events referred to in this manner will never be identified by the writer.

**4.3.3. INTENTIONALITY**

Intentionality is what the discourse intends to convey and achieve. The sustenance of intentionality as a matter of fact, gets enhanced through the usage of discourse markers. The discourse markers like, 'initially', 'primarily', 'secondly', 'thirdly', 'fourthly', 'fifthly', 'sixthly', 'finally' and 'ultimately' help in the chronological sequencing of the technical text. These discourse markers are in fact, used in describing the process of experiments performed in the laboratories, assembling of the machines in the mechanical workshops, modelling devices in the robotics laboratories, connecting circuits in the
4.4. CLASSIFICATION OF PARAGRAPHS

A paragraph is a unit of writing that consists of one or more sentences focusing on a single idea or topic. In fact, a well-written paragraph comprises the following features.

- **Topic Sentence:** This sentence outlines the main idea that will be presented in the paragraph.

- **Support Details or Examples:** This is the part of the paragraph that presents details, facts, examples, quotes and arguments that support the main idea.

- **Conclusion Sentence:** This sentence summarizes the main idea of the paragraph. It may also lead the reader to the topic of the next paragraph.

Discourse is difficult to define and to make a clear cut division of it. Therefore depending on the form, the linguists distinguish various styles of written discourses like

1. Descriptive Style
2. Narrative Style
3. Expository Style
4. Argumentative Style
5. Chronological Style
The descriptive style of a discourse is generally witnessed through the delineation of the subject matter. The narrative style may be seen when the stress is on the symptom aspect which makes the discourse very expressive. The informative subject matter given in the form of definitions and explanations determine the expository style. The argumentative style is characterized by the accent generally revealed through the occurrence of connectives and discourse markers. The chronological style is seen through the enunciation of the subject matter.

Apart from these styles the juxtapositional style is exhibited through the usage of compare and contrast discourse markers and the persuasive style is edified through the impressive tone of the discourse.

4.4.1. DESCRIPTIVE PARAGRAPH

A descriptive paragraph has sentences that work together to present a single clear picture of description of a person, place, thing, event, or idea. In technical English the descriptive style is commonly used to explain a theory, a formula, a new device and its functioning capacities. In fact, descriptive paragraphs kindle the imaginary visual picture of the subject described. There are four main ways of organizing a descriptive paragraph and they are illustrated in Fig. 4.3 titled, ‘methods of description’.
The subsequent passage on *steam locomotives* is an exemplification for the descriptive style occurring in the technical discourse.

e.g.

**STEAM LOCOMOTIVES**

*The modern steam locomotive is capable of generating steam pressures often in excess of 300 lb/in², against the 50 lb/in² pressure of Stevenson’s ‘Rocket’. There are two fire-boxes inside the boiler, an inner one and an outer one, which extend a long way forward. The inner fire-box is linked by tubes to fire-plate at the front of the boiler. Practically, the whole of the heating surface, which includes these fire-tubes, is surrounded by water.*
A high rate of evaporation in the boiler is essential in order to generate the large quantities of steam which are required. For this purpose, a powerful draught of air is blown over the fire. The steam which is evolved is passed through a super-heater, which raises its temperature and makes it dry as possible. Then the superheated steam is passed to the steam-chest which is attached to the cylinder. From the steam-chest it is introduced into the cylinder at the appropriate moments through ports.

4.4.2. NARRATIVE PARAGRAPH

Narrative paragraph is usually subjective in tone. These paragraphs are written from a defined authorial perception and feelings. The explicit exhibition of the autobiographical element could be seen in a narrative style. Since a narrative paragraph relies on personal experiences, it is apparently found in the form of a story. When the writer uses this technique, he or she must be sure to include all the conventions of story telling: plot, character, setting, climax and ending. It is usually filled with details that are carefully selected to explain, support or embellish the story. Almost all the points revolve around the main point the writer is attempting to make. Precisely, the narrative style

- Is used from a particular view point
- Makes and supports a point
- Is filled with precise detail
- Uses vivid verbs and modifiers
• Uses conflict and sequence as does any story
• May use dialogue

In brief, this style is exclusively observed in literary texts.

4.4.3. EXPOSITORY PARAGRAPH

Expository paragraphs are generally informative and instructional in nature. They explain a topic or define something. What needs to be explained may be either factual information or opinion. In each case a main point needs to be expanded so that the reader can clearly comprehend what the writer conceives in the mind or believes. Many assignments in engineering education require students to answer in well-developed expository paragraphs.

The discourse handled in the expository paragraph generally teaches something or introduces the unexplored knowledge. A paragraph on the installation methods of electronic devices, preparation and extraction procedures of metals can be classified under expository paragraph. For exemplification, an expository paragraph on the installation of a ceiling fan is stated below.

e.g.

