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National Assessment Framework for Grade 12

Government of Nepal

National Examinations Board
Sanothimi, Bhaktapur

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Users/Readers are requested to review this draft National Assessment Framework and provide their valuable comments and suggestions.

National Examinations Board

ACRONYMS

ACER	Australian Counsel of Educational Research
ADB	Asian Development Bank
AF	Assessment Framework
AGDoEEWR	Australian Government Department of Education, Employment and Workplace Relations.
ASLO	Assessment of Student Learning Outcomes
ATAU	Assessment, Testing and Accreditation Unit
BLEE	Basic Level Education Examination
BOP	Balance of Payments
BS	Bikram Sambat
CBSE	Central Board of Secondary Education
CDC	Curriculum Development Centre
CEHRD	Centre for Education and Human Resource Development
CRIs	Constructed Response Items
ERO	Education Review Office
GCE-A Level	General Certificate of Education Advance Level
GCE-N (A) Level	General Certificate of Education Normal (Academic) Level
GCE-N Level	General Certificate of Education Normal Level
GCE-N(T) Level	General Certificate of Education Normal (Technical) Level
GCE-O Level	General Certificate of Education Ordinary Level
GoI, UMoHRD	Government of India, Union Ministry of Human Resource Development
GoN	Government of Nepal
HAs	Higher Abilities
HSC	Higher Secondary Certificate
HSEB	Higher Secondary Education Board
IGCSE	Internal General Certificate of Secondary Education
IRT	Item Response Theory
LAQ	Long Answer Questions

LO	Learning Outcome
LPP	Linear Programming Problems
MCQ	Multiple Choice Question
MoE	Ministry of Education
MoEST	Ministry of Education, Science and Technology
MS	Marking Scheme
NASA	National Assessment of Students' Assessment
NCF	National Curriculum Framework
NEB	National Examination Board
NLC	Nepal Law Commission
NQF	National Qualification Framework
OCE	Office of the Controller of Examination
OECD	Organisation for Economic Co-operation and Development
PCL	Proficiency Certificate Level
PISA	Programme for International Student Assessment
PSLE	Primary School Leaving Examination
SAARC	South Asian Association for Regional Co-operation
SAQ	Short Answer Question
SDEA	Specialist Diploma in Education Assessment
SDGs	Sustainable Development Goals
SEAB	Singapore Examinations and Assessment Board
SEE	Secondary Education Examination
SESP	School Education Sector Plan
SG	Specification Grid
SLC	School Leaving Certificate
SLCE	School Leaving Certificate Examination
SRI	Selected Response Item
SSCE	Senior Secondary Certificate of Education
SSDP	School Sector Development Plan
UN	United Nations
VSAQ	Very Short Answer Question

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Chapter I : Introduction

1.1 Brief History of National Examination Board

The establishment of Office of the Controller of Examination (OCE) in 1934 under the Ministry of Education (MoE) marks the institutionalization of high-stake examination system in Nepal. Equipping with the responsibilities for planning, managing and conducting final examination of Grade 10, the then Government of Nepal (GoN) authorized Office of the Controller of Examination (OCE) as the only governing body of national examination to provide the School Leaving Certificates (SLC) to the SLC graduates. The OCE conducted the final examination of Grade 10 as an SLC examination until 2015¹ when the new constitution of Nepal got promulgated.

The education reform in 1989 extended school education from grade 10 to 12 two years being added i.e., grade 11 and 12 named as “higher secondary schools” (NLC, 1989). The government formed a Higher Secondary Education Board (HSEB) under the Higher Secondary Education Act in order to formulate the policies and to oversee the higher secondary schools. Controller’s Office/Section was created within the HSEB to plan and conduct the final examination of grade 11 and 12. This office conducted the examination of higher secondary grades from 1989 to 2015. As such, two separate examination institutions existed in the country to conduct high stake examinations of school education, i.e. OCE for SLC examination at grade 10; and Controller’s Office under HSEB for grade 11 and 12. But these two examination institutions for school education were merged into one with the implementation of 8th amendment of the Education Act-1971. This amendment dissolved both HSEB and OCE, and established National Examination Board (NEB). The Board was authorized for carrying out the functions of OCE and HSEB related to the school examinations. Specifically, NEB has been given the following two major legal mandates regarding examinations:

- To devise or cause to devise the policy of the board based on the examination policy approved by the MoEST.
- To evaluate or cause to evaluate whether or not the fairness and quality of Secondary Education Examinations are maintained.

Since the establishment of NEB, it has been administering grade 11 and 12 final examinations. However, the responsibility of conducting grade 11 examinations was shifted from the Board to the concerned school since 2022. According to the 8th amendment of Education Act, the

¹<https://nepal.gov.np:8443/NationalPortal/view-page?id=109>

examination of Grade 8 has been delegated to local governments. Besides its routine activities, NEB has been conducting various programmes such as capacity development programme for key actors of examination system by conducting research works, material development etc. in the pursuit of improving examination system.

Regarding the marking system of the standard of proficiency or correct answers of students in the exam, numeric system was used from the very beginning (after establishment of OCE in 1934) to 2017. Since 2018 NEB introduced grading system in grade 12 to communicate the students' performance level in the final examination. The grading system had a nine-point scale, in which students are awarded grades from A to E. This nine-point grading system was replaced with an eight-point grading system in 2022 which is given in Appendix 1 (<https://www.nepaliupdates.com/neb-grading-system/>)

1.2 The Context of Assessment Framework

The technological development in the 21st century has put a pressure, virtually to every country, to review the present education system. As a result, there is a growing trend in the globe that they require expanding evaluation and assessment activities to cope with the situation. It is believed that this change can be brought by improving the public examination system. Organization for Economic Co-operation and Development (OECD) has reviewed evaluation and assessment in education in more than 25 countries (Australia, Belgium, New Zealand, Norway, Sweden, the United Kingdom, etc.), and, has published country review reports since 2010. It reported that the countries faced under mentioned common challenges in the evaluation and assessment framework (OECD 2013):

- Building a coherent and integrated evaluation and assessment framework
- Ensuring articulations within the evaluation and assessment framework
- Securing links with classroom practice
- Finding a desirable measure of national consistency as against local diversity
- Developing competencies for evaluation and assessment and for using feedback
- Overcoming the challenges of implementation

It is recommended that evaluation and assessment frameworks be developed embracing a holistic approach. OECD (2013) suggested formulating main policy directions for the development of holistic evaluation and assessment framework. The key policy directions are to:

- integrate the evaluation and assessment framework
- align the evaluation and assessment framework with educational goals and student learning outcomes
- secure links to the classroom and draw on teacher professionalism

- promote national consistency while giving room for local diversity
- establish articulations between components of the evaluation and assessment framework
- place the students at the centre of the evaluation and assessment framework
- sustain efforts to improve capacity for evaluation and assessment
- engage stakeholders and practitioners in the design and implementation of evaluation and assessment policies.

In fact, the research studies mentioned in the succeeding paragraphs clearly pinpoints the real picture of the examination system that Nepal has also been facing the problems mentioned above in public examination. In addition, though NEB has been made sole and apex body to improve exam system of school education as per policy document, some of the policy-directed activities aiming to improve examination system are still to be carried out yet.

Asian Development Bank (ADB, 2017) reviewed the Assessment of Student Learning Outcomes (ASLO) in three South Asian countries; Bangladesh, Nepal and Sri Lanka, and pointed out that the countries needed well-defined assessment framework (AF) to improve their assessment system. The review suggested developing an AF that enables all key actors in the education system to envision assessment as a vehicle to improve learning achievement by having improved assessment modalities, continuous professional development programme, and creation of learning communities engaged in improving assessment practices.

Prior to this study, a similar type of study on “Student performance in SLC” presently known as Secondary Education Examination (SEE) in Nepal was conducted in 2006 (Mathema, 2006). Some of the findings and recommendations related to test paper, answer sheet marking and capacity development of the key actors of examination system are presented below.

Findings

- National expertise on testing, assessment, and examinations are found limited.
- Test developers, moderators, and examiners have inadequate knowledge and skills in exam-related activities.
- The test items are designed to test the acquisition of lower-order abilities.
- Marking schemes are not completely error free.
- A number of gaps and inconsistencies were observed in marking of answer books.

Recommendations

- Specification grid needs to be balanced in terms of content coverage, and testing of higher level objectives.

- Appropriate training should be provided to the paper setters, markers, moderators, and other persons involved in the examination process.
- National expertise in testing, assessment, and examinations should be developed through training and workshops.
- A question bank should be established in order to facilitate retrieval of standard test items in the time of need. These test items should be pretested and validated.
- The OCE should adopt a system of double marking where each answer book is examined by two examiners.
- The sample of marked answer scripts should be rechecked by the head examiner before actual marking commences. (Mathema, 2006)

The above-mentioned findings and recommendations were corroborated by the study conducted by Counsel and Counsel (2022). Moreover, this study also suggested that sets of model questions with marking scheme as per the specification grid (SG) should be prepared and made available to the schools and students. Similarly, School Education Sector Plan (SESP) has also developed the strategy to improve evaluation system of school education (GoN, MoEST, 2022). More specifically, the following four major strategies have been mentioned in SESP document for the improvement of evaluation system of school education.

- Formative assessment should be effective, and it should be a means of improving learning by providing feedback to teachers and students
- Public exam i.e. final examination of grade 8, 10 and 12 should be made systematic, valid and reliable
- Teachers need to be trained in exam activities including result analysis and its result should be used to improve learning.
- Important actions are needed to improve the assessment tools and procedure to maintain the uniformity

Examination measures students' learning, and provides feedback for revision and/or formulation of new policy in education sector, provided such test is valid and reliable. In order to make the examination valid and reliable, AF is a pre-requisite as it consists of comprehensive guidelines for examination activities ranging from planning of test to result analysis; and contents to be tested.

Considering the suggestions made in ADB Review Report (2017), by the study on student performance of SLC conducted by Mathema in 2006; and also keeping the importance of AF to improve the examination system in Nepal, NEB has been making efforts to develop a comprehensive national AF for school education for the last few years. Accordingly, Framework for Grade 8 standardized tests ~~examination~~ was developed based on the new curriculum, and has

been implemented to conduct Grade 8 examinations in a consistent manner in the country and ultimately to standardize the examination (NEB, 2022). Similarly, draft standardized tests in English Language, Mathematics and Science of grade 10 were also developed based on the general assessment guidelines. Development of comprehensive AF for the public examination in Nepal, indeed, is a new effort in evaluation sector. Similar AF was developed in 2017 by Education Review Office (ERO) to conduct the periodic national assessment of grade 8 students in Mathematics, Nepali and Science (GoN, MoE, 2017).

As in grade 8, development of AF for grade 12 is pertinent to improve the examination system of this grade. Moreover, necessity of development of the AF is realized as grade 12 Board examination is a high-stake examination which represents the completion of school education. It is high time to develop AF for grade 12 at present as the new curriculum has been implemented in this grade from the academic year 2022 (CDC, 2076 B.S.). The curriculum of Grade 12 consists of three compulsory subjects, Nepali, English and Social Studies and Life Skills or Mathematics, and 82 elective courses in general secondary education.

1.3 Importance of Grade 12 Examination in Nepalese Context

The final examination of Grade 12 is considered significant for various reasons. Some of the reasons are briefly presented below.

Transition from School Education

Grade 12 annual examination is a regular process of examination system with a great significance for students, as it represents the completion of school education and the transition to professional life or higher education. It is a time when students are expected to make independent decisions and assume responsibilities for their lives as they depart from the school system. The emphasis on creativity in grade 12 prepares students for the demands of the 21st century, fostering innovation and problem solving skills. Additionally, grade 12 examination provides opportunities for self-reflection, exploration of interests, and the development of essential life skills necessary for future success. Hence, this examination should be reliable, valid and fair.

Prospect of Higher Education and Employment

Grade 12 examination is one of the high-stake examinations in the country due to the significance of its results. Results of the Grade 12 examination determine eligibility for higher education attainment of a scholarship for higher studies and securement of a job. These examinations foster confidence, competition, and self-analysis among students, while also providing a platform for achievements and enhancing the learning process. Moreover, examinations serve as an effective means of evaluating students' abilities and understanding, offering valuable insights for teaching and learning.

