TECHNIQUES

6.1 Introduction

In the process of development of Normalisation technique that is intended to be a deliverable of this research study it is well worth the efforts to visit the techniques that are available and some of those that were recommended by some of the valued respondents. Following techniques are discussed in succeeding paragraphs:

(a) BITS Pilani Model
(b) Grading Universities by their Students' performance in Various Competitive Examinations.
(c) Conducting Common Competitive Examination
(d) Development of the Student Evaluation standard
In the beginning the above techniques along with their respective merits and de-merits are discussed and then the technique (Weighted Average) as an outcome of this research study is discussed. In the end why statistical tool of "weighted average" is better in the present context than other statistical tools is discussed.

Lastly, what would constitute a total solution and how would the proposed technique fit into such a total solution is discussed.

6.2 Assumptions and Hypothesis.

While working out the normalisation technique certain basic but realistic assumptions as discussed in Chapter 5 are considered. These are derived based upon the reviewed literature, responses by respondents in the questionnaires and direct interaction with the eminent personalities whose advice was found extremely useful. The hypothesis that emerged and discussed in Chapter 5 is also considered while working out the normalization technique.

As is evident from and the genesis of the problem and discussion in Chapter 1 the solution has to be such as to address the following three important aspects and suggest a normalisation technique that addresses these:
(a) Marks of students of same university and faculty passing out in different years.
(b) Marks of students of same university and same or different faculties in different / same year.
(c) Marks of students of different universities, year and faculties.

6.3 BITS Pilani Model:

In Birla Institute of Technology (BITS), Pilani, Rajasthan a technique of normalisation of marks of students coming from different Boards/universities for admission to BITS is followed. The same can be seen in their website [www.bits-pilani.ac.in](http://www.bits-pilani.ac.in) and is as under:

The candidate's position in the merit list is based only on his/ her aggregate marks after it has been normalised by a process known as normalisation. The terms 'aggregate' and 'normalisation' are described below:

6.3.1 Aggregate:

Aggregate is the total marks of all subjects considered by the Board/University for computing result. The candidate's position in the merit list will be based only on the aggregate after it has been normalised by a process known as normalisation described later in this part. For this purpose the aggregate contains the required subjects, namely,
Physics, Chemistry and Mathematics etc. to make the candidate eligible for admission.

6.3.2 Normalisation:

To bring all candidates from the different examining authorities/boards on the same scale of comparison and to create a merit list in linear order, the Institute has been practicing a system known as normalisation. It basically tries to find the relative displacement of a candidate from the candidate who stood first in the examination of the Board from which the candidate under review has passed. As such the first rank student of each board is considered to have obtained 100% marks and the aggregate marks of all other students from that board are normalised with reference to the aggregate marks obtained by the first rank student of that board.

The Actual Mechanism of Admission: The complete process of admissions is computerised. All candidates, whose applications duly completed are received before the due date, are included in the merit list according to descending order of normalised percentage of marks.

For example, if the aggregate marks of the first rank student from a board is 94%, his normalised aggregate is 100% and if another student from the same Board has obtained 88% marks, then his normalised percentage will be \((88 \times 100)/94 = 93.61\% \).
6.3.3 Merits of the Technique:

In the absence of any readily available technique of normalisation in vogue in India, the procedure adopted by BITS is definitely a welcome step. It definitely addresses the need. To have some system is better than not having any.

The system is a pointer to those institutions/ Boards/ Universities who do not follow any such normalisation technique but directly compare the marks scored by the students even though they come from different universities.

The system is found workable even where students of varying faculties have to be compared; for example, for admission in Law Course or Management studies.

6.3.4 Demerits of the Technique.

The above-mentioned technique presupposes that the merit list of universities/ Boards is linearly poised. If it were actually not linear then it would not be able to do full justice. For example, if there is a vast gap between the student standing first in the order of merit and the second in a
A study of grading systems in different universities for development of normalisation technique to streamline recruitment processes.

certain university then this technique of normalisation will do a lot of injustice with students other than the first coming from that university.

An accurate and authentic data in terms of score(s) of students standing first in the order of merit of all the boards and universities in each year will have to be maintained. This at deemed university or college level may be difficult because the same is not readily available as authentic data.