**INSTALLATION OF A CEILING FAN**

*The installation begins with choosing where the fan should be located. In almost all homes, the fan is installed in the center of the room, replacing a central light fixture. This spot provides a smooth air flow to most of the room.*
Since a fan draws about the same power as a ceiling fixture, the electrical circuit shouldn't be overloaded. But if the fan includes lights, it should be made sure that the circuit has enough extra capacity to handle the load.

Mounting a Ceiling Fan

Step 1: Turn off the Power

Start installation by turning off the power to the light's circuit breaker or fuse. Only then the light fixture should be removed. The electrical safety tips must be thoroughly carried out.

Step 2: Determine Center

If there is no central light fixture, snap diagonal chalk lines from opposite corners of the room to find its center. Determine whether the lines cross exactly below a ceiling joist. If they do, move aside just far enough between the joists to fasten the side of the fan's new junction box directly to the joist.

Step 3: Install Junction Box

Cut a hole large enough for the junction box to be slipped in. If it's next to the joist, drill holes in its side and screw it to the joist. Fasten the box to a 2" x 4" header nailed between the joists. Sometimes, the 2" x 4" header can be inserted through the junction box's hole, nailing it to each joist. If not, it may need to open a larger access hole. Then, patch the hole to close it again.

The expository writing becomes an essential skill for the engineering students to master. The exhibition of facts and statistical information, usage of
cause and effect relationships and examples perhaps make the paragraph expository. Since the expository style enunciates factual information, it is written in objective tone. The usages of ‘I’ and ‘we’ are totally obsolete.

4.4.3.1. THE DISTINCT FEATURES OF EXPOSITORY PARAGRAPH

Some of the salient features of the expository paragraph are stated below

- The crux of the expository passage must be enunciated properly besides being specific enough to be supported by the points given in the text.

- Each supporting paragraph must have a distinct controlling topic and all other sentences must factually relate directly to it. The transition words or phrases are important as they help the reader follow along and reinforce the logic.

- The conclusion paragraph should originally restate the crux and the main supporting ideas. A finishing statement that reinforces the gist of the paragraph in a meaningful and memorable way is essential.

- A new material is hardly introduced in the conclusion.

4.4.4. ARGUMENTATIVE PARAGRAPH

An argumentative writing attempts to convince the reader that the point of view or course of action recommended by the writer is valid. To accomplish this, the writer must develop a limited topic which is well defined and debatable.
In fact, it should have more than one facet of approach. Even if the passage exhibits only one side of the argument it implies the thorough knowledge of the writer of the other facet of the argument also. The following sample titled, *Climate and Pollution Related?* is an illustration for the argumentative style used in technical discourse.

*e.g.*

**CLIMATE AND POLLUTION RELATED?**

Every year there are changes in climate in different parts of the world. Some of these changes are due to natural causes. However, some climatic changes are caused by air pollution and these changes may increase.

If the pollution affects the level of carbon dioxide in the atmosphere, the results are likely to be serious. Carbon dioxide constitutes only a small part of the atmosphere. But it has an important function in maintaining the balance between radiation from the sun entering the atmosphere and radiation leaving the Earth. Some of the radiation is absorbed by the Earth and some is radiated back into the atmosphere. The carbon dioxide in the atmosphere prevents some of the radiation from leaving the atmosphere. Thus the heat remains in the atmosphere and carbon dioxide helps to prevent the temperature of the Earth from falling.

If the proportion of carbon dioxide in the atmosphere is increased as a result of air pollution, the temperature of the atmosphere may rise. This might eventually cause the ice in the north and the south poles to melt. If this happened,
the sea level would rise and parts of the Earth would be flooded. The likelihood of this happening is remote, but the possibility exists.

There is also a fairly strong possibility that the dust level in the atmosphere will rise as a result of industrial pollution. This dust pollution will reflect sunlight back into space. If this happens, less sunlight will reach the Earth and the temperature will fall. Another danger comes from the destruction of the Earth’s vegetation, such as the forests of Brazil, which are being cleared to make way for farmland and cities. Trees use carbon dioxide and their destruction may upset the balance of carbon dioxide in the atmosphere.

The argumentative paragraphs at the maximum use cause and effect sentences to strengthen and substantiate the argument in a convincing strategy. The two significant classification of argumentative paragraph is illustrated in Fig. 4.4.