Common Yardstick

Result of the students in Grade 12 examination at national level is the common yardstick of an understanding of the skills acquired by the students during school education whether the learning objectives are being met or not, for parents, employers and colleges.

Reliable Feedback for Policy Formulation

High-stakes testing in schools is based on the premise that student learning will increase if educators and students are accountable for achievement. Hence, the policy makers use the result of this examination while developing the education policy at the national level.

1.4 Need for a Robust Assessment Framework in Nepal

There are several reasons for developing an AF especially for high-stake examinations. The AF outlines various components of the examination system and articulates characteristics and principles governing the examination design and practices. It provides a set of parameters for test development which includes defining the scope of the content of the test or question paper for a domain and prescribing the curriculum balance and the range and type of test items that shall be used.

The purpose of the AF is to:

- describe the why, what and how of G-12 question papers;
- guide the design and development of various tests or question papers;
- build a shared understanding of examination among various stakeholders; and
- communicate the purpose and key features of the examination to a larger audience.

The AF together with the curriculum enables stakeholders to understand the content basis of examinations across the subject areas and competencies to be tested; purposes, principles, and procedures that guide assessment development; and assessment specification in terms of distribution of the content in the question paper or any other assessment task.

The framework serves a number of purposes for the individuals and organizations working on the national examination as well as for the broader public interested in understanding assessment. The AF is developed to support the stakeholders of examination system to improve Grade 12 examination addressing the points listed below. These points are very important for Grade 12 examination for it being a high-stake examination

Reliability – Reliability – A reliable assessment ensures that repeated or equivalent assessments will produce consistent results. Reliability reveals how trustworthy a score on that test will be. Valid conclusions cannot be drawn from a test score unless it is reliable. Hence, in order to make the assessment result of public exam of grade 12 trustworthy, attention should be paid on reliability. Reliability is concerned with the test result which is, by and large, depends on the

answer keys, marking scheme and scoring the answer sheets of the students. All these rudiments required for making test result reliable are specifically mentioned in the AF. Therefore, development of AF is a must for the public examination.

Validity– Validity is one of the most important aspects of assessment as it evaluates how well a test covers all relevant parts of the ~~context~~ content it aims to measure. It also examines suitability of the content of the test for its aims. The test needs to measure the concrete outcome it is designed to measure. Similarly, it should measure the concept that it is intended to measure. The tests are the assessment tools that are used to determine how much ~~the~~ learning occurred among the learners at the end of the course. For this purpose, any test designed for the ~~of~~ public exam must possess adequate validity. AF will ensure the validity in the test as it pinpoints the domain, learning outcomes, content and sub-contents areas to be measured. Additionally, the elaborated specification grid given in the AF will guide to develop the test items with necessary validity.

Consistency – The AF helps achieve and maintain uniformity in an assessment across test forms and across subjects.

Quality assurance –The AF provides adequate guidance to the test developers in writing good test items with technical qualities including appropriate difficulty level and discrimination index; and cognitive level according to the given specifications. It, therefore, ensures quality test not only by targeting the appropriate group but also by covering suitable content areas in the right proportions.

Objectivity- The test should be away from any personal or subjective judgment. However, in an essay-type test, students answer differently as each one has his/her own style of writing. When more than one examiner checks the answer sheet, they may give different scores according to whether they like the style or not causing the test to be less objective. To avoid subjectivity, sharp rules should be set in evaluating constructed response types of subjective tests. It calls for a unified and calibrated guideline for teachers to use while evaluating such tests. With an aim to bring uniformity in marking, the AF provides assessors with subject specific holistic mark scheme with descriptors. This certainly removes biasness and ensures objectivity as much as possible.

Relevance: Preparation of AF is obviously a mandatory task to make a test relevant to the subject matter being tested and is appropriate for the intended audience. The AF adequately not only defines cognitive as well as subject domains, content areas and sub-contents to be tested but it also facilitates to identify whether or not subject-specific competencies, learning outcomes are aligned with instructional objectives. The AF also supports item writers to check whether or not each item constructed aligns with the specified cognitive level mentioned in the AF. Additionally, relevancy of the test items can also be checked against the difficulty and discrimination value of the test items given in the AF

Transparency – The details stated in the AF provide a clear picture of the features and purposes of the testing program to a wide audience.

Acceptability – The AF also plays a key role in ensuring acceptance from a wide range of stakeholders to ensure that any information gathered by the assessment and the recommendations are actually utilized.

Comparability – The AF also documents an assessment plan to ensure consistency from one assessment cycle to the next. As a result, the effect of any change in the program in the future cycles can be compared, recorded, and evaluated.

This AF is developed to support the stakeholders of examination system to improve Grade 12 examination addressing the points listed above.

1.5 Objectives of the Assessment Framework

The major objectives of the AF are presented below.

Standardization of the Examination

One of the main objectives of the examination reform is to standardize the test. The demand for standardization of Grade 12 examination has been identified after observing fluctuations in the student test scores over the years. The pass percentage of Grade 12 in the country ranged from 32 to 56 percent from 2003 to 2017² (Aryal, 2022). Though the reason behind this fluctuation in the pass percentage still remains obscure, it draws the assumption that one of the plausible reasons of this fact could be the test/s that were most likely to be difficult for the Grade 12 students in some years while they were comparatively easy for the students in other years. So, there is a need to standardize item development process as it assists to make all sets of test paper more or less similar and parallel in terms of difficulty level and discrimination index, and ensure comparability of the scores of students passing board examination in different years. It implies that students with 60 percent marks in Year 1 are most likely to possess the same amount of knowledge, skills and attitude as compared to students scoring 60 percent in Year 2. For this purpose, AF is a starting point to standardize Grade 12 examination.

Inclusion of Higher Ability Items in the Examination

The international education community is moving towards preparing a new generation of learners for the era of technology where creativity and practical application of principles are more critical than memorizing and remembering. More and more countries are moving from curriculum-based to competency-based assessments, and focusing more on developing tests which assess higher abilities. Higher abilities (HAs) include analyzing, evaluating, synthesizing, critical thinking, problem solving and creating. These are the cognitive skills categorized as

² The provision of pass and fail was until 2017.

upper cognitive processes in the revised Bloom's Taxonomy by Anderson and Krathwohl. The figure below shows the cognitive process dimension defined in the revised Bloom's Taxonomy.

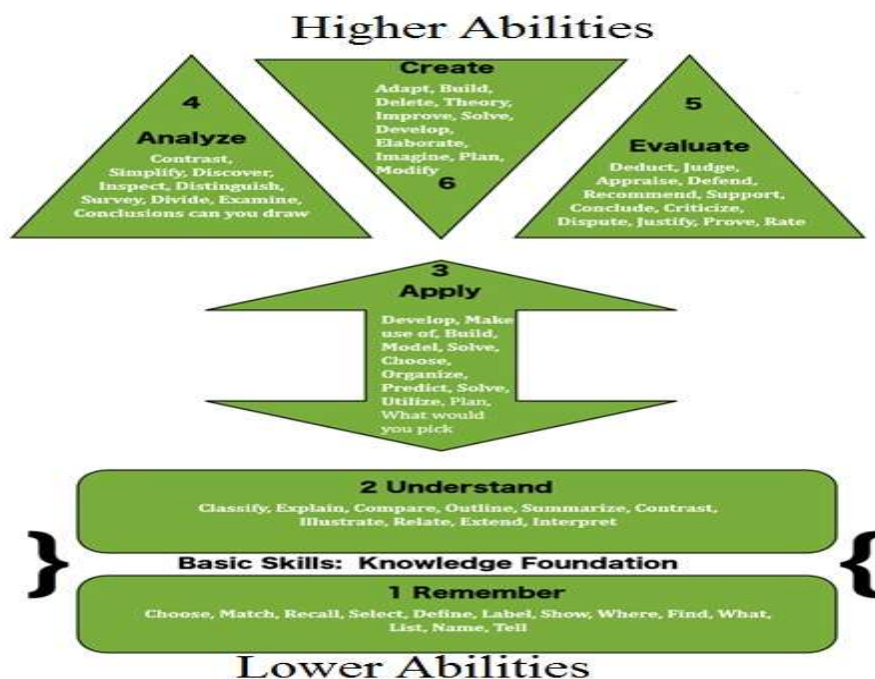


Figure 1.1 : The Revised Bloom's Taxonomy³

There are six major categories in the cognitive process dimension defined in the revised taxonomy, including Remember, Understand, Apply, Analyze, Evaluate and Create. The complexity of cognitive process increases as the skills move up in the hierarchy. The processes are briefly summarized below (Krathwohl, 2002):

Remember – It is a skill which retrieves relevant knowledge from long-term memory and includes recognizing and recalling.

Understand – It is a process which determines the meaning of instructional messages, including oral, written and graphic communication and includes interpreting, exemplifying, classifying, summarizing, inferring, comparing and explaining.

Apply – It is a skill which carries a previously gained skills or a procedure in a given situation and includes executing and implementing that knowledge in real life situations.

Analyze – It is a skill which breaks material into its constituent parts and detects how the parts relate to one another and to an overall structure or purpose. It includes differentiating, organizing and attributing.

³https://commons.wikimedia.org/wiki/File:Bloom27s_Taxonomy_for_Course_Design_and_Teaching.pdf

Evaluate – It is a skill which helps make judgments based on criteria and standards and includes checking and critiquing.

Create – It is a skill which puts elements together to form a novel, coherent whole or make an original product and it includes generating, planning and producing.

Traditional way of teaching and learning has focused on the lower cognitive skills, including intensely memorizing and recalling of textbook contents. In order to change the way teachers teach in the classrooms, it is imperative to bring a transformation in the way that the students are assessed. CDC prepared specification grids (SGs) of all test subjects for Grade 12 examination, which include about 50% weightage of HA items assessing ability to analyse, evaluate and create. NEB, has elaborated the SGs of 30 subjects of Grade 12 to make them clearer and self-explanatory. However, NEB has not changed the weightage allocated for each level of cognitive skills (memorizing, understanding, application and HAs) given in the SGs, as such task is under the jurisdiction of CDC.

Providing Comprehensive Guidelines for Test Development

The AF aims to provide comprehensive guidelines for the systematic development of test items for Grade 12 examination. It is highly recommended to develop test items of the examination following the SG laid out in curriculum and the elaborated SG in this AF. The AF includes a definition of the subject domains. It explains which aspects of the domain are included in the examination. The framework also outlines how the examination is conducted, by setting out the proportion of items for each aspect of the learning domain. It describes the response formats that are used, and the length and number of items in the examination. It also outlines the development of marking schemes for fair and consistent marks to be given to student answers.

Once a pool of items is available and field-trialed, information on item difficulty, item discrimination, differential item functioning and other essential parameters should be provided for the item selection and test building. The key aspects of item development are described in detail in Part 2 of this AF. This AF aims to provide comprehensive guidelines for the systematic test development of Grade 12 examination. This will help all stakeholders including test developers, to understand what the examination is about and what the examination results mean.

The framework consists of two parts. Part I discusses general principles of development of Grade 12 examination, which can be applied to all the subjects. Part 2 focuses on specific requirements of the selected subject tests, English (compulsory), mathematics (compulsory), physics (optional), and economics (optional). Due to the huge number of optional subjects that is 82 courses in general secondary school, it is not practical to develop individual chapters on all the optional subjects.

Reliability of Scores

One of the foremost requirements of effective examination system is to obtain the reliable score obtained by the students. In order to make the scores reliable gained by students in any

subjective test item, it is obviously a challenging task, as the students are free to give the answers of such test item in their own way and are different from each other. When multiple examiners mark the answer sheet of a student, there will be variation in the scores provided by the examiners even the answer sheets is the same. More the variation in the scores obtained by a student, less the score is reliable. Such variation in the scores obtained by a student is the cause of inconsistency in scoring the answer sheet. In order to make the scoring consistent, answer keys and marking scheme are required to guide the examiners to score each answer book in a consistent way. This is the reason that the AF includes how answer key and marking scheme of test item are developed. Hence, one of the major objectives of AF is to make the score reliable by examining the answer sheet in a consistent manner based on the prepared answer key and marking scheme with appropriate break down of mark and its descriptors.