6.4 Grading Universities by their Students' performance in Various Competitive Examinations.

In India there are several competitive examinations conducted on an all India basis every year where students (Under graduates, Graduates and/or Post Graduates) appear to seek admissions for certain higher education or joining jobs. Some such examinations are as under:

(a) National (Or State) Eligibility Test for Lectureship.
(b) Nationalised Banks' Probationary Officers Entrance Examination
(c) Entrance examination for Civil Services conducted by UPSC.
(d) Forest Services Examination conducted by UPSC.
(e) Mass Recruitment Examination conducted by DRDO.
(f) Engineering Services examination conducted by UPSC.
(g) Common Admission Tests conducted by Indian Institutes of Management. And so on...
Cue could be taken from the results of such examinations to infer as to which universities are better in performance versus others. Ratio of the number of students qualifying to the number of students appearing from each university represented in such examinations could be considered and a certain index number be allocated based on this fraction. The index number then could be used to determine the inter-se merit of students of different universities.

6.4.1 Merits of The Technique

Such a technique could constitute a workable solution. It would definitely be a better way than simply comparing the marks scored by the students. This is because such examinations provide a level playing field and a common platform for all the students in India independent of the university they come from.

6.4.2 Demerits of the Technique

The data required from various agencies to work out the index number of any faculty and university for one year will be difficult to compile, for the concerned agencies may not share it.

If some universities' students do not appear in any such examination(s) then normalising marks of students of such universities would be difficult.
The merits tested in such examinations are in narrow field(s) as per the requirement of the agencies conducting the examinations and not broad based ones, as are the university examinations. Thus the index of merit that will be worked out may not be accurate one.

The types of students who undertake such examinations vary. All the eligible students in India do not appear in each of such examinations and thus indexing based on the outcome of such examinations would reflect the merits of those students who appeared but would remain silent on those who did not appear.

The outcome of such examinations also depends upon the preparation of students appearing. In urban areas there is a facility of special coaching classes and thus students hailing from urban areas would do better than those who hail from rural areas. The results will thus be skewed in favour of urban students.

The inter-se standing of the universities in such examinations will be quite vague. It will be extremely difficult to build accurate comparison. The credibility of such comparison may be doubted and it will be difficult to justify.
6.5 Conducting Common Competitive Examination

Every time a need is felt to do normalisation of marks of the students, carry out competitive examination by setting an apt question paper to suit the requirement. Based on the results of such examinations list the students in the order of merit for short-listing them to invite for interviews.

6.5.1 Merits of the Technique

This technique is definitely the best and no formal normalisation is required. In the very introduction of this thesis this has been clarified.

6.5.2 Demerits of the Technique

It is extremely cumbersome to conduct a written test since it requires large number of resources. Several times it may not even be economical to conduct written examination.

If there are such several competitive examinations in India then students will be busy for whole year or greater part of the year in appearing in such examinations. Students may find it difficult to keep pace with such a growing number of examinations. Moreover, such a solution is practically not viable every time.
6.6 Development of the Student Evaluation standard(s)

It is possible to design certain standards of evaluating students. If such standards are designed and brought in place and adopted in letter and spirit, then it is possible to develop an environment where normalisation is not at all required. In India such initiatives are yet to be taken.

In USA draft standards have been framed for evaluating the students. The standards are in four parts:

- Propriety Standards
- Utility Standards
- Feasibility Standards
- Accuracy Standards

These standards are in draft form and not implemented as yet. The details of standards are available on a number of websites. The standards have been discussed in "Review of Literature" and details of the standards are enclosed as appendix 'A'.

Until these standards become a reality and their effects are seen practically, this solution is elusive and seems to be just utopian. Even in USA where these have been drafted over a year ago the implementation is still awaited.
However, if such standards do find light of the day then it would mean that normalization of marks would not only be on an all India Basis but on a global basis. It would prove a large step forward towards making the world a global village.

6.7 Proposed Normalization Technique

6.7.1 Analysis of data by Weighted Average Method

While designing the system of normalization following points have been taken into account because the sample respondents so desired.