Fig. 4.4. Classification of argumentative paragraph

ARGUMENTATIVE PARAGRAPH

DIRECT ARGUMENT

INDIRECT ARGUMENT

CAUSE AND EFFECT DISCOURSE MARKERS
4.4.1 SPECIFIC FEATURES OF ARGUMENTATIVE PARAGRAPH

Similar to the other kinds of paragraphs, there are specific features for this argumentative style also. They are:

- The topic sentence is not a fact as facts cannot be debated. It is a statement of position that is enunciated directly and overtly. This statement indeed directs the readers to follow along with the authorial logic towards the specific stated conclusion. The tone is generally objective and definitive.

- The introductory paragraph itself bears three best reasons to support and substantiate the authorial perception. These three reasons are generally supported with the secondary ideas.

- The content of the paragraph exhibits specific evidences, examples and statistical details instead of broad generalizations

- Each topic sentence for the supportive points is usually introduced in the beginning of the paragraph. The additional sentences closely relate to the topic by which the logical coherence is easily maintained.

- The conclusion very overtly redefines the topic sentence and restates the most contemplative evidence as it becomes the ultimate opportunity to reinforce the point discussed through which the reader gets convinced.

4.4.5. CHRONOLOGICAL PARAGRAPH

The chronological paragraph gives information in a sequential order. In technical English the chronological paragraph plays a vital role especially in
transcoding tabular columns. Usually, in transcoding tabulated information into a passage, the points are given in a chronological order. For instance the Table 4.1 on *The average prices of animal feed raw materials* may be comfortably transcoded into a chronological passage as exemplified beneath the table.

e.g.

Table 4.1. The average prices of animal feed raw materials

<table>
<thead>
<tr>
<th>S.No</th>
<th>Item</th>
<th>1993-94 (Rs)</th>
<th>1994-95 (Rs)</th>
<th>1995-96 (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rice Bran</td>
<td>3,020</td>
<td>5,250</td>
<td>5,260</td>
</tr>
<tr>
<td>2.</td>
<td>Rice Bran</td>
<td>1,580</td>
<td>2,520</td>
<td>2,680</td>
</tr>
<tr>
<td></td>
<td>Extract</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Maize</td>
<td>2,370</td>
<td>4,980</td>
<td>5,130</td>
</tr>
<tr>
<td>4.</td>
<td>Jowar</td>
<td>2,020</td>
<td>4,730</td>
<td>4,680</td>
</tr>
<tr>
<td>5.</td>
<td>GN Cake</td>
<td>4,180</td>
<td>6,250</td>
<td>7,290</td>
</tr>
<tr>
<td>6.</td>
<td>GN Extract</td>
<td>3,970</td>
<td>5,150</td>
<td>6,230</td>
</tr>
<tr>
<td>7.</td>
<td>Soya</td>
<td>6,120</td>
<td>7,050</td>
<td>8,130</td>
</tr>
</tbody>
</table>

*ANIMAL FEED RAW MATERIAL*

The price of rice bran has increased from Rs. 3,020 in 1993-94 to 5,250 in 1994-95. The price increased further to 5,260 in 1995-96. The price rise in 1994-95 has been less than that in 1993-94. The price of rice bran extract has
increased from Rs. 1,580 in 1993-94 to Rs. 2,520 in 94-95 and Rs. 2,680 in 1995-96. In the case of maize, the price per ton increased from Rs. 2,370 in 1993-94 to Rs. 4,980 in 94-95. The year 1995-96 saw a further increase in the price of maize to Rs. 5,130.

The price of jowar increased from 2,020 in 1993-94 to Rs. 4,730 in 94-95. On the contrary, the price per ton went down to Rs. 4,680 in 95-96. The price of GN cake increased from Rs. 4,180 in 93-94 to Rs. 6,250 in 94-95 and further to Rs. 7,290 in 95-96, whereas the price of GN cake extract increased from Rs. 3,970 in 93-94 to Rs. 5,150 in 94-95, and further to Rs. 6,230 per ton in 95-96. The price of soya has increased consistently from Rs. 6,120 in 93-94 to Rs. 7,050 in 94-95 and Rs. 8,130 in 95-96. In conclusion, it can be said that the price rise of all the items mentioned has been steep between 94 and 95. However, the price rise is seen of all the items, except jowar, where the price has fallen marginal between 95 and 96.

4.5. TESTING

To examine the proficiency level of the written technical discourse of the target group a test was conducted manually. The questionnaire designed for scrutinizing this particular aspect of the target group formed the third part of annexure-II. The focus of this questionnaire is to examine the proficiency level of the engineering students in written technical discourse. This questionnaire
shows difference from the former two questionnaires set for the analysis of morphological and syntactic knowledge of the target group chosen for this study. Here it is noteworthy that these types of questions generally feature in ‘Part-B’ of the examination question paper of the engineering students.