1.6 Key Features of the Assessment Framework

The AF is a descriptive document that briefly outlines an assessment, Grade 12 examination in this case, and explicitly states its characteristics and principles upon which the assessment is built. The framework presents comprehensive guidelines of assessment and the contents to be tested. The key features of Grade 12 assessment framework include:

Definitions of the domains and sub-domains: It is important for the framework to be explicit about the area of learning that is being assessed. Subject specific chapter of the AF describes what the test domain means by defining it and its sub-domains.

A clear linkage between the designed and implemented curriculum: What is to be tested at the end of Grade 12 in the form of summative examination has been covered in the AF. Once the test domain is defined, the AF identifies what is to be assessed in the form of Grade 12 internal and external examination.

The distribution of sub-domains: The AF presents weightage of each sub-domain in proportion and/or the number of items and marks.

Learning outcomes: The AF shows the learning outcomes of the particular grade, to be assessed. Tests items are developed to check whether the learning outcomes are achieved or not. So, the test items are developed based on learning outcomes.

The distribution of cognitive skills or processes: The framework defines weightage of each cognitive skill or process in proportion and/or the number of items and marks.

The type of item formats: The AF lists the types of item format; multiple choice question, very short answer question, short answer question and long answer question, used in each subject test. In addition, it presents examples of each type of question in the context of the test domain.

The distribution of item formats: The AF presents weightage of each item format in proportion and/or the number of items and marks.

Types of assessment: Considering the importance of internal assessment and external assessment in their own area, the framework also provides the guidelines for both types of assessments. Therefore, the framework may be helpful in supporting teachers in classroom too.

The principles of marking scheme and scoring rubric for each domain: The framework lays out the principles for developing marking guides or rubrics of constructed response items in each test subject. This includes presenting examples of marking guide or rubric in the context of the test domain. The information contained in the framework is entirely based on the curriculum and elaborated SGs.

1.7 Process of Development of Assessment Framework

Realizing the necessity of guidelines for carrying out each activity under each phase of assessment of grade 12, ranging from planning of assessment to the post-assessment activities, draft of National AF of grade 12 was prepared with the technical supports from the senior researcher of Australian Council of Educational Research (ACER) and national consultant of ADB (Examination specialist). This draft National AF was finalized by NEB and the team following the steps given below.

Formation of Subject Teams

The draft national AF consists of two parts: generic and subject-specific portions. The first part is related to evaluation principles whereas second part consists of the AF for English, Mathematics, Physics and Economics subject. In order to review and finalize this draft, a committee in each subject was formed considering the necessity of subject teachers and experts in this task. In addition, each subject committee also consists of an evaluation expert. Besides these committees, an education subject team was also formed to review the generic part of the AF. Each of these committees consists of 6 to 8 members: one subject expert from CDC, one evaluation expert, 3 to 5 subject teachers and one technical official from NEB who is due to coordinate the respective committee. (See Appendix 2)

Organizing Workshops

NEB planned to organize three workshops at different level to review and finalize the draft AF. Prior to organizing each workshop, the draft AF was distributed to each participant and hence, the participants would get enough time to go through and make comments on it. The following texts present a brief description of each workshop.

First workshop: The first workshop was small in terms of number of participants, i.e. 2 subject experts from each subject (English, Mathematics, Physics and Economics) and 4 from education group and hence, making a total of 12 participants. In the beginning of workshop, purpose of the workshop and expected outcomes are made clear by the national consultant. The draft AF was presented briefly by the consultant and followed by a short discussion on the draft. Then workshop participants were grouped into their own subject, i.e. Education group, English group,

Mathematics group, Physics group and Economics group. Each of these groups went through the draft thoroughly of their respective subjects and made comments. At the end of workshop, each group presented the comments and suggestions they made in their own subject in the plenary session. In the process of review, the respective teams identified the strengths of the draft AF as well as the rooms for its improvements as per the national and global perspectives. So, each team made specific suggestions to make the draft clear, complete and well-organized.

Second workshop: This workshop focused on gathering the comments and suggestions on the draft AF from a larger number of subject teachers and experts of English, Mathematics, Physics and Economics. The list of participants of each subject is attached in appendix 3. The national consultant explained the context and necessity of development of AF. He also argued that the AF would be fruitful, functional, appropriate and suitable in the Nepalese context, provided the participation from each section of stakeholders is ensured in the development process of AF.

One of the evaluation experts and subject experts who participated in first workshop presented their respective portions of the draft AF in the workshop followed by a short discussion. All these participants were split into a group of four based on their subjects. One assessment expert and one subject expert worked as the facilitators in each group. In each subject group, each participant went through the AF and made comments/suggestions individually and independently for which adequate time was given. Then each participant presented his/her comments in the respective group followed by the discussion. At the end of group discussion session, facilitators in each group listed the final comments.

At the end of this workshop, facilitator (Subject expert) of each group presented the comments which were finalized in the group session. All these comments were presented, discussed and finalized in the plenary session. These comments along with the comments collected in the first workshop were incorporated in the AF.

Final Workshop at National Level: With a view to gather the comments and suggestions for the purpose of further improvement of the AF draft, the final workshop was organized for a day. This workshop was participated by a larger number of experts, subject specialists and high-level personnel of different interconnected departments of ministry of education like MoEST, CDC, NEB, ERO, Centre for Education and Human Resource Development (CEHRD) and education chiefs of some municipalities, representatives of some subject organizations, head teachers, NEB members etc. (See appendix 4 for the list of participants).

In the workshop, a short review of past experiences on the development of AF of grade 8; and standardized tests in grade 8 and 10 were presented by a consultant involved in such task. The purpose behind this presentation was to identify the lapses in preparing a robust AF. The emerging context for the development of AF for grade 12, its development procedures and a short description of generic part of the AF was presented by the consultant followed by the presentation of the team-leaders of each subject group (English, Mathematics, Physics, and Economics), who elaborated each component of AF in their respective subjects. Additionally, the

presentations also highlighted the comments and feedback received in the second workshop which were incorporated in the draft AF. The presenters requested each participant to provide comments/suggestion for further improvement and finalization of the AF draft. One of the remarkable facts of this workshop was that each and every participant presented his/her comments/suggestions on the draft AF. All the comments received were listed and summarized by the consultant at the end of workshop to ensure all the necessary information being received. Furthermore, all the participants were requested to send the comments through email if they missed/overlooked anything in the workshop.

All these comments collected in this final workshop were sorted, organized and analyzed in a meeting of education subject team and subject team leaders. The meeting also identified the places of each chapter where the comments were to be incorporated. Accordingly, valuable and constructive comments were incorporated in this AF and gave it a final draft shape.

Having incorporated all the comments received in three phases of workshops, this final draft AF was once again sent to ADB, ACER and NEB authorities for further comments and feedback. According to their suggestions, some repeated texts were removed; some sections were reorganized; “Introduction” and “Process of Development of AF” were merged into one chapter. Besides, some sections were made short. In this way, incorporating all the suggestions received from various groups of stakeholders, the draft AF was ~~finally brought into this shape~~ presented to the Board of NEB. As per suggestions made by the Board, the AF was finalized. Having received approval from the Board, the soft and hard copy of AF was submitted to the MOEST. The comments and feedback received from the MOEST were found very important and relevant to further improve this AF. At the last step, the summary of AF was presented to the concerned officials of MOEST. A few comments, but very important ones were received in the presentation. These comments helped to furnish this AF and bring it in this shape.

1.8 Limitations of the Framework

- This framework does not cover assessment of subjects related to the Technical and Vocational Education stream.
- There are more than 100 subjects in grade 12. Each subject allocates twenty five percent of total marks for internal assessment. However, the assessment criteria and activities to be performed in the internal assessment by the students and marks allocated for each activity are not only incongruent but they are based on the nature of the respective subjects. In other words, the criteria of assessment and the activities to be performed by the student under internal assessment, and weightage for each activity are subject-specific. It requires a considerable amount of time and fund to work on standardizing tests of all these subjects and is indeed beyond the scope of this preliminary attempt. So, this framework covers only four subjects in which standardized tests will be developed. The same is true with the subjects that have practical examination.

Chapter II : Guiding Principles of Test Development

This chapter lays out the foundation of the process of developing the test for Grade 12 examination, and explains the key principles and considerations to be made in each step of the process. The principles discussed in this chapter are applied to all the domains of the examination in general. It also presents some responsible factors such as time and cost effective ways for improving the examination system in the Nepalese context. This proposed procedure for improving examination system is based on the best practices of examination system of selected countries. This chapter, therefore, deals with ~~three~~ two sections viz; (i) process of test standardization, (ii) ~~Examination system in selected countries~~ and (iii) ~~Exam improvement: Pragmatic process in Nepalese context~~.

2.1 Process of Standardization of Test

Standardized tests are designed in such a way that the questions and interpretations are consistent and are administered and scored in a predetermined, standard manner. A standardized test may be any type of test: a written test, an oral test, or a practical skills performance test. The questions can be simple or complex. The following diagram shows the process of test standardization.

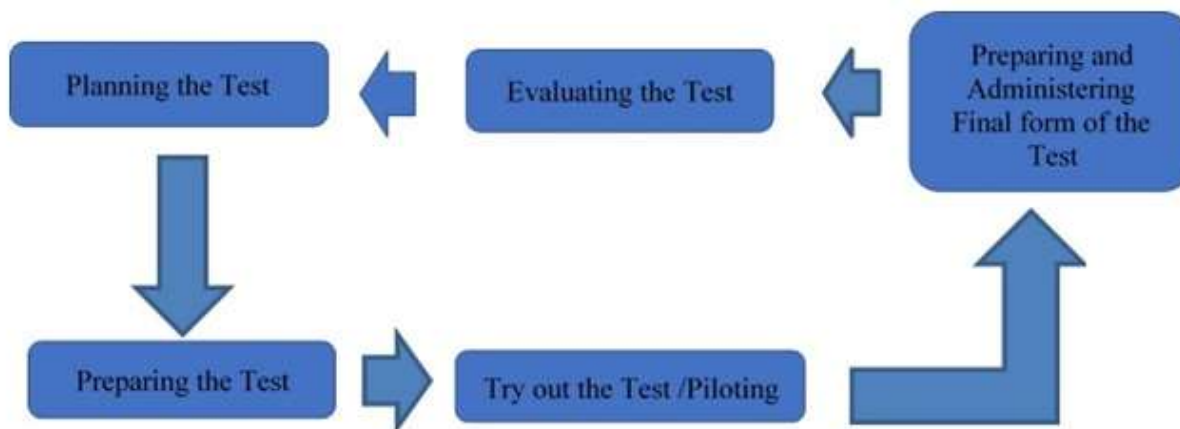


Figure 2.1: Process of Standardization of the Test⁴

Test standardization is a long process taking two to three years of time period. It also involves efforts of many experts from various fields. Test standardization process generally involves the following steps:

⁴The step "Evaluating the Test" of standardization will not be conducted while developing the standardized tests here.

2.1.1 Planning

The planning stage of the standardization process involves several tasks which are presented below.

2.1.1.1 Understanding Guidelines of the Assessment Framework

A good test instrument depends on a clear idea of why the test is developed, its objectives, and which learning areas of the test domain are to be included in the assessment. The AF provides this information and is, therefore, very important for writing good items. It is particularly important for a test developer to understand the fundamental purpose, types of test items, SG, length and duration of the relevant test of Grade 12 examination.

2.1.1.2 Types of Assessment

In Grade 12 examination, certification in each subject is based on two components, internal examination and external examination. Internal examination carries 25 marks out of 100 in evaluating student abilities in the form of formative assessment. It is required for schools to document classroom activities and student's individual work as shown in Figure 2.2 below. The activities to be carried out and marks allocated for those activities under internal evaluation differ from subject to subject and are explained in detail in each subject chapter of this assessment framework.