(a) If in a certain university liberal marking is noticed in one faculty it is not true that it is liberal in all other faculties.

(b) If in a certain university liberal marking is noticed in one year it is not true that it is equally so in all the years.

(c) The proposed technique compares marks faculty (discipline) wise.

(d) Operation of Normalisation to be carried out every year.

6.7.2 The procedure:

The procedure is sequential and to be performed as under:

1. Take the number of passed students in one university (Say 'A'), one faculty ('m') and one level of education (Say Graduation) at a time.
2. Add marks of all such passed students and take weighted average (A_average).

3. Do similar operation in all universities in that discipline.

4. Take weighted average of all the students in all the universities of that discipline put together at a time (U_average).

5. Assign index number ('r') specific to that discipline of the university equal to the division (average in step # 4 ) / (average in step # 2) . (U_average / A_average)

6. While normalizing marks of any student in that faculty of that university multiply his marks scored by this index number ('r').

7. The index number 'r' is for university 'A' for one year and faculty 'm' only. Such indices are to be worked out every year for all faculties and the level of programme (such as Graduation, Post Graduation etc.).

8. Repeat step # 1 through step # 6 for all faculties at the same level, same year in all universities (as applicable) and tabulate them.

Note: If in certain universities instead of awarding marks in absolute numbers alphabetical grading (Like A, A+, A- .. etc..) is awarded then
"A study of grading systems in different universities for development of normalisation technique to streamline recruitment processes".

Normalization Technique

Start

Select One University

Select One Course (Faculty) F

Calculate Average % Marks Scored By All the Students Passed = M

Tabulate:
Number of Students Passed and Average

Index Of This University For Faculty F = U_Av/M

Finished All Universities

No

Yes

Calculate Weighted Average Marks Scored By The Student at National Level U_Av

Finished All Faculties

No

Yes

Compile and Publish Results

Flow Chart 6.1
percentage marks associated with such alphabetical grading and notified by such universities be considered.

Even if the results of some of the universities are not declared, the process of carrying out normalisation could be followed if results of just over 50% universities are declared. The universities declaring their results after such normalisation is carried out can be processed with respect to the national weighted average so worked out.

The process has been explained through the means of flow chart 6.1. The following example helps explain the process:

6.7.3 Example. There are say A, B, C, D and E universities; the number of students who passed at the Graduation level are tabulated in Table 6.1.

It is assumed that the minimum percentage of marks of each student passing in each of the universities and in each of the disciplines is the same. It is also assumed that the number of students passed and average % marks scored by successful students in the faculties and universities are as indicated in Table 6.1
A study of grading systems in different universities for development of normalisation technique to streamline recruitment processes.

<table>
<thead>
<tr>
<th>University Courses</th>
<th>A (B.A. Hist, Geo, Pol. Sc.)</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.A. (Hist, Geo, Pol. Sc.)</td>
<td>118 (75%)</td>
<td>39 (80%)</td>
<td>49 (60%)</td>
<td>34 (70%)</td>
<td>101 (65%)</td>
<td>341</td>
</tr>
<tr>
<td>B.Com. 'k'</td>
<td>37 (65%)</td>
<td>55 (60%)</td>
<td>75 (45%)</td>
<td>113 (50%)</td>
<td>114 (55%)</td>
<td>394</td>
</tr>
<tr>
<td>B.Sc. (MPC) 'm'</td>
<td>31 (45%)</td>
<td>55 (50%)</td>
<td>60 (55%)</td>
<td>52 (60%)</td>
<td>111 (65%)</td>
<td>319</td>
</tr>
<tr>
<td>B.Sc. 'n' (Computers)</td>
<td>37 (65%)</td>
<td>60 (60%)</td>
<td>80 (55%)</td>
<td>92 (50%)</td>
<td>117 (45%)</td>
<td>386</td>
</tr>
<tr>
<td>B.E. 'p' (Mechanical)</td>
<td>21 (65%)</td>
<td>30 (60%)</td>
<td>62 (70%)</td>
<td>78 (75%)</td>
<td>85 (80%)</td>
<td>276</td>
</tr>
</tbody>
</table>

Table 6.1

The weighted average marks in B.A. examination for all students in all 5 universities together will be:

\[
= \frac{(118 \times 0.75 + 39 \times 0.8 + 49 \times 0.6 + 34 \times 0.7 + 101 \times 0.65)}{341} = 238.55/341 = 0.69956. \text{i.e.} 69.956\%.
\]

For B. A. (History, Political Science and Geography Group) Examination

- Index of A University = \( 69956/0.75 = 0.9327 \)
- Index of B University = \( 69956/0.8 = 0.8745 \)
A study of grading systems in different universities for development of normalisation technique to streamline recruitment processes.