Three questions comprising the sub divisions ‘a’ and ‘b’ concentrating on ‘transcoding’, ‘note making’, and ‘paragraph writing’ were given in questionnaire-III of annexure-II. The three significant areas of knowledge level of students in handling the written technical discourse examined were

1. Transcoding the technical discourse
2. Conversion of technical details into discourse
3. Paragraph writing and application of apposite discourse markers.

4.5.1. TRANSCODING THE TECHNICAL DISCOURSE

The term ‘transcoding’ is used to mean ‘encoding’ or ‘encrypting’ and ‘decoding’ or ‘decrypting’ of the given technical information into technical discourse. ‘Transcoding’ skill is very essential for an engineering student as most of the engineering texts exhibit data in the form of graphics.

This topic is included in the Technical English paper prescribed for the engineering students to enhance the skill of appropriate inference from the
graphical representations and to elaborate it into a paragraph and vice versa. ‘Transcoding’ requires dual skills namely,

- Primarily, the information given has to be comprehended well.
- Secondly, it has to be transcoded either into a technical passage or into graphics. The two-way strategy of ‘transcoding’ is illustrated in Fig. 4.5.

**Fig. 4.5.Two-way strategy of ‘Transcoding’**

```
Transcoding
   /   \
 /     \ 
Encryption Decryption
   |     |   |
   v     v   v
Written discourse into graphical representation
   |     |   |
   v     v   v
Graphical representation into written discourse
```

**4.5.1.a. ENCRYPTION**

Graphics is an inevitable part of engineering or technical discourse. In fact, the subject matter is conveyed perfectly through graphical representations. Generally, the graphical representations are preferred for overt comprehension of the statistical data discussed in the text. Perhaps, this is achieved from the reader’s point of view to add clarity to the inference. The four significant constituents of graphical representations are illustrated in Fig. 4.6
4.5.1.b. DECRYPTION

An encrypted data or information is usually decrypted into a technical passage. In fact, the style of the passage is determined by the data encrypted. Generally, decryption of a flow chart gives a descriptive passage. But the style of the passage to be decrypted may not be determined for the rest of the graphical representations like bar diagram, line graph, pie chart or tabulated information. The style of the discourse to be decrypted sustain unique and quizzical unless the data is comprehended with enough clarity.

4.5.1.1. TEST FORMAT – I

The test format–I of questionnaire–III, annexure–II was designed to examine the knowledge level of the students in logical ‘decryption’ and ‘encryption’ using appropriate discourse markers. While the first question focused on examining the capacity of decryption, the second question aimed at bringing out the potentiality of the target group in encryption.
4.5.1.2. STUDENT RESPONSE

A tabulated data on the comparison of the ‘human brain’ and ‘computer’ was given and the students were asked to write a passage comparing both. But most of the answers exhibited contrastive tone. Invariably, this error had occurred due to the usage of contrastive discourse markers like ‘despite’, ‘although’ ‘whereas’, ‘but’, ‘yet’ and ‘however’. On the other facet, a few students have linked the given data into a passage using comparative discourse markers like ‘similarly’, ‘comparatively’, ‘in fact’, ‘indeed’, ‘at the same time, ‘at the maximum’, ‘as a matter of fact’, and ‘on the other facet’. The Table 4.2 is the data given for the decryption test.

Table 4.2 Data given for the decryption test

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>HUMAN BRAIN</th>
<th>COMPUTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>About 1.5 Kg.</td>
<td>From a few grams to tons</td>
</tr>
<tr>
<td>Energy sources</td>
<td>Blood Glucose</td>
<td>Electricity</td>
</tr>
<tr>
<td>Temperature needed</td>
<td>Fairly steady</td>
<td>Not very sensitive to change</td>
</tr>
<tr>
<td>No. of parts</td>
<td>Approx $10^{11}$</td>
<td>Approx $10^{11}$</td>
</tr>
<tr>
<td>Location of parts</td>
<td>Inside skull</td>
<td>Could be even in different countries.</td>
</tr>
<tr>
<td>Memory</td>
<td>Probably unlimited capacity</td>
<td>Capacity limited</td>
</tr>
<tr>
<td>Speed of calculation</td>
<td>Slow compared to a computer</td>
<td>Extremely fast.</td>
</tr>
</tbody>
</table>
The second part of the test format was conversion of a passage into a pie chart. This encryption exercise actually aimed at examining the intense comprehension capacity of the target group through conversion of it into a diagrammatic form. Maximum students stood above the level of average in encrypting this data into a pie chart. At the same time, the erroneous graphical encryptions like ‘bar diagrams’ and ‘line graphs’ were also tried by some of the students instead of a pie chart.