External examination of Grade 12 examination is summative and pen-and-paper based in nature, carrying 75 out of 100 marks. NEB conducts the examination nationally every year. This assessment framework mainly focuses on the standardization of the external examination. The details of the external examination vary across the test domains and are explained in each subject chapter in Part 2 of this framework. Figure 2.2 below explicates the Grade 12 Assessment System being currently adopted by NEB.

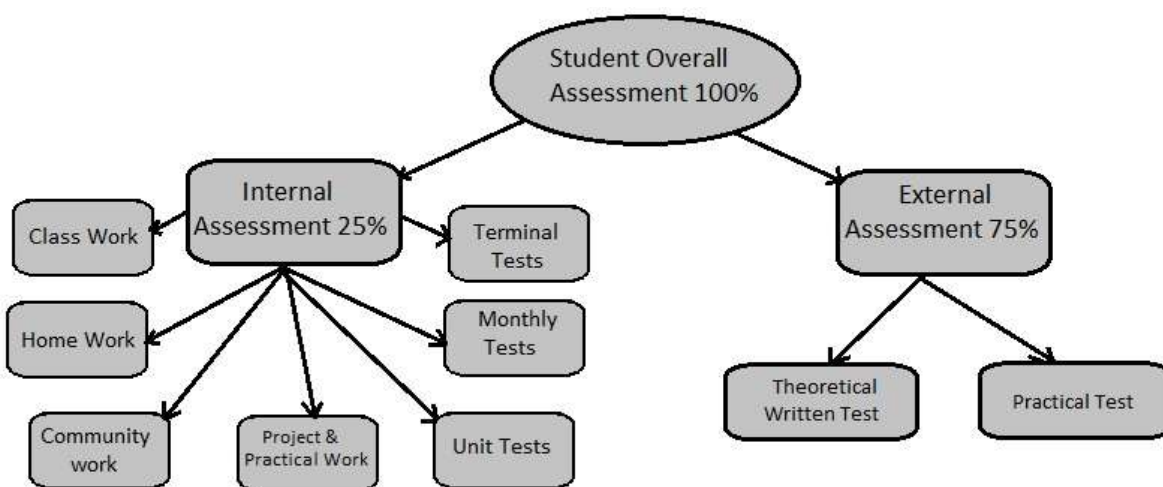


Figure 2.2: Process of Student Assessment in Grade 12

As shown in Figure 2.2, the internal assessment is based on various activities the students are required to complete during the whole study session. Nevertheless, the activities to be carried may vary based on the nature of the individual subject. For example, Grade 12 Physics subject, requires both practical and project works as a part of internal assessment whereas subject of Accounting requires only project work. Likewise, community work is an essential part of some subjects such as Economics of Grade 12; however, most of the other subjects do not mention this component specifically.

There are variations in marks allocated for each of the activities. For example, 2 marks are allocated for practical works and attendance in Chemistry of Grade 12 collectively whereas a total of 3 marks are allocated for attendance and class participation in the subject of Tourism and Mountaineering Study.

The same is also true in case of external evaluation. Some subjects require practical work as a part of external examination. For example, the total of 75 marks in Grade 12 Yoga Subject is divided into two parts; of which 25 percent is for practical test and 75percentisfor theoretical test. However, most of the other subjects require only theoretical written test.

The details of activity components and marks allocated in internal assessment and types of test adapted in external evaluation are presented in subject related chapters of this assessment framework.

2.1.1.3 Item Format

The item format is already determined by CDC. So, prior to the development of test items, the test writers should be aware of the item types in their respective subjects. Grade 12 examination is conducted nationally in a large-scale, which is pen-and-paper based in nature, in terms of number of examinees and number of subjects. The main item formats used in Grade 12 examination are selected response items (SRIs) and constructed response items (CRIs).

Selected Response Items (SRI): A selected response item consists of a problem, known as the stem, and a list of suggested solutions, known as alternatives. The alternatives consist of one correct alternative, which is the key/answer, and incorrect or inferior alternatives are known as distractors. It includes a total of 3 to 5 options. To answer SRI, a student selects a response from provided options. For this purpose, this framework suggests using 4 options.

Constructed Response Items (CRI): In the Grade 12 examination, various types of CRIs are included to test student abilities. There are three types of CRIs depending on the length of answers, although their usages and associated marks may vary from one domain to another. They are:

Very Short Answer Question (VSAQ): The very short answer questions require only one or two-word answer, and the range of acceptable responses is usually very small. It carries 1 mark.

Short Answer Question (SAQ): This sort of question needs more complex answer than very short one. However, answer should not be very lengthy in comparison to long answer question. This type of questions weighs 5 marks.

Long Answer Question (LAQ): Long answer questions require students to generate more complex answers and, therefore, a wide range of responses is acceptable. Long answer questions carry 8 marks.

2.1.1.4 Specification Grid

SG, a road map for writing items, consists of detailed contents, item format, full marks for each item with cognitive level and total number of items to be prepared.

SG is a two-way chart that relates the instructional objectives to the instructional contents. It is also called a blue print for test developer. It is a frame that portrays a clear picture of the design of the test and serves as a guide. Generally, the SG includes:

- Levels of objectives to be measured.
- Percentage allotted to each level of cognitive skill
- Contents and sub-contents from which items are to be drawn
- Types and number of each type of tests including marks for each test item
- Total number of items
- Total marks
- Instructions, if necessary

Importance of SG is enumerated in the following points:

- It helps ensure content validity.
- It guides the test developers in writing the items.
- It can be useful for improving students learning.
- It helps to ensure that there is a match between what is taught and what is tested.

2.1.2 Preparing the Test

With SG being finalized, the next task is developing the test. The following points should be considered while developing the test.

2.1.2.1 Selection of Contexts and Stimulus Materials

An early step in developing a good test item is deciding on the context and selecting or creating a stimulus. The ‘Stimulus’ refers to the context on which an item is based. It is a particular instruction or a text that triggers a specific response. It plays an important role in the process of

developing items so as to elicit the desired response. Test developers need to make judgements about whether the stimulus is intrinsically worthwhile, and also about whether it is of appropriate difficulty for Grade 12 students. As a rule, the stimulus text should be kept as simple and short as possible to meet the intent of the question. While a test item may relate to an area of curriculum that a student has prepared for, a good stimulus is self-contained and self-explanatory. Each stimulus should be relevant to the aspect of learning domain. Students should recognize the relationship between the context and the area of learning without any difficulty. Stimulus materials can take many forms, with the range depending on the domain. A stimulus used as the basis for testing reading skills, for example, could be in the form of a story, a poem, a newspaper article, a letter, a biography, a recipe or an advertisement. A stimulus for testing mathematics or science could be in the form of a short text, an experiment, a diagram, a graph or a table.

2.1.2.2 Avoiding Bias

The stimulus and contexts used across a test item should be equitable to all students. This does not mean that every context or stimulus will be equally appealing to every student. Rather, the test developer should aim for diversity in order to avoid context-related bias. Bias occurs when much of the test gives advantage or disadvantage to one group or subgroup of students. A text based on a distinct dress style may cause gender bias, or a text based on a particular geographical area, culture or food habits may give advantage to a distinct group of students.

2.1.2.3 Sensitivity

The test developer must take great care to avoid constructing items that may offend, frighten or upset the test takers. The emotional wellbeing of a student affects how the student performs in an assessment task. Contexts such as trauma, violence, abuse or any controversial issues should be avoided. Sensitive topics such as religion, politics and poverty should be carefully considered, taking into account grade appropriateness and community attitudes associated with a topic.

2.1.2.4 Item Writing

The item writers need to develop appropriate test items in the format mentioned in the elaborated SG. Grade 12 examination, especially external examination, uses a few formats of test item. It is recommended that test developers should be familiar with the item formats mentioned above. Similarly, the test developers should develop the test items considering the qualities of a good test and test-item and then the assessment tool like written test will be valid and reliable.

2.1.3 Marking Scheme of CRI

The most common challenge encountered by test developers, when writing short and/or long answer question, is construction of a marking scheme (MS). The marking scheme for short and/or long answer question needs to be comprehensive enough to cover the full range of responses that students provide. The marking scheme needs to be precise, reliable, and clear enough to ensure consistency between different examiners. It is strongly recommended for item

developers to develop item and its marking scheme at the same time. Item developers can develop either holistic or analytic marking scheme by considering the nature of the related subject. Subject domain specific requirements and sample marking guides are presented in each subject chapter of this AF.

2.1.4 Panelling/Moderating and Trying out of the Test

No matter how carefully items have been prepared, defects may creep in. Various sorts of errors can be detected. These errors are modified via panelling/moderating before field trialling or trying out process. Description of these steps is presented below:

2.1.4.1 Panelling/Item Moderation

The first draft of items will be reviewed by a small group of test developers who are also subject experts. This is called here ‘panelling’ or item validation. The objective of the panel is to examine the stimulus and the questions posed about it. Development of high quality test items may require multiple rounds of panelling and reviews. During the panel meeting, the group reviews the quality of items. The test developer makes a note of all issues that are flagged in the panel meeting. The panel provides suggestions and comments hovering around the following questions:

- What is the relationship between the items and the SG?
- What learning behaviour is the item testing?
- Is the item testing anything other than what it intends to test?
- Do/does the items/item test significant learning outcomes?
- What do the students need to know to answer the question?
- Does the item rely too much on background knowledge?
- Is the item-difficulty appropriate for the target grade level?
- Is there any ambiguity in the stimulus or the stem?
- Are the items understandable to students?
- Is the item appropriate for the target group?
- Are all the distractors plausible?
- Is there only one correct key?
- Is the item likely to offend or upset students?

2.1.4.2 Piloting/Field Trialing

Piloting is a kind of trialing with relatively small number of students (about 200 students per item recommended if any psychometric item analysis is to be applied). Piloting is designed to obtain information about how well the items are working and highlight any issues that might exist with the items. Information collected from students' responses is then used to rectify any faults in the items that have not been detected by the previous reviews. In addition, item data collected from piloting can provide a ground for item selection. The selected items should meet criteria for quantitative and qualitative validity. To meet quantitative criteria, items should have good statistical characteristics. For example, items should be of appropriate level of difficulty and they should be able to discriminate between high performing and low performing students. The test will be tried out more than once until the items satisfy the necessary criteria. Only the items that pass through parameters are selected.

2.1.5 Item Difficulty

Item difficulty indicates how difficult or easy an item is for the test takers. Item difficulty is also called item facility and the two terms are used interchangeably. P-value is one of the common statistics of item facility. It is the proportion of test takers who answered an item correctly. When multiplied by 100, the p-value converts to a percentage, which is the percentage of test takers who got the item correct. The p-value statistic ranges from 0 to 1 indicating high difficulty to low difficulty. Item difficulty, in particular, is a statistic calculated as p-value, 0 being high difficulty and 1 being low difficulty. Difficulty level of an item is interpreted in the following way.

Table 2.1: Interpretation of Item Difficulty

Difficulty Levels	Interpretation
0 – 19	Very difficult
20 – 39	Difficult
40 – 59	Moderate
60 – 79	Easy
80 – 100	Easier

However, p-value can successfully describe the item difficulty only if all the test takers in the sample take the same test. To overcome this limitation, we need a better indicator of item difficulty. The best practice is to use Item Response Theory (IRT) for item analysis. IRT models separate the difficulty of the test item from the ability level of the test taker so that all the test takers can be compared using one single scale. Item difficulties can be compared accurately even if the test takers do not take the same sets of a test. The statistic of item difficulty is known as

logit or threshold. In theory, item difficulty can range from $-\infty$ (easy) to $+\infty$ (difficult), however it mostly lies between -3 and 3 in practice. The higher the threshold value, the more difficult the item is. In order to have a holistic picture of item information and parameters during development of the test items of Grade 12 examination, it is recommended to include item difficulties calculated by an IRT model as well as the p-values.