- Index of C University = \( \frac{69956}{0.6} = 1.1659 \)
- Index of D University = \( \frac{69956}{0.7} = 0.9994 \)
- Index of E University = \( \frac{69956}{0.65} = 1.0762 \)

The weighted average marks in B. Com. examination for all the students in all 5 universities will be:

\[
\frac{(37 \times 0.65 + 55 \times 0.6 + 75 \times 0.45 + 113 \times 0.5 + 114 \times 0.55)}{394} = \frac{186.6}{394} = 0.4736 \text{ i.e. } 47.36\%
\]

For B. Com. Examination

- Index of A University = \( \frac{0.4736}{0.65} = 0.7286 \)
- Index of B University = \( \frac{0.4736}{0.6} = 0.7893 \)
- Index of C University = \( \frac{0.4736}{0.45} = 1.0524 \)
- Index of D University = \( \frac{0.4736}{0.5} = 0.9472 \)
- Index of E University = \( \frac{0.4736}{0.55} = 0.8611 \)

The weighted average marks in B. Sc. examination will be:

\[
\frac{(31 \times 0.45 + 55 \times 0.5 + 60 \times 0.55 + 52 \times 0.60 + 111 \times 0.65)}{319} = \frac{177.8}{319} = 0.5574 \text{ i.e. } 55.74\%.
\]

For B. Sc. Examination

- Index of A University = \( \frac{0.5574}{0.45} = 1.2386 \)
- Index of B University = \( \frac{0.5574}{0.5} = 1.1148 \)
A study of grading systems in different universities for development of normalisation technique to streamline recruitment processes.

- Index of C University = 0.5574/0.55 = 1.0134
- Index of D University = 0.5574/0.6 = 0.929
- Index of E University = 0.5574/0.65 = 0.8575

The weighted average of marks in B. Sc. (Computers) examination will be
\[(37 \times 0.65 + 60 \times 0.6 + 80 \times 0.55 + 92 \times 0.5 + 117 \times 0.45) / 386 = 202.7 / 386 = 0.5251 \text{ i.e. } 52.51\%\]

For B. Sc. (Computers) Examination
- Index of A University = 0.5251/0.65 = 0.8078
- Index of B University = 0.5251/0.6 = 0.8752
- Index of C University = 0.5251/0.55 = 0.9547
- Index of D University = 0.5251/0.5 = 1.0502
- Index of E University = 0.5251/0.45 = 1.1669

The weighted average of marks in B. E. (Mechanical) examination will be
\[(21 \times 0.65 + 30 \times 0.6 + 62 \times 0.7 + 78 \times 0.75 + 85 \times 0.8) / 276 = 201.55 / 276 = 0.7303 \text{ i.e. } 73.03\%\]

For B. E. (Mechanical) Examination
- Index of A University = 0.7303/0.65 = 1.1235
- Index of B University = 0.7303/0.6 = 1.2171
- Index of C University = 0.7303/0.7 = 1.0433
A study of grading systems in different universities for development of normalisation technique to streamline recruitment processes.