4.5.1.3. ERROR GRAVITY

To comprehend a discourse the learner needs to recover the relationship between the discourse elements contextually. Inadequate skill in diagnosing the flow of discourse perhaps leads to several errors. In fact, this was evidently witnessed in the ‘transcoding’ exercises given to the target group as a part of this study. Maximum number of errors was found in ‘decryption’ of the tabulated information into a comparative passage when compared to the ‘encryption’ of given passage into a pie chart.

The reason for this may be misconception of the instruction stated in the decryption exercise or may be due to the usual stereotyped technical differentiations found in the form of tabulation. Table 4.3 testifies the inference of the target group in the ‘decryption’ and ‘encryption’ exercises.
Table 4.3. Types of errors identified in transcoding

<table>
<thead>
<tr>
<th>S.No</th>
<th>ERROR FIELD</th>
<th>TYPE OF ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Decryption of the table</td>
<td>Misconception due to over generalization.</td>
</tr>
<tr>
<td>2.</td>
<td>Encryption of a pie chart</td>
<td>Less exposure.</td>
</tr>
</tbody>
</table>

4.5.1.4 QUANTIFICATION

The errors quantified in ‘transcoding’ exercise are tabulated in Table 4.4. Most of the errors occurred as a result of the misconceived notion of the target group especially in the ‘encryption of a pie chart’. But, the ‘decryption’ exercise helped to observe the less exposure of the target group resulting in stereotyped errors. The quantification of the analysis of test format–I, of questionnaire–III, annexure–II edified the following details.

- The percentage of errors in the ‘decryption’ exercise was high compared to that of the ‘encryption’.
- Both the MQ and GQ students were found to be weak in ‘encryption’ exercise when compared to the ‘decryption’ exercise. However, the performance of the MQ students was better than that of the GQ students.
- The percentage of errors quantified in ‘encryption’ as a wholesome unit is half that of ‘decryption’.
The error quantification variable of MQ students in the encryption of a pie chart was identified to be in single digit (9) while the rest were in two digits.

Table 4.4 Quantification of student committed errors in transcoding

<table>
<thead>
<tr>
<th>ERROR FIELD</th>
<th>MQ (50) students</th>
<th>GQ (50) students</th>
<th>Percentage of student committed errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>MQ</td>
</tr>
<tr>
<td>Decryption of a table</td>
<td>22</td>
<td>29</td>
<td>44</td>
</tr>
<tr>
<td>Encryption of a pie chart</td>
<td>9</td>
<td>13</td>
<td>18</td>
</tr>
</tbody>
</table>

4.5.2. CONVERSION OF TECHNICAL DETAILS INTO DISCOURSE

The global purpose of technical communication is to convey new ideas and results of technical research, as well as to explain and rationalize them. As the technical discourse involves reasoning that is organized as a sequence of mental operations of informing and arguing, the skill of elaborating the hints into technical discourse and the efficacy of note making of the passage given were examined through the test format–II, questionnaire–III of annexure–II.

4.5.2.3. ERROR GRAVITY

The first part the test format–II of questionnaire–III identified the inadequate potentiality of the target group in developing the hints given into a
passage. Some of the answers exhibited the intervention of structural words like prepositions and articles placed in between the words and phrases given in the hints for development. In fact, this type of mistake is commonly witnessed in the answers sheets of the students who came from the Tamil medium that too from a very rural background. At the same time some of the answers revealed the hollow and broken discourse of the students irrespective of the quota through which they were given admission into engineering education. Apparently, less exposure and mother tongue influence may be the causes for the broken discourse witnessed in their written discourse.

The second part of the conversion exercise exhibited the presumption and prejudice of students in jotting down the significant phrases and operating words that convey the gist of the context discussed in the passage. Many students had picked up a word at random from every sentence of the given passage and had jotted down one by one for the note making exercise. The errors observed were stereotyped due to less exposure.

Table 4.5. Types of errors identified in the conversion of technical details

<table>
<thead>
<tr>
<th>S.No</th>
<th>ERROR FIELD</th>
<th>TYPE OF ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hints developing</td>
<td>Mother tongue influence and less exposure</td>
</tr>
<tr>
<td>2</td>
<td>Note making</td>
<td>Less exposure</td>
</tr>
</tbody>
</table>
4.5.2.4 QUANTIFICATION

The quantification of the analysis of the conversion of technical details into discourse given in test format–II, questionnaire–III of annexure–II identified the better performance of the target group in the note making exercise rather than the hints developing exercise. The error quantification in the conversion of technical details is depicted in Table 4.6.