2.1.6 Item Discrimination

Item discrimination refers to the ability of an item to differentiate test takers who answer the item correctly and who do not. Point-biserial correlation is often used as an index of item discrimination. It is calculated by correlating the test takers' answers in dichotomous score (either right or wrong) with their total scores. As in all correlations, point-biserial values range from -1.0 to +1.0. A low point-biserial implies that students who get the item correct tend to do poorly on the overall test (which would indicate an anomaly) and that students who get the item wrong tend to do well on the test (also an anomaly). As a rule of thumb, it is recommended for test developers to carefully examine any item with point-biserial correlation lower than 0.2 for any error in the item and apply professional judgement for further actions. Discrimination index of an item can be interpreted in the following way.

Table 2.2: Interpretation of Discrimination Index⁵

Value of Discrimination	Interpretation
Below 0.20	Negligible
0.20 – 0.29	General
0.30 – 0.39	Good
0.40 – 1.00	Very Good

2.1.7 Item Selection

Items that fit into the quality framework or parameters such as p-value, D value and expert judgment, are selected for final try-out. However, for the purpose of criterion-reference test, there is no formula for determining the exact distribution of item difficulties (Freeman, 1962). The normal curve, however, can be taken as a guide in selection of difficulty indices. Thus, 50% of the items might have difficulty indices between 0.25 to 0.75; 25% indices larger than 0.75; and 25% smaller than 0.25. An item passed by 0% or 100% has no differentiating value (Garrett, 1981). So, it is recommended that a test should cover a wide range of item difficulties. It should include some difficult items which can challenge test takers with high ability and some easy items that allow test takers with low ability to show what they know and can do.

⁵<https://www.washington.edu/assessment/scanning-scoring/scoring/reports/item-analysis/>

2.1.8 Item Banking

After piloting or trialling, the items are filtered through the criteria such as expert judgement, or difficulty and discrimination criteria. An item bank, composed of good items, will be created. And, item metadata for each item will also be created. Item metadata is a record of all the information related to an item. Grade 12 examination items will be managed by the sophisticated item banking system of NEB. A metadata record allows for systematic access to assessment material, which serves a number of purposes. An important purpose of recording the metadata for test developers is to assist in ensuring that items cover a range of content, skills and levels of difficulty, as outlined in the AF.

Item Code (Unique Item Identifier)

The AF has a provision of assigning each item a unique code which correspond to the cognitive skill, item writer, item moderator as well as marking scheme. Virtually every item related matter gets a unique identifier code in the process of banking system of items. Each item metadata record should include the following information:

- The name of the test developer who writes the item.
- The name of the moderator who finalizes the item.
- Target population (Grade 12 in this case)
- Domain/subject
- Content classification (according to framework)
- Skill classification (according to framework)
- Item descriptor
- Marking scheme
- Item number in test booklet (when used)

NEB has developed a standardized item card to improve item development for various board examinations and to facilitate item banking. An example of the item card is presented below.

1.	Subject:										
2.	Item cell code:										
3.	Elaborated item code										
	<table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <tr> <th style="width: 20%; padding: 5px;">Unit</th> <th style="width: 20%; padding: 5px;">LO</th> <th style="width: 20%; padding: 5px;">Cognitive skill</th> <th style="width: 20%; padding: 5px;">Format</th> <th style="width: 20%; padding: 5px;">Marks</th> </tr> <tr> <td style="height: 30px;"></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Unit	LO	Cognitive skill	Format	Marks					
Unit	LO	Cognitive skill	Format	Marks							
4.	Objective of the item (in line with learning outcome)										
											
5.	Item:										
6.	Key answer/marking scheme/rubric:										
7.	Code no. of item writer:										

2.1.9 Preparing and Administering Final Form of the Test

The following section deals with the preparation of final form of the test and final administration of the test.

2.1.9.1 Preparation of Final Form of the Test

After the item bank is ready, the next task is to prepare for an assembled form of the test for standardization of test. This step involves:

- Individual items are drawn by ensuring the coverage of the tests as specified in the elaborated SG in terms of learning areas of the test domains, range of skills, difficulty level and discriminating power of items etc.
- The items are then assembled and arranged in appropriate format.
- The assembled items are categorized as a set and the set is printed.
- Blank answer sheets are printed (if necessary).
- Time required for the test is determined by taking average of three pupils' time on answering the test. The pupils selected for the purpose, represent three groups—bright, average and below average.
- Instruction to examinees, as well as to the persons who will administer the test is prepared and printed.
- Mode of administrations is determined.

2.1.9.2 Final Try-Out of the Test

Final try-out is done relatively on a large sample of individuals for estimating the reliability and validity of the test. The sample is relatively larger than the number of students in the previous

try-out. Its purpose is to decide the duration of the test also. Almost all the precautions in try-out test are supposed to be taken while administering the final test. Completed response sheet should be scored with the help of scoring key and the scores be tabulated for statistical treatment.

2.2 Exam Improvement: Pragmatic Process in the Nepalese Context

With a view to improve examination system, NEB has already developed standardized tests for grade 8 and 10 in the selected subjects which are very essential for reliable result. This year, NEB is going to develop standardized tests in 4 subjects i.e. compulsory English, Mathematics, Physics, and Economics for grade 12. In order to make the examination system standardized, development of standardized tests is essential and hence, NEB will subsequently continue to develop such tests in other subjects too in the years to come.

The process of standardization of the test, however, is time consuming as it takes 2-3 years and involves a high cost for NEB, as there are more than 100 subjects (compulsory and elective subjects) in grade 12. It may, therefore, not be financially and technically feasible for NEB to develop standardized tests in all subjects by adopting all necessary steps for the final/annual examination at present. However, it is also principally true that only the standardized tests can give the reliable result of students' assessment. In this context, NEB plans to adopt the following procedures which seems to be pragmatic and cost effective at present in the Nepalese context, for making tests valid and the result reliable as much as possible. ~~Considering all these factors, it seems to be pragmatic and cost effective for other subjects at present in the Nepalese context.~~ NEB has a plan to adopt these procedures in developing the test and examining the answer sheets of those subjects in which standardized tests are not developed at present. These procedures will be adopted in combination with different activities such as capacity development, development of a model test paper, and standard operating procedures of examination system, which are also based on the good practices of the examination system of other ~~selected~~ educationally good renowned countries ~~presented above in section 2.2.~~ Moreover, most of these steps of this process are also useful to improve grade 11 examination conducted by the concerned schools as well.

2.2.1 Capacity Development of Key Actors of Examination

Test developers, moderators, examiners, scrutinizers, result analysts etc. are considered the key actors of examination system. These actors play important role in constructing quality test and making result reliable. Hence, the extent of quality test and reliable result depend on the knowledge and skills on the areas such as developing tests, marking scheme, examining answer sheets and analyzing results the key actors possess. Therefore, it is essential to develop the capacity of these actors in the aforesaid areas of examination system in the context of Nepal. In order to develop capacity of the key actors in these areas, training for them is a must. Such practice was observed in examination system of Singapore where the structure type of trainings for the key actors of examination system is conducted in order to provide the required knowledge and skills to perform the test development, moderation of the test paper, examining the answer

sheets and the other exam-related activities. Only people who complete the training are involved in exam-related activities (¹https://en.wikipedia.org/wiki/Education_in_Singapore

¹https://en.wikipedia.org/wiki/Singapore_Examinations_and_Assessment_Board).

NEB conducted training on elaboration of SG for the purpose of developing test item, analyzing test paper, and examining answer sheets in a few subjects. Such training should be conducted in all the subjects. Besides, training on analysis of test result should be organized to provide feedback for developing education policies through the qualitative and quantitative data of result analysis. NEB requires conducting trainings on the following areas in order to capacitate the key actors such as test developers, moderators, examiners, scrutinizers, and result analysts in order to ameliorate the examination system of grade 12

- Elaboration of specification
- Development of SGs
- Development of test items
- Analysis of test paper
- Examining and scrutinizing the answer sheets
- Result analysis

2.2.2 Development of Model Test Paper and Marking Scheme

After training on test paper and MS, test developers and moderators should develop the model test paper and MS in their respective subjects. This activity certainly enhances the practical skills of the test developers and moderators on the one hand, and, on the other, these materials guide the subject teachers to make their teaching meaningful. It also provides students with opportunity to improve their learning. These materials equally assist classroom teachers in developing valid test paper and scoring answer sheets in reliable manner while conducting internal assessment in schools. Once these materials are developed, they work until the curriculum is revised.

2.2.3 Standard Operating Procedures of Examination System

The following procedures will be followed to make the examination system standardized as much as possible.

2.2.3.1 Understanding Competencies and Learning Outcomes

The curriculum of each subject specifies the level wise competencies as well as learning outcomes. Whether formative or summative, every examination assesses the level of students' learning attainment mentioned in the curriculum. The test developer and other actors should be cognizant of level wise competencies and learning outcomes. Therefore, the item writer must be able to compare and contrast various types of items in regard to competencies and learning outcomes. This is a usual practice in other educationally developed countries too. This activity

helps the test developers to develop test items based on competencies and learning outcomes given in the curriculum.

2.2.3.2 Understanding Elaborated Specification Grid

For developing the test items and test, the test writers should be fully knowledgeable of elaborated SG of their respective subjects. More specifically, test developers should be aware of types and number of test items, full marks of each test items, and distribution of cognitive behaviour in the test paper, all of which are given in the elaborated SG. The SG in each subject is elaborated by NEB. An example of SG is given below. ~~(See appendix 4 for example).~~

Grade: 12

Full Marks:

Subject:

Subject Code:.....

Pass Marks:.....

Time:.....

Unit number and content	Sub-content	Knowledge%			Understanding%			Application%			Higher ability%			Total no. of each type of questions			Total no. of questions	Total marks
		VSAQ /MCQ	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q		
1.	1.1 • 1.2 • 1.3 •	()					()				()			()		()		
2.	2.1 • 2.2 • 2.3 •	()					()				()			()		()		

Note: 1. Figures in the parentheses in content column indicate the teaching hours, and the figures in parentheses in the other columns indicate the full mark of their respective questions

2. VSAQ=Very Short Answer Question, SAQ= Short Answer Question and LAQ = Long Answer Question, MCQ=Multiple Choice Question

3. Each VSAQ, SAQ and LAQ carries 1(one), 5(five) and 8 (eight) marks respectively.

4. There should be two optional (OR) questions for any two SAQ and one optional question for any one of LAQ.

5. SAQ and LAQ can be structured with two or more sub-item.

6. Questions should cover all of the units and sub-units as far as possible to adequately represent the course objectives.

7. Flexibility to create a similar matrix in or between the sub contents is open as far as the content coverage and cognitive behaviours are maintained.

Test developers can create a new SG should they desire to write items from the content areas not covered in this SG as far as the cognitive behaviours are maintained.

Since weightage allocated for each level of cognitive behaviour, number and types of test items under these cognitive behaviour, number of sub-contents in each unit/chapter vary and are subject-specific they are not given in the sample SG presented above.

2.2.3.3 Development of Test Paper for Final Examination

The subject teacher/expert should develop the test-paper as per the requirement of the SG, where the content, item type, cognitive level of the item, and marks distributions are clearly mentioned. At present about 50 percent of total test items are to be constructed by the test developers such that they measure application and higher level thinking skills of the students. Percentage of these items should be gradually increased in the test paper along with SG in consultation with CDC.

2.2.3.4 Preparation of Answer Key and Marking Scheme

Answer Key: Answer key is a set of answers corresponding to a test paper, a compilation of test items. It shows the correct and possible answers for the test items. The answer key acts as a mutually accepted set of answers for both students and examiners. The answer key helps examiners to consistently mark answer sheets of the students. The following points should be considered while preparing the answer key.

- Answer keys are based on the types of expected answers, and answer of each part of test item needs to be listed.
- Crucial elements are listed and reasoning is presented in a stepwise and hierarchical order.
- Be descriptive, not merely judgmental, rational or logical (when needed)
- All possible/expected answers are provided as far as possible and where open indicative suggestions for possible/probable answers are provided.
- Answer keys are developed together with test items, pretested, revised, and finalized test items.
- Think how response will be scored.

Marking Scheme (MS): MS is the range of marks that may be given to a student depending on the quality of its response to a question. MS ensures fairness of students' works in assessment. It should consist of the following three elements.