- Index of D University = 0.7303/0.75 = 0.9737
- Index of E University = 0.7303/0.8 = 0.9129

After tabulation the indices would look as in Table 6.2:

<table>
<thead>
<tr>
<th>University</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.A. (HGP)</td>
<td>0.9327</td>
<td>0.8745</td>
<td>1.1659</td>
<td>0.9994</td>
<td>1.0762</td>
</tr>
<tr>
<td>B.Com.</td>
<td>0.7286</td>
<td>0.7893</td>
<td>1.0524</td>
<td>0.9472</td>
<td>0.8611</td>
</tr>
<tr>
<td>B.Sc. (MPC)</td>
<td>1.2386</td>
<td>1.1148</td>
<td>1.0134</td>
<td>0.929</td>
<td>0.8575</td>
</tr>
<tr>
<td>B.Sc. (Computers)</td>
<td>0.8078</td>
<td>0.8752</td>
<td>0.9547</td>
<td>1.0502</td>
<td>1.1669</td>
</tr>
<tr>
<td>B.E. (Mechanical)</td>
<td>1.1235</td>
<td>1.2171</td>
<td>1.0433</td>
<td>0.9737</td>
<td>0.9129</td>
</tr>
</tbody>
</table>

Table 6.2

It is evident from the above table that universities where average scored marks are less than national average the index is higher than one and thus upon multiplication their marks will be increased.
Universities where average scored marks are more than national average the index is lower than one and thus upon multiplication their marks will be decreased.

The proportion of increase/ decrease will be such that the national average is kept at one.

6.7.4 Merits of The Method:

(a) The suggested method takes into account all students passing out of all universities and not selectively few. This would ensure correct normalisation and almost no error.

(b) Due to any reason if certain universities' results are delayed, the system and the procedure is robust enough to allow working out their indices later.

(c) Normalisation of even deemed university students' marks is feasible.

(d) It addresses all the three situations explained under “Genesis of the problem", as to why normalisation is required.

(e) The system is transparent and can be audited by any teaching staff, university staff, students, their parents or even courts. The various calculations performed to work out indices can be made public without any fear or favour.
(f) The result can also be used while validating and grading the universities by NAAC. For example the universities who are close to national index of one in maximum number of faculties could be adjudged as the best in evaluation standards.

(g) The process is implementable through a computer-based system or even manual.

(h) The process can stand the test of scrutiny and accuracy if desired at any time by anyone including the courts.

(i) The process is extremely useful, may be better, in an era where the interviews are possible over the Internet through email, Chitchat and video-conferencing etc.

(j) The process is useful even if some universities follow traditional grading and some others follow alphabetical grading.

(k) The system proposed will be of more and more use with constantly increasing number of students searching the jobs.

(l) The system will be able to find its use even if an era of more jobs and less applicants comes into being. Though such a situation is not likely.

(m) Qualities desired in evaluation norms as discussed in Chapter 3 under paragraph 3.15 are fully met.

(n) Since the technique uses all the students passing in one academic year and not the samples from universities the technique is free from errors associated with sampling.
6.7.5 De-Merits of The Method:

The only drawbacks of the proposed technique noticed/ feared are:

(a) If in a certain university some of the students have passed but going by their score after normalisation they deserve to fail then they cannot be failed. They will continue to be passed students.

(b) If in a certain university some of the students have failed but going by their score after normalisation they deserve to pass then they cannot be passed. They will continue as failed students.

(c) There is apprehension that the result after normalisation when applied to the students of different disciplines together may not paint a correct picture. This aspect is discussed in great details.

(d) The results of all the universities after normalization in each of the faculties will follow normal distribution. (This is because all students from all universities are taken into consideration while developing the normalization technique) However, if the faculty wise indices of all universities show a skewed pattern then the indices of universities will have to be further processed to fit them in normal distribution pattern. The skewness may be visible when the number of
universities found liberal in grading is greater than that of more stringent universities. Readymade statistical tools implementable through computer based systems are available for fitting the normalised (Which may be skewed) score to fit within normal distribution curve and thus this would not really form any de-merit of the technique.

6.7.5.1 Normalisation of marks of Interfaculty students:

Director Indian Institute of Psychometry, Kolkata had expressed the limitation in (c) above during an interaction of this researcher with him. In his opinion, the technique presented here would do quite a good job in so far as normalisation within the same discipline is concerned but may not do so when it comes to interdiscipline normalisation. He gave an example to explain simple thumb rule. If after normalisation a Graduate engineer, say, has 50 % marks to his credit and an Arts graduate has 60 % even then an Engineering Graduate may be higher in merit than Arts Graduate.