Table 4.6 Quantification of student committed errors in the conversion of technical details

<table>
<thead>
<tr>
<th>ERROR FIELD</th>
<th>MQ (50) Students</th>
<th>GQ (50) Students</th>
<th>Percentage of student committed errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>MQ</td>
</tr>
<tr>
<td>Hints developing</td>
<td>32</td>
<td>40</td>
<td>64</td>
</tr>
<tr>
<td>Note making</td>
<td>24</td>
<td>27</td>
<td>48</td>
</tr>
</tbody>
</table>

4.5.3. PARAGRAPH WRITING AND APPLICATION OF APPosite DISCOURSE MARKERS

Discourse markers are the ‘cue words’ that unveil the coherence embedded in the adjacent text spans. These lexical expressions are perhaps studied under various labels like, sentence connectors, discourse operators, pragmatic connectives and cue phrases. They are quite heterogeneous group of words, many of which are traditionally treated as function words belonging to the
realm of grammar rather than to lexicon. Discourse markers are referred to more commonly as ‘linking words’ and ‘linking phrases’, or ‘sentence connectors’.

Discourse markers may be described as the ‘glue’ that binds together a piece of writing, making the different parts of the text ‘stick together’. They are used less frequently in speech, unless speech is very formal. Without sufficient discourse markers in a piece of writing, a text would not seem logically constructed and the connections between the different sentences and paragraphs would not be obvious.

There are many discourse markers that express different relationships between ideas. The discourse markers that act as relationship indicators are presented in Table 4.7 titled, Discourse markers used to express different relationships. The discourse markers in the table are generally used at the start of a phrase or a clause.

Discourse markers act as sentence connectors that do not always begin a completely new sentence but also occur in different positions of a sentence. The two different kinds of discourse markers and their occurrence in the written discourse are illustrated in Fig. 4.7.
Table 4.7 Discourse markers used to express different relationships

<table>
<thead>
<tr>
<th>RELATIONSHIP INDICATORS</th>
<th>DISCOURSE MARKER / PHRASE</th>
<th>POSITION WITHIN CLAUSE / SENTENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twining Discourse Markers</td>
<td>Moreover, additionally, in addition, further, further to this, also, besides</td>
<td>Beginning of a sentence</td>
</tr>
<tr>
<td>Enumerative Discourse Markers</td>
<td>Firstly, initially, secondly, thirdly, fourthly...finally, ultimately</td>
<td>Beginning of a sentence</td>
</tr>
<tr>
<td>Emphatic Discourse Markers</td>
<td>As a matter of fact, in fact, indeed.</td>
<td>Beginning of a sentence</td>
</tr>
<tr>
<td>Contrast Discourse Markers</td>
<td>However, on the other hand, in contrast, on the contrary.</td>
<td>Beginning of a main clause as well as the subordinate clause</td>
</tr>
<tr>
<td>Declarative Discourse Markers</td>
<td>Although, Even though, Despite the fact that, In spite of the fact that, Regardless of the fact that</td>
<td>Beginning of a main clause as well as the subordinate clause</td>
</tr>
<tr>
<td>Situational Discourse Markers</td>
<td>Therefore, consequently, in consequence, as a result, accordingly, hence, thus, for this reason, because of this</td>
<td>Beginning of a main clause as well as the subordinate clause</td>
</tr>
<tr>
<td>Conditional Discourse Markers</td>
<td>Because, since</td>
<td>Beginning of a main clause as well as the subordinate clause</td>
</tr>
<tr>
<td></td>
<td>If, in case of, in the event of, as long as, so long as</td>
<td>Beginning of a main clause as well as the subordinate clause</td>
</tr>
</tbody>
</table>
In a formal technical writing the vitality of discourse markers is inevitable as they exhibit different relationships between the technical concepts discussed.

The noteworthy points about the discourse markers are

- the primary structuring unit of written technical discourse.
- function as relationship indicators
• play a significant role in the technical contexts to express cause and effect and purpose and means.
• occurrence at the start of a phrase or clause and
• positioning in different places within a sentence apart from the ‘initial position’ and ‘midway position’ at the start of another clause.

4.5.3.1. STUDENT RESPONSE

The knowledge level of the students in the apposite contextual usage of discourse markers and their proficiency in application of different kinds of technical discourse were explored in test format–III, questionnaire–III, of annexure–II. The test format–III comprised two questions on paragraph writing. The first question was to attempt an argumentative paragraph on ‘global warming and inevitable increase of vehicles’ and the second question was to write a descriptive paragraph about ‘the process of sending an e-mail’. The objective of these two questions was to analyze the proficiency of the target group in the application of discourse markers.