- Criteria - characteristics used to judge the quality of the assessment task.
- Standards - levels of achievement or performance.
- Descriptors describe the qualities required to demonstrate achievement of each standard for each criterion.

In order to make marking consistent though answer sheet(s) scored in different time, in different situation, by different examiners, MS needs to be prepared considering the following points.

- Split the full mark of each question in different level (performance level) like 0.5, 1.0, 1.5, 2.0, 2.5, and 3.0. (See example of Marking Scheme in subject specific chapters)
- Prepare descriptors of each standard.
- Focus on cognitive level while developing answer key and MS (List/state, explain, justify, give reason, Apply, Analyze, evaluate....)
- Do not allocate marks for the answer which is not demanded by the question.

MS should possess the following qualities.

- A marking scheme should be usable even by a non-expert in the subject.
- Suggested directions should lead anyone to mark given answers.
- It is self-explanatory.

Here is an example of a combined format of an answer key with marking scheme.

Table 2.3: Proposed Format of Marking Scheme

Item format	Q.N. and question	Answer Key	Marking Guidelines		
			Descriptors/ criteria for each point/mark	Answer-wise full marks, i.e.	Question-wise full mark
Types of item (MCQ, or Very short answer question or short question or long answer question etc.	Question number and the question	Precise and possible answers of the question in bullets.		0.5	5.0
				1.0	
				1.5	
				2.0	
				2.5	
				3.0	
				3.5	
				4.0	
				4.5	
				5.0	

Reflecting on each test item's demand or expected-answer, the marking scheme including the answer key is also prepared by the test-paper developer in each subject. Answer key of the same test paper should also be prepared by another subject teacher/expert independently. So, there will be two sets of answer keys for a set of test paper.

2.2.3.5 Moderation of Test Paper

While moderating the test paper by the moderators, the answer keys prepared by the test developer and the subject expert/teacher should be verified by the moderation panel. In this process, the panel matches these two sets of answer-keys with each other to ensure whether each test item can measure what it intends to measure, length of the answer, time for attempting each test item, clarity of the item etc. If they are matched, then the moderation panel adopts further

steps of moderation and finalizes the test-paper. If they are not matched, problem pertaining in the test item will be identified and the necessary revision in the test items is made. This task, though subjective in nature, i.e. expert's judgment, will make the test valid and reliable, which helps to make the test standardized to some extent. While moderating the test paper, the test moderation panel must consider the qualities of test items and test paper. This moderation task of test paper of the public examination is carried out in the other educationally renowned countries like, Singapore, Canada, and The Seychelles ([https:// www.tandfonline. com/doi/ full/ 10. 1080/ 09695940802164226](https://www.tandfonline.com/doi/full/10.1080/09695940802164226)). In The Seychelles, the test paper is moderated by the subject specialist officials at the Assessment, Testing and Accreditation Unit ([https:// www. ibe.unesco. org/ sites/ default/files/BEAPTanz_Assessment_policies_Seychelles.pdf](https://www.ibe.unesco.org/sites/default/files/BEAPTanz_Assessment_policies_Seychelles.pdf))

2.2.3.6 Revision of Answer Key and Marking Scheme

Answer key and marking scheme together with the test paper will have been prepared by the test paper developer himself/herself. However, if any test item/s is/are revised and/or deleted and/or added in the moderation process, revision in answer key and marking scheme should also be made accordingly.

2.2.3.7 Analysis of Test Paper

Though the test paper is moderated by the expert panel, it may not be error free in some cases. If any test item/items of the test paper contains any error, it will reflect in the marking; resulting inconsistency among the scores. The task of analysis of the test paper right after exam will address such problem and make the scoring consistent. Hence, test paper should be analyzed through workshop of experts, teachers and students independently. Detail discussion will be made in each test item based on its technical qualities. If the item is unclear, lengthy in terms of time allocated to answer such item, or has any other error, marking scheme should be revised accordingly by the teacher or the expert. This task will give justice to the students' writing of an item, and helps make quality test paper in future.

2.2.3.8 Orientation for the Examiners

Since the volume of the answer sheets of most of the subjects is normally large, NEB should recruit a large number of examiners for scoring the answer sheets. Uniformity in marking the answer sheets by the examiners may be lacking until they are unanimous about the nature of answers and the scores they deserve. In order to bring uniformity and fairness in scoring, it is desirable to orient all the examiners on MS and process of marking in their respective subjects. Orientation programme for the examiners should be organized and they should be oriented in the following points.

- Understanding what is being asked by the item
- Deciding the major points/contents to be included in the answer.
- Ability to use answer key and marking scheme

- Dealing with the irrelevant matters.

In order to make the orientation programme effective, the practical experience on scoring answer sheets should be provided to the examiners. It enhances the reliability of the score. For this purpose, the orientation process may begin with a broad discussion and clarification on how answer key and marking scheme should be applied. Then one of the answer sheets will be drawn and photo copied, and provided to each examiner. They will be asked to mark answer of each question and award total marks for the paper. If no variance or negligible variance is found, the MS can be considered acceptable and there is no need for further modification. But if significant differences are found, the MS will be modified until satisfactory consistency in marking is ensured. Once it is finalized, the examiners will be assigned to score the answer sheets with the expectation that there will be no errors or if any, it is at its lowest.

2.2.3.9 Orientation for Scrutinizers

Scoring the answer sheets by following the marking scheme does not fully ensure that marking is errorless. To check such errors a sample of scored answer sheets should be re-examined by a panel consisting of two to four scrutinizers. The scrutinizer's task is to ensure that students' works are fairly checked and marked by the examiners. The scrutinizers should be well oriented because, once it is scrutinized, the marks decided by them become final and will not be changed thereafter unless special case arises.

The scrutinizers must fully be aware of the following matters while scrutinizing the answer sheets.

- Selecting sample answer sheets representing reasonable distribution of marks, for example reasonable percentage of answer sheets from high marks group, average marks groups and low marks group.
- How marks are allocated for each question.
- Checking that marking of the sample is consistent with the marking scheme
- What to do with unmarked page, section or calculation/totaling errors.
- Deciding on what to do if significant discrepancy is found.

Therefore, orientation programme needs to be organized to deal with the above-mentioned points.

2.2.3.10 Result Analysis

Results Analysis is the process of collecting information on how well the test worked. It also helps understand how students are learning, and how they have performed in each area of the syllabus. Hence, analysis of the test result can be used for the purpose of making teaching and learning effective. Such information enables stakeholders to identify areas of strengths and weaknesses of the test from various perspectives. The information is also helpful in identifying overall trends of performances which will help to provide feedback for developing and/or revising the education policies. Such practice was also found in education system in Canada

where the result of exam is used for developing and monitoring school action plans; and developing and monitoring educational programs and policies. More importantly, the data of result of the public exam is used for the purpose of making teaching and learning effective. Schools are encouraged to use the results as data to monitor and change classroom practices ([https:// www.tandfonline. com/doi/ full/ 10. 1080/ 09695940802164226](https://www.tandfonline.com/doi/full/10.1080/09695940802164226)). So, on completion of whole testing procedure, NEB should analyze test result that will be useful to improve teaching learning process, revise curriculum, provide feedback for policy formulation, construct or modify the current testing practice, if needed.

Chapter III : English

English, as a subject forms a significant component assessed in the examination as a core subject due to its importance as an international language. This chapter seeks to present a comprehensive framework for both formative and summative assessment of English in the Grade 12 examination.

3.1 Description of Present Curriculum

National Curriculum Framework (NCF) of school education recognized English as a compulsory subject to be taught from primary to secondary levels (CDC, 2077, B.S.). English is taught to enable learners to exchange ideas with people of vastly different nationalities and expose them to the vast treasures of knowledge and pleasure available in the English language in both printed and electronic forms. Evidently, the curriculum aspires to upscale students' overall competency of English language required for both academic and non-academic purposes.

This chapter attempts to delineate the constituents of both formative and summative assessment of English language as a subject in the Grade 12 examination. The core skills, learning outcomes (LOs), and the pattern of examination, including the weightage assigned are largely drawn from the curriculum and the elaborated SG.

3.1.1 Competencies

The revamped curriculum for Grade 12 emphasizes the established vision of transacting this subject to equip the learners to step into the global environment with confidence to contribute and gain from the shared resources. It also aims at providing the young adults with a definite linguistic base in English for their future academic and career engagements. Specifically, English curriculum expects students to achieve the following 11 competencies by the end of Grade 12 (CDC, 2077 B.S.).

- Use both spoken and written English for general and academic purposes in a variety of personal, social, and academic contexts.
- Read a wide variety of texts for information and understanding.
- Read a variety of literary texts for pleasure and appreciation.
- Read, reflect and interpret a wide range of texts.
- Critically analyse and evaluate ideas in a wide range of level appropriate texts.
- Search, select and manage information from various textual and online sources.
- Create a variety of writing for different purposes and audiences with appropriate content, style, and accuracy.

- Produce a variety of creative and critical writings.
- Appreciate diverse cultures.
- Listen and respond in English with accuracy and fluency.
- Communicate clearly and effectively in a range of situations using verbal and non-verbal communication strategies.

3.1.2 Description of Assessment Domains in Curriculum

The four sub-domains of Listening, Speaking, Reading, and Writing provide scaffolding to the learning of this subject. Though it is recognized that the acquisition of these sub-domains by students is by no means linear or mutually exclusive, yet separate desired learning outcomes for each skill have been specified. The following sections examine the learning outcomes (LOs) in more detail.

3.1.3 Skills and Learning Outcomes

Learning outcomes (LOs) in the English curriculum expect varied skills from the students. All the LOs under each skill may not present the scope to be tested as some of the LOs may need to be assessed in other ways. The following sections discuss the LOs for each skill as outlined in the curriculum.

(i) Reading

Reading can be defined as understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, develop one's knowledge and potential, and participate in the society (OECD, 2018).

The curriculum identifies the following ten reading constructs to evaluate the reading skills of Grade 12 students.

- Read the texts intensively for information and understanding.
- Read a variety of literary texts for pleasure, appreciation, and interpretation.
- Read the texts and critically analyze, interpret, and evaluate the information.
- Read the texts closely and understand the structure and organization of the text.
- Read the texts and predict the content and make inferences.
- Read the texts and take notes.
- Read and interpret the Para-orthographic texts.
- Read texts and deduce the meaning of unfamiliar lexical items from the context.
- Use an authentic English dictionary, thesaurus, encyclopedia, and academic reference material.
- Read and identify the practices and values of national and target cultures.

In order to achieve these reading constructs, the curriculum expects 48 LOs covering the different levels of learning. Some of the LOs are given below. (Refer to the curriculum for the detailed list of learning outcomes.)

- Can scan the text and retrieve specific information from it.
- Can distinguish between cause and effect and fact and opinions.
- Can find out main ideas and supporting details.
- Can read and interpret literary texts (e.g. short stories, essays, poems and dramas) from a wide variety of authors, subjects and genres.
- Can appreciate literary texts of appropriate level.
- Can compare the structure of different types of text organization.
- Can interpret and integrate information presented in diagrammatic forms (charts, graphs, tables, maps etc.)

(ii) Writing

Writing allows students to put their feelings and ideas on paper, to organize their knowledge and beliefs into convincing arguments, and to convey meaning through well-constructed text. Spelling, vocabulary, grammar, and organization come together and grow together to help the student demonstrate more advanced writing skills each year (Michigan State University, 2002).

The curriculum identifies the following 16 constructs for the writing skill. The constructs for writing comprise ‘Write’, ‘Interpret’ and ‘Use’ tasks, which are largely self-explanatory.

- Compose well-formed paragraphs.
- Write different kinds of letters and emails with appropriate format and layout.
- Write well-organized essays on the given topics and the topics of own interest.
- Write news articles on current issues.
- Write formal reports in an appropriate style and format.
- Narrate a sequence of events and personal experiences.
- Describe a person or event appropriately.
- Summarize a text.
- Write a character sketch.
- Write a book/film review.
- Transfer information from tables, graphs, and charts to prose and vice versa.
- Prepare communiqué and press release.