The following points merit consideration while judging the efficacy of using the proposed technique against above observation:

(a) The basic study is to develop normalisation technique that would help streamline the recruitment processes. Keeping this in mind it appears that the argument of Director, IIP may not have serious repercussions because for all India
normalisation technique to streamline recruitment processes.

recruitment it would not be wise to keep the system of selection skewed in favour of engineers.

(b) It is most likely that an engineer graduate had scored more marks while he was in his Higher Secondary School Examination than the Arts Graduate and thus managed to get admission in engineering course, but it is not true that he could keep himself up all the time. Had he kept himself up, he would also have scored more marks in his graduation.

(c) Notwithstanding the above arguments, it is felt that the proposed normalisation technique is not final and ultimate. There can always be improvements to the proposed technique. Better tools or a better process can be developed and together the drawbacks could be removed.

(d) It would be worth an effort if an all time indexing model for interfaculty normalization were developed to equate the faculties. Presence of such an index would make the technique developed in this study free of any lacunae. Developing such an all time indexes would be another single exercise in itself and not under the scope of the present study.
6.8 Procedure for Implementation:

The technique presented above only lists the procedure of normalising the marks. How it could be implemented is suggested below:

Since authentic data from all universities across India are required, it is essential that such a task be performed by an entity, which has statutory power and existence. As it stands today, this task could very much be assigned to UGC.

Since a very large number of students pass out every year and past data may also be required for reference or use, this data should be stored in ready for use state.

This entails that a \textit{web-based data warehousing solution} will have to be implemented with its server located at UGC and clients at the Headquarters of all universities. The data will flow from the university online to the server at UGC for processing. The same will be available for checking indices on the UGC web within about a few hours thereafter.

Subsequently, the processed data in tabulated form could be printed and made available to public for their offline use.
6.8.1 Total Solution

The aim of the present research study is to find a workable and practicable technique of normalising marks of students in different universities and accordingly, detailed discussion is limited to such a technique. However, it would be quite in order to discuss here what could constitute a total solution, its feasibility, how it could be attained and what changes will have to be made in the existing system of evaluation. Briefly such a system is being discussed in succeeding paragraphs.

Ideally, when a student qualifies in any academic examination he should be handed over a mark list such that his % marks indicate his evaluation on an all India basis leaving no more requirement of normalising his marks. If such a system is made established at the national level, it would facilitate the following processes.

(a) Admissions to academic institutions to undertake higher studies practically in any discipline.

(b) Recruitment on all India basis.

(c) Recruitment on any State level basis.

(d) Sponsoring candidates for certain National or International commitments.

(e) Besides, many of the existing competitive examinations will be rendered redundant.
Not only will it save a lot of time, money and resources of people and the Government but also save the students from studying several times differently to get to their intended destination. This will also allow reducing the staff strength heavily in offices such as Union Public Service Commission, State Public service Commissions etc.

The total solution should be capable of demonstrating as if all the students in India in each single discipline in any one year would have faced:

(a) Follow same syllabus throughout India in all the universities,
(b) All the instructors should be uniform in the art of teaching and thus render similar opportunity of learning to all the students.
(c) All the students are subjected to examination on the same day and face the same question paper.
(d) The process of evaluation of the answer papers is similar.
(e) All other administrative arrangements across India are similar.

Such a total solution will provide equal opportunity for all students in their respective pursuits, they are eligible for. At present not all, but some are aware of the opportunities before them. In India such a solution will come extremely handy to effect national integration. The suggested solution is capable of doing justice to all students irrespective of their geographical location and social background.
6.8.2 How Would The Marks List Look Like:

If such a total solution were implemented, how would the marks lists differ from the existing ones? It is felt that there would not be any change except that the marks list would clearly state that the marks are normalised on an all India Basis. Alternatively, the marks list would be the way it is at present and will have a number (fraction) printed on it as the index of that university for that year and discipline. Multiplying the marks scored by the student with this index would show his marks normalised on an all India Basis. Such a number (index) will differ every year, for each discipline and each course.

6.8.3 Is It Possible?

It is absolutely possible and possible in near foreseeable future and practically implementable.