4.5.3.2. ERROR GRAVITY

The style of discourse is perhaps determined by the appropriate usage of discourse markers. But the paragraph writing exercise explored the broken syntax and hollow discourse vulnerably edified due to incorrect positioning of
discourse markers and structural words. To analyze the written discourse as a wholesome unit a sample of the data collected from the target group for the question on writing an argumentative paragraph on ‘global warming and inevitable increase of vehicles’, is cited here for introspection.

e.g.

*Global warming is the day to day changes the heat is highly produced.*  
*Sometimes heat is very low condition. So the global warming is change to the sessions.*  
*But increasing the vechials the transportation cost is high. Low cost vechials are selected and two vellars and four vellars are highly bring the people transportation cost is increased.*  
*Petrol cost is high. So losses the transporter vechials are increased the population centre.*  
*Social are affected.*  
*Vehials are increased.*  
*Trafic problems.*  
*So the traffic signals are provided.*  
*Control the traffic.*  
*Vehials are increased accitent are highly two vellars and four vellars.*  
*Increasing the vehials transportation is easy but accitent are high.*  
*Vehials increasing fual is affect the social.*  
*Sum will produce the people on vehials.*

The morphological errors seen through the spellings like, ‘vellar’ for ‘wheelers’, ‘accitent’ for ‘accident’, ‘vehials’ for ‘vehicles’ are written as the way the words are uttered. The perplexing usage of ‘session’ to actually mean ‘season’ results in contextual ambiguity. The coherence and cohesion of the discourse is totally lost due to the irregular combination of active and passive verb phrases resulting in a broken syntax, besides, the irregular combination
sentence structures like statement and imperative as observed in the following sentences.

e.g.

Combination of active and passive verb phrases

- *Petrol cost is high. So losses the transporter vehials are increased the population centre. Social are affected. Vehials are increased.*

- *Global warming is the day to day changes the heat is highly produced.*

Irregular combination of sentence structures (imperative and statement)

- *Control the traffic. Vehials are increased accident are highly two vellars and four vellars.*

A few sentences from some of the paragraphs written by students are stated here for reference.

e.g.

- *The global warming do not happen moreover the vehicles reduce. Ultimately the green house gases emission people dangerous.*

- *The government take action firstly global warming. So, it put rules for global warming.*

- *Global warming is a cause to green house gases. It come from vehicle therefore.*
The less exposure of the students and mother tongue influence are very well seen in the above stated examples. The incorrect usage of the verb ‘do’ and inappropriate positioning of the discourse marker ‘moreover’ collapses the flow of the context intended in the first sentence.

In the second example, the omission of the modal auxiliary ‘should’ immediately after the subject besides, the combination words ‘firstly global warming’ and ‘it put rules for global warming’ are due the inevitable infectious nature of the student’s vernacular. Here, the usage of the word ‘put’ is noteworthy. The Tamil speaking students generally substitute this word in several places due to their mother tongue influence. This mistake is in fact common even among the students of English medium.

The third example is cited here to show the less exposure of the students who especially come from Tamil medium schools. The incorrect usage of the structural words ‘to’, discourse marker, ‘therefore’ besides, the totally broken sentence are actually the result of lack of exposure to the language itself.

The second question on writing a descriptive paragraph on ‘the process of sending an e-mail’ aimed at studying the application of the descriptive style and usage of descriptive discourse markers. This test exhibited the hollow discourse
of the target group constituted by broken syntax. A sample of the data collected is cited here for reference.

E.g.

**DESCRIBE THE PROCESS OF SENDING AN E-MAIL**

E-mail is the developing of sending a mail is just as 1, 2, 3. The first stop is to open the compose mail. The second is to compose mail composing mail is that adderig receivers, subject and the main information.

Then after finally the e-mail is sent. These are the procedure to sending an e-mail.

Even this answer is edification for the morphological errors obviously seen in the incorrect spellings like ‘stop’ instead of ‘step’, ‘adderig’ for ‘addressing’ in addition to the erroneous syntax as observed in the sentence.

“The second is to compose mail composing mail is that adderig receivers, subject and the main information”.