- Use the mechanics of writing properly.
- Use various strategies for generating and organizing ideas for writing.
- Apply process approach to writing for producing variety of creative writings.
- Use an authentic English dictionary, thesaurus, encyclopedia, and academic reference material.

The broader constructs above are expected to meet with the following LOs in writing. (See the curriculum for detail.)

- Can compose well-formed paragraphs including the appropriate topic sentence, supporting details and a concluding sentence.
- Can create blogs for expression.
- Can narrate a personal experience appropriately.
- Can summaries a text into a short form condensing the information.
- Can transfer information from tables, graphs and charts to prose and vice versa.
- Can use a range of organizational strategies such as clustering, webbing, and mapping to present information.
- Can critically analyze the sample writings to find out their structure and styles.
- Can apply the stages of process approach (i.e. planning, making an outline, preparing the first draft and revising, editing and producing the final draft) to create a variety of creative writings such as essays, personal experiences and articles.

Since grammar and vocabulary are equally significant for developing all four skills of language, the curriculum aspires to teach them in an integrated manner. The same applies for testing as well. They can be assessed via listening, speaking, reading and writing in an incorporated way. The language functions prescribed in the present SG are intended for developing tasks for listening and speaking whereas the curriculum expects grammar to be linked to the language functions. Nevertheless, both grammar and vocabulary are expected to be assessed separately in the SG.

(iii) Listening

Listening includes students' ability to listen for basic interpersonal, instructional, and academic purposes, and use the information to make connections and draw inferences (Government of India, 2012⁶). The present curriculum defines the following 8 broader learning constructs for listening

⁶https://cbseacademic.nic.in/web_material/Circulars/2012/63_Guidelines_for_Assessment_of_Speaking_and_Listening_Skills.pdf

- Identify and discriminate stress and intonation patterns.
- Listen to the spoken text and understand its gist and retrieve specific information from it.
- Make inference while listening.
- Listen to the spoken text and critically analyze and evaluate the information in it.
- Listen to the spoken text and take note of important information.
- Participate actively and effectively in an interaction.
- Listen to instructions, directions and announcements and follow them.
- Gain knowledge and understanding of target culture(s) through listening.

In order to meet the requirements of the listening constructs, the curriculum mentions 33 LOs for listening, some of which are given below. (Refer to the curriculum for detail.)

- Can identify the speaker's attitudes and feelings through their use of stress and intonation.
- Can retrieve specific information from spoken English, and take notes.
- Can identify the gist, main idea and supporting details of a listening text.
- Can compare and contrast information.
- Can demonstrate an understanding of the patterns of interactions from various English speaking cultures.

(iv) Speaking

Speaking refers to the ability of learners to employ their communicative skills and engage in discussions in an analytical and creative manner. The curriculum outlines the following twelve constructs for speaking.

- Participate effectively in interactions and conversations.
- Participate effectively in an informal discussion.
- Participate effectively in a formal discussion.
- Give and take an interview.
- Use telecommunications effectively.
- Narrate as sequence of events or process.
- Use supra-segmental features like stress, tone, and intonation for expressing range of meanings and emotions.

- Make effective presentations.
- Describe, people, objects, events etc.
- Seek and provide a wide variety of information.
- Speak with critical analysis and evaluation.
- Understand and demonstrate inter-cultural understanding.

The curriculum defines 48 LOs to measure the constructs of speaking skills, some of which are given below. (See the curriculum for detail.)

- Can speak fluently, accurately and effectively according to social norms and cultural values in different situations on a wide range of general, academic, vocational or leisure topics.
- Can ask questions for clarification and understanding.
- Can present ideas, opinions, experiences and arguments with confidence.
- Can make proper use of extra linguistic features such as facial expressions and gestures.
- Can make critical remarks or express disagreement.
- Can narrate a sequence of events or processes using appropriate structures and vocabulary.

The curriculum also expects the inclusion of 21 language functions while selecting topics to construct speaking tasks. Some of the language functions are given below. (Refer to the curriculum for detail.)

- Expressing feelings, emotions and attitudes
- Arguing/defending a point

3.1.4 Assessment Types

The curriculum recommends the inclusion of both internal and external assessments. The respective school conducts internal assessment whereas NEB conducts external assessment. As the grades obtained by the students in both types of assessments are incorporated in their academic transcripts, it is worthwhile to incorporate both internal and external assessment in this chapter. The internal assessment is conducted to assess listening and speaking skills of the students. The external assessments will be used to assess student performance in reading and writing, and, generate the appropriate grades.

The internal assessment will carry 25% weightage and the external assessment will carry 75% weightage. The section below elaborates what they comprise.

3.1.4.1 External Assessment

External assessment covers 75 marks. The external assessment focuses on reading comprehension and writing along with grammar and vocabulary tasks. This section presents the SG on each assessment area in the external assessment.

(i) Test Specification Grid: Reading

The SG identifies four levels of comprehension for Reading 1 whereas levels of comprehension are not clearly stated for constructing items from the literature section of the textbook. Therefore, this framework utilizes the same levels of comprehension i.e. Literal Comprehension, Reorganization, Inference and Evaluation and reflection for constructing items from the literature section as well. The first two categories, literal comprehension and reorganization, deal with the facts as presented orally or in the books the students have read, and thus result in closed questions that have a single correct response. A possible exception is synthesizing if the combination of facts presented leads to a totally new idea. Under those conditions, the student has creatively added his or her uniqueness to the presented information. However, in classroom learning, synthesis is most often the putting together of facts to reach a generalization or concept or definition. The remaining categories will always involve the student's own background of experience and/or prior knowledge. As a result, it is possible to have as many different, but correct, responses as there are students present, since each brings to school a different background of home, family, friends, and learning. These categories therefore lead to the development of open-ended questions.

Table 3.1: Present Specification Grid - Reading

Reading Types	Content Elaboration	Expected skills to be measured	Item Format	Comprehension Type	Marks
Reading 1	One unseen prose text of about 500 words	- Understanding general content of paragraphs or sections - Identifying and understanding specific information in the passage - Scanning and understanding information - Understanding the opinions of the writer - Understanding words in context - Identifying aims of a passage - Understanding details and order of information -	Any three types of : - True/False/Not given - Matching - Multiple choice - Sentence Completion - Ordering - SAQ - Summary Completion	- Literal Comprehension - Reorganization - Inference - Evaluation	15

Reading Types	Content Elaboration	Expected skills to be measured	Item Format	Comprehension Type	Marks
Reading 2	Literature section from the prescribed textbook for Grade XII. Short Stories: Unit 1 – 7 Poems: Unit 1 – 5 Essays: Unit 1 – 5 One Act Plays: Unit 1 – 3	- Comprehending - Narrating - Summarizing - Writing character sketch - Paraphrasing - Writing theme/central idea of the text - Comparing and contrasting - Making judgment (e.g. Title justification) - Arguing - Analyzing and interpreting - Explaining with reference to context - Literary interpretation - Critical appreciation	- Five short answer questions - Two long answer questions	- Literal Comprehension - Reorganization - Inference - Evaluation	20

Levels of Comprehension: Reading comprehension refers to the act of understanding of a written text. When a person reads a text, the person is engaged in a complex array of cognitive processes. Depending upon the types of text, a reader requires using his/her awareness and understanding of phonemes, phonics and ability to comprehend or construct meaning from the text. Reading comprehension includes answering and generating a question, summarizing and being aware of the structure of the text to understand the author's voice. The SG identifies four levels of comprehension viz. Literal Comprehension, Reorganization, Inference and Evaluation and reflection for Reading 1. Nevertheless, it does not specify what kind of comprehension is expected from the literature section (Reading 2). The assessment framework is expecting the same cognitive processes for reading 2 as well. To fill in the gap, the assessment framework attempts to clarify the comprehension levels as given below.

(i) Literal Comprehension (LC): Literal comprehension occurs at the surface level. The details are stated and clear for anyone to identify while reading a particular text. Literal comprehension is often referred to as 'on the page' or 'right there' comprehension. This is the simplest form of comprehension. Literal Comprehension questions are designed to elicit ideas and information that are explicitly stated in the reading text. The students/examinees are expected to locate or identify facts such as the names of characters, the time of the story, or the place of the story or just about any other kind of explicit fact or detail requiring literal comprehension. Most importantly, literal comprehension refers to recognition and the recall of ideas and information presented in a sentence.

Example:

Dogs and cats should never be permitted to eat chocolate, because chocolate works like a poison in their bodies. Chocolate contains a chemical called the obromine, which is similar to caffeine. Human bodies are able to process the the obromine without any ill side effects, but dogs and cats cannot.

Questions:

- Which two pet animals are mentioned in the text?
- Why should dogs and cats not be allowed to eat chocolate?
- What does chocolate contain?

(ii) Reorganization(RE):Reorganization covers the literal understanding of the text by combining information from various parts of the text. Reorganization comprehension requires some curiosity and creativity. Reorganization requires students to analyze, synthesize, and/ or organize ideas or information explicitly stated in the text. The questions in this level are constructed in such a way that the students need to understand various parts of the text to answer them. In other words, the response of a particular question cannot be picked up straight forward but students can create their answers by reading two or more words or sentences. To produce the desired thought product, the students may utilize the statements of the author verbatim or they may paraphrase or translate the author's statements.

Example:

As more people came to live in the area many trees and bushes were cut down. As a result, the number of birds grew less and less. The remaining few are protected.

Question:

- Why did the number of birds grow less and less?

(iii) Inference (IN): Inference level covers use of cognitive process to deduce implied, inferred or assumed meaning based on evidence and reasoning. Making inferences involves more than a literal understanding. Inference questions are designed in such a way that students use their literal understanding of the text combined with their prior knowledge and intuition. The answer of an inference question is open since it is not explicitly stated. Students create their answers by drawing conclusions based on some clues and evidence given in the text.

Example:

Every day after work Dinesh took his muddy boots off on the steps of the front gate. Radhika would have a fit if the boots made it so far as the welcome mat. He then took off his dusty overalls and threw them into a plastic garbage bag; Radhika left a new garbage bag tied to the entrance railing for him every morning. On his way in the house, he dropped the garbage bag off

at the washing machine and went straight up the stairs to the shower as he was instructed. He would eat dinner with her after he was “presentable,” as Radhika had often said.

Questions:

- What type of job does Dinesh do?
- Describe Radhika.
- What is the relationship between Dinesh and Radhika?

(iv) Evaluation and Reflection(ER): Evaluation and Reflection level covers reading beyond lines that requires personal judgment i.e. analyzing, evaluating and creating. Evaluation requires the students to give a global or comprehensive judgment about some aspect of the text. The evaluative questions are open in nature and therefore it may include both positive and negative responses based on the students’ understanding. In other words, the students may not agree with what the examiner assumes to happen. The students have to extrapolate to respond the evaluative questions as the answers of the evaluative questions are not found in the text.

Example:

Book clubs are a great way to meet new friends or keep in touch with old ones, while keeping up on your reading and participating in lively and intellectually stimulating discussions. If you’re interested in starting a book club, you should consider the following options and recommendations.

The first things you’ll need are members. Before recruiting, think carefully about how many people you want to participate and also what the club’s focus will be. For example, some book clubs focus exclusively on fiction, others read nonfiction. Some are even more specific, focusing only on a particular genre such as mysteries, science fiction, or romance. Others have a more flexible and open focus. All of these possibilities can make for a great club, but it is important to decide on a focus at the outset so the guidelines will be clear to the group and prospective member.

Questions:

- What is the purpose of this text?
- Do you agree or disagree with the idea of the author? Why, why not? Give reasons to support your answer.
- Would you suggest people to form book clubs? Why, why not? Explain.

The following excerpt from page 224-225 of Grade XII English textbook gives an idea for constructing test items for terminal examinations.

Read the following text and answer the questions that follow.