6.8.4 How and Why?

It is possible because there are Intranets and Internets and they are working and operating in India. This would make possible error free, secure and safe transaction of voluminous data. It is possible because various time tested statistical and analytical tools are available to process the data.
Going by the discussion on Total Solution above and the recommended technique of normalization as an outcome of this research along with the procedure of implementing the same it clearly indicates that the proposed technique is a strong candidate to constitute a total solution. This is how the proposed system as a total solution can be implemented.

6.9 Other Statistical Tools Explored:

The proposed technique of normalisation is based on weighted average. Some of the learned respondents had also suggested exploring some other methods of data analysis. In succeeding paragraphs the same is explained at length.

6.9.1 Use Marks of sampled passed students:

Instead of using the data of all students passed from all universities some experts had indicated that sampled passed students’ marks only could be considered.

Explanation for not following this technique: With the fast computing powers being readily available along with the best of data warehousing tools it would not make much difference in cost of processing marks of all the students as against that of processing sampled data. The result of processing data in respect of all students would definitely be better and more credible than the results after processing sampled data.
6.9.2 Linear Programming

Some of the respondents suggested that instead of working on weighted average of marks of the passed students linear programming could be used to develop a technique of normalisation.

Explanation for not following this technique: The list of factors that are responsible for affecting the difference in the grading systems in Universities may not be complete and final. It is likely that there may be some more factors, which may matter favourably or adversely. If there were more factors then any model developed by Linear Programming would be error prone. Secondly and more importantly, even if it is presumed that the list of factors is final and complete even then since one does not know the co-relation coefficients of each of these factors the Linear Programming for processing multivariate data is not applicable.

6.9.3 Use of Data Envelopment Analysis (DEA)

Data Envelopment Analysis method on sampled data could be used to relate various universities and determine their efficiencies. DEA technique was developed at Warwick University. This technique is useful for estimating efficiency of service providing institutions such as banks, education institutions, airlines etc. Brief on DEA is enclosed as appendix P.
Explanation for not following this technique: DEA uses linear programming only and reasons of not using linear programming are applicable to this technique also. Moreover, the DEA could have been useful if the objective was to identify the most efficient University having specific qualities or features. DEA is thus not applicable in the present case.

6.9.4 Factor Analysis

Instead of normalising marks by weighted average method a few respondents had suggested to use Factor Analysis to do normalisation. Brief on Factor Analysis is enclosed as appendix ‘Q’.

Explanation for not following this technique: For Factor Analysis actually what is needed is only the correlation or covariance matrix not the actual scores. The purpose of factor analysis is to discover simple patterns in the pattern of relationships among the variables. In particular, it seeks to discover if the observed variables can be explained largely or entirely in terms of a much smaller number of variables called factors. Factor analysis is typically applied to a correlation matrix. Since there exist no indices of co-relation coefficients of several factors this method is not applicable.
"A study of grading systems in different universities for development of normalisation technique to streamline recruitment processes".

6.9.5 Conjoint Analysis

Instead of normalising marks by weighted average method some of the respondents suggested that conjoint analysis might be used to do the same. Brief on Conjoint Analysis is enclosed as appendix 'R'.

Explanation for not following this technique: Conjoint analysis is one of the terms used to describe a broad range of techniques for estimating the value people place on the attributes or features that define a product and service. Discrete Choice, Choice Modelling, Hierarchical Choice, Card Sorts, Tradeoffs Matrices, Preference Based Conjoint and Pair wise Comparisons are some of the names used for various forms of conjoint analysis.

The goal of any conjoint survey is to assign specific values to the range of options buyers consider when making a purchase decision. Armed with this knowledge, marketers can focus on the most important features of products or services and design messages most likely to strike a cord with target buyers.

It may be seen from the above that the conjoint analysis could have been useful if the objective was to identify the best qualities or features of any University that are most popular so that these could be introduced in such a university to make it most popular or likable. Conjoint analysis is not applicable in the case of the problem on hand.
It has been explained above that the most suitable technique to address the subject of this research study is weighted average method to be applied on the marks scored by the students. The marks of all the students affected in any one examination are taken into consideration to avoid occurrence of any type of sampling error. By doing so the resultant normalisation is going to be almost error free and error, if any, would get evened out since large number of students' marks will be processed.