The irregular usage of sequential and descriptive discourse markers like ‘then’, ‘after’, ‘finally’ as witnessed in the final sentence of the paragraph given above would have occurred due to less exposure. Table 4.8 categorizes the types of errors identified in usage of discourse.
Table 4.8 Types of errors identified in usage of discourse

<table>
<thead>
<tr>
<th>S.No</th>
<th>ERROR FIELD</th>
<th>TYPE OF ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Morphological Error</td>
<td>Ambiguity and Less Exposure</td>
</tr>
<tr>
<td>2.</td>
<td>Syntax Error</td>
<td>Less Exposure</td>
</tr>
<tr>
<td>3.</td>
<td>Coherence</td>
<td>Mother tongue influence and Less Exposure</td>
</tr>
<tr>
<td>4.</td>
<td>Discourse markers</td>
<td>Less Exposure</td>
</tr>
</tbody>
</table>

4.5.3.3. QUANTIFICATION

The technical writing skill of students explored through a paragraph writing exercise unveiled the errors committed in different fields of discourse namely, morphology, syntax, coherence and application of discourse markers like contrast and descriptive. The paragraph questions in fact, aimed at studying the knowledge level of the students in the apposite usage of discourse markers.

But the morphological, syntactical and logical errors were the by products of the findings. The quantification of the analysis of the paragraph writing exercise given in test format–III, questionnaire–III of annexure–II is tabulated in Table 4.9.
Table 4.9 Quantification of the student committed errors in the usage of discourse

<table>
<thead>
<tr>
<th>Error Field</th>
<th>MQ (50) Students</th>
<th>GQ (50) Students</th>
<th>Percentage of student committed errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>MQ</td>
</tr>
<tr>
<td>Morphological error</td>
<td>7</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Syntax error</td>
<td>19</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td>Coherence</td>
<td>20</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td>Discourse markers</td>
<td>25</td>
<td>30</td>
<td>50</td>
</tr>
</tbody>
</table>

4.6. CONSOLIDATION OF THE ANALYSIS CARRIED OUT

The analysis was carried out to explore the proficiency of the target group in technical discourse on three different technical English writing skills namely, transcoding graphical representation, conversion of details into discourse and paragraph writing. Table 4.10 brings out the error fields identified through this test.

The consolidated observations made out of the study are:

- The morphological errors, syntactical errors, and errors made in coherence were the sub components witnessed in the course of the main research carried out in the usage of written technical discourse.
Table 4.10 Identification of error fields in the usage of technical discourse

<table>
<thead>
<tr>
<th>ANNEXURE–II</th>
<th>TEST FORMAT</th>
<th>ERROR FIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire–III</td>
<td>Transcoding Graphical Representation</td>
<td>Decryption of a table</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Encryption into technical data</td>
</tr>
<tr>
<td></td>
<td>Conversion of details into discourse</td>
<td>Hints Developing</td>
</tr>
<tr>
<td></td>
<td>Paragraph writing</td>
<td>Note making</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Morphological Error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Syntax Error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coherence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Discourse markers</td>
</tr>
</tbody>
</table>

- The overall quantification of the students who have committed errors in every individual test format is calculated by adding the total number of students in both MQ and GQ who have committed atleat a single error in any one of the test formats (Table 4.11).

- The consolidated quantification revealed 89% of the target group to possess inadequate knowledge in technical English writing skill. This 89% comprises 84% of MQ students and 94% of the GQ students. It is
noteworthy that the performance of the MQ students sustained better than the performance of the GQ students throughout the analysis.

Table 4.11 Consolidated quantification of student committed errors in the usage of technical discourse

<table>
<thead>
<tr>
<th>TEST FORMAT</th>
<th>ERROR FIELD</th>
<th>MQ (50) Students</th>
<th>GQ (50) Students</th>
<th>Percentage of student committed errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MQ</td>
</tr>
<tr>
<td>Transcoding Graphical Representation</td>
<td>Decryption of a table</td>
<td>22</td>
<td>29</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Encryption into technical data</td>
<td>9</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>Conversion of details into discourse</td>
<td>Hints Developing</td>
<td>32</td>
<td>40</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Note making</td>
<td>24</td>
<td>27</td>
<td>48</td>
</tr>
<tr>
<td>Paragraph writing</td>
<td>Morphological Error</td>
<td>7</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Syntax Error</td>
<td>19</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Coherence</td>
<td>20</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Discourse markers</td>
<td>25</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Overall quantification of errors</td>
<td>42</td>
<td>47</td>
<td>84</td>
<td>94</td>
</tr>
</tbody>
</table>

- The hints developing exercise exhibited a high percentage of error quantification when compared to the rest of the test formats.
• Less exposure to the usage of comparative discourse marker with respect to the answers studied in the decryption exercise; sequential discourse markers with special reference to the encryption exercise; contrast discourse markers observed through the first question of paragraph writing exercise and descriptive discourse marker in connection with second question of paragraph writing exercise were identified.

• The percentage of error quantification of the test format–II, the conversion exercise was comparatively higher than the rest.

• The morphological error which was identified as a sub component of the discourse analysis rated the least (19 %) and the hints developing exercise rated the higher (72 %).