Frightened by that nightmare, Pelayo ran to get Elisenda, his wife, who was putting compresses on the sick child, and he took her to the rear of the courtyard. They both looked at the fallen body

with a mute stupor. He was dressed like a rag picker. There were only a few faded hairs left on his bald skull and very few teeth in his mouth, and his pitiful condition of a drenched great-grandfather took away any sense of grandeur he might have had. His huge buzzard wings, dirty and half-plucked, were forever entangled in the mud. They looked at him so long and so closely that Pelayo and Elisenda very soon overcame their surprise and in the end found him familiar. Then they dared speak to him, and he answered in an incomprehensible dialect with a strong sailor's voice. That was how they skipped over the inconvenience of the wings and quite intelligently concluded that he was a lonely castaway from some foreign ship wrecked by the storm. And yet, they called in a neighbor woman who knew everything about life and death to see him, and all she needed was one look to show them their mistake.

Questions, Answer Keys and Explanations:

1. Who was not well in Pelayo's family? (LC)

Answer Key: Any answer that mentions: the child

Explanation: This question is a literal comprehension question designed to measure the student's ability to identify the explicitly stated information in the text because **sick child** is explicitly stated. And also the answer is found in a single sentence. Furthermore, literal comprehension question seeks specific information such as a noun or a number.

2. Describe the fallen body in one sentence. (RE)

Answer Key: Any answer that mentions: The fallen body was dirty, had a bald head, enormous wings, and, had very few teeth in his mouth.

Explanation: This question is a reorganization question designed to measure the student's ability to make meaning by relating two or more than two pieces of explicitly given information across the sentences in a paragraph because the students create the answer by combining the various parts of the text. In order to write the answer of this question, the students have to locate information such as dressed like a rag picker, bald skull, very few teeth in his mouth and dirty and half-plucked.

3. What made Pelayo and Elisenda think that the fallen body was not an angel? (IN)

Answer Key: Any answer that mentions: enormous and muddy wings incomprehensible dialect and the strong sailor's voice.

Explanation: This question is an inference question designed to measure the student's ability to infer or make an educated guess because the answer is not in the text. But there are clues such as buzzard wings, dirty and half plucked, forever entangled in the mud and strong sailor's voice that can appear as an evidence to make an educated guess that the enormous wings cannot help a body to fly like an angel that common people can think of, the angel's wings cannot be muddy. Furthermore, the incomprehensible speech and the sailor's voice are enough to think that he was a castaway from the foreign wrecked ship.

4. What would you do if you saw the fallen body? Give a reason to support your answer. (EV)

Answer Key: Any answer that mentions: scared and run away/ call someone for help/ would not dare to go near

Explanation: This question is an evaluative question designed to measure the student's ability to make judgment using their prior knowledge from their real life situation because it demands the answer from the students' head. The answer is not in the text but the students need to make some judgment to decide what they would do. They could say anything by presenting their logic.

The specification grid mentions different skills such as comprehending, narrating, summarizing, writing character sketch, paraphrasing, writing theme/central idea of the text, comparing and contrasting, making judgment (e.g. Title justification), arguing, analyzing and interpreting, explaining with reference to context, literary interpretation and critical appreciation as the type of questions for Reading 2. It is expected that the items for testing reading comprehension from literature section are constructed on four different levels of cognitive processes viz. Knowledge, Understanding, application and Higher Abilities as suggested in the elaborated specification grid.

(ii) Test Specification Grid: Writing

The test specification grid comprises of 3 types of writing tasks to test the writing skills of the students. The table below explicates the writing assessment.

Table 3.2: Present Specification Grid – Writing

Task Types	Areas to be assessed	Expected word limit	Item Format	Marks
Task 1	Any one of: Paragraph writing Summary writing Interpreting graphic text News story writing Note-taking Skeleton stories	150 words	Constructed	7
Task 2	Any one of: Personal letter Job application letter Letter to the editor Business letter Emails Writing a CV	180 words	Constructed	8
Task 3	Any one of: Essay Travelogue/memoir Book/film review Biography Diary entry Communique Press release	300 words	Constructed	10

(iii) Present Test Specification Grid: Grammar

The SG identifies the following areas of grammar for assessment. Although it does not mention the types of task/item, some possible formats are included in the table below.

Table 3.3: Present Specification Grid – Grammar

S. No.	Areas to be assessed	Task Types	Item Format	Marks
1	Adjectives and adverbs	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Grammar in Context	1
2	Concord/subject verb agreement	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Grammar in Context	1
3	Prepositions	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Grammar in Context	1
4	Modal auxiliaries	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Grammar in Context	1
5	Tense and aspects	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Grammar in Context	1
6	Infinitives and gerunds	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Grammar in Context	1
7	Conjunctions	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Reproduction	1
8	Relative clause	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Grammar in Context	1
9	Voice	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Reproduction	1
10	Reported speech	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Reproduction	1

(iv) Present Test Specification Grid: Vocabulary

The SG comprises of the following areas of vocabulary for assessment. Although it does not mention the types of task/item, some possible formats are included in the Table 3.4 below.

Table 3.4: Present Specification Grid - Vocabulary

S.N.	Areas to be assessed	Task Types	Item Format	Marks
1	Sound system of English: consonants and vowels	Any one of: - sentence completion - Multiple Choice - SAQ	Selected / constructed	1
2	Vocabulary study - Stem/root - Suffixes - Prefixes - Derivation - Inflexion - Synonyms/antonyms - Parts of speech - Idioms and phrases - Nouns-number - Verb conjugation - Spelling – Punctuation	Any two of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Selected / constructed	2
3	Dictionary use	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Selected / constructed	1
4	Idioms and phrasal verbs	Any one of: - sentence completion - identifying/correcting mistakes - Multiple Choice - SAQ	Selected / constructed	1

3.2 Elaboration of Specification Grid

The present SG does only state the type and the number of items to be constructed but does not present the details of the necessary components an item writer needs to be aware of. These components include information such as how many items on each comprehension levels, which items attempt to test particular learning outcome and the percentage of the weightage. The elaborated SG attempts to address the comprehensive details to help an item writer to develop the items to measure the student's ability to respond.

3.2.1 Elaboration of Specification Grid for External Evaluation

The reading and writing sub-domains are elaborated for the purpose of development of standardized tests for the Grade 12 examination in this section. Development of the standardized tools that include administration guidelines and training and evaluation criteria such as rubrics are essential to ensure a robust, reliable assessment. Another aspect to be considered would be the time and resources needed for a technically robust assessment of these skills. The elaborated SG is given in the table 4.10 below. Item writers are expected to construct items as per the criteria mentioned in the SG for securing validity and reliability of the test.

Table 3.5: Elaborated Specification Grid

Contents	Sub-contents/Skills	Knowledge (Literal Comprehension) 20%			Understanding (Reorganization) 20%			Application (Inference) 27%			Higher ability (Evaluation) 33%			No. of each type of questions			Total No. of question & marks	Remarks
		V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q		
One unseen prose text of about 500 words from: Book/film reviews/News reports and articles/Stories/Reports/Letters or emails/Essays/Biographies/autobiographies/Product Guides/Blogs/Brochures/Travelogues/Memoir	- Understanding general content of paragraphs or sections - Identifying and understanding specific information in the passage - Scanning and understanding information - Understanding the opinions of the writer - Understanding words in context - Identifying aims of a passage - Understanding details and order of information	7 (1)	-	-	3 (1)	-	-	3 (1)	-	-	2 (1)	-	-	15	-	-	15 (15)	In the case of VSAQ, any three of the following item-types should be asked. However, one type of question should test the vocabulary in context in the following format. - Multiple Choice - True/False/Not Given - Sentence Completion - Matching - Ordering - Summary Completion - Short Answer Questions
Short Stories (Lesson 1-7)	Comprehending	-	3 (2)	-	-	-	-	-	-	1 (5)	-	2 (2)	1 (5)	-	5	2	7 (20)	For SAQ 2 items from short

Contents	Sub-contents/Skills	Knowledge (Literal Comprehension) 20%			Understanding (Reorganization) 20%			Application (Inference) 27%			Higher ability (Evaluation) 33%			No. of each type of questions			Total No. of question & marks	Remarks
		V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q		
Poems (Lesson 1-5)	• Narrating • Summarizing • Writing character sketch • Paraphrasing • Writing theme/central idea of the text • Comparing and contrasting • Making judgment (e.g. Title justification) • Arguing • Analyzing and interpreting • Explaining with reference to context • Literary interpretation • Critical appreciation																	stories, 1 item from poems, 1 item; from essays, 1 item; from one act-plays For LAQ 2 questions should be asked from distinct genre. Only one question (whether short or long answer) should be asked from a single lesson.
Essays (Lesson 1-5)																		
One Act Plays (Lesson 1-3)																		
Writing Task 1	Paragraph, Summary, chart interpretation, news story, note taking, skeleton story	-	-	-	-	-	1 (7)	-	-	-	-	-	-	1	-	-	1 (7)	Task1= Guided writing, Task 2= Free writing, Task 3 = Free writing Clear instructions and stimulus/context should be provided
Writing Task 2	personal letter, job application letter, letter to the editor, business letter, emails, writing a CV)	-	-	-	-	-	-	-	-	1 (8)	-	-	-	1	-	-	1 (8)	

Contents	Sub-contents/Skills	Knowledge (Literal Comprehension) 20%			Understanding (Reorganization) 20%			Application (Inference) 27%			Higher ability (Evaluation) 33%			No. of each type of questions			Total No. of question & marks	Remarks
		V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q		
Writing Task 3	essay, travelogue/memoir, book/film review, biography, diary entry, communique and press release	-	-	-	-	-	-	-	-	-	-	-	1 (10)	1	-	-	1 (10)	with each question. Word limits for writing task 1, 2 and 3 are 150, 180 and 300 words respectively.
Grammar	a. Adjectives and adverbs	1 (1)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	10 (10)	Each Grammar Item should be asked individually following one of these question types: MCQ/Identifying Error/Usage in Context/ Fill in the Blanks/Transformati on
	b. Concord/ subject verb agreement	-	-	-	1 (1)	-	-	-	-	-	-	-	-	1	-	-		
	c. Prepositions	-	-	-	1 (1)	-	-	-	-	-	-	-	-	1	-	-		
	d. Modal auxiliaries	-	-	-	1 (1)	-	-	-	-	-	-	-	-	1	-	-		
	e. Tense and aspects	-	-	-	-	-	-	1 (1)	-	-	-	-	-	1	-	-		
	f. Infinitives and gerunds	-	-	-	-	-	-	-	-	-	1 (1)	-	-	1	-	-		
	g. Conjunctions	-	-	-	-	-	-	1 (1)	-	-	-	-	-	1	-	-		
	h. Relative clause	-	-	-	-	-	-	1 (1)	-	-	-	-	-	1	-	-		
	i. Voice	-	-	-	-	-	-	-	-	-	1 (1)	-	-	1	-	-		
	j. Reported speech	-	-	-	-	-	-	-	-	-	1 (1)	-	-	1	-	-		

Contents	Sub-contents/Skills	Knowledge (Literal Comprehension) 20%			Understanding (Reorganization) 20%			Application (Inference) 27%			Higher ability (Evaluation) 33%			No. of each type of questions			Total No. of question & marks	Remarks
		V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q	V S A Q	S A Q	L A Q		
Vocabulary and Sound system	Sound system of English: consonants and vowels	1 (1)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	5 (5)	Each vocabulary Item should be asked individually following one of these question types: Identifying Error/Usage in Context/ Fill in the Blanks /Same/different Vowel Sound/Same/different Consonant Sound/MCQ/ Head/Guide words
	Vocabulary study - Stem/root - Suffixes - Prefixes – Derivation - Inflection - Synonyms/antonyms - Parts of speech - - Nouns-number - Verb conjugation - Spelling – Punctuation	-	-	-	2 (1)	-	-	-	-	-	-	-	-	2	-	-		
	Dictionary use	-	-	-	-	-	-	1 (1)	-	-	-	-	-	1	-	-		
	Idioms and phrasal verbs	-	-	-	-	-	-	-	-	-	1 (1)	-	-	1	-	-		
Total questions		9	3	-	8	-	1	7	-	2	6	2	2	30	5	5	40 (75)	
Total marks		9	6	-	8	-	7	7	-	13	6	4	15	30	10	35	75	

Note: 1. Designated weightage in the combined cell should be met, but ± 2 marks variation will be allowed within a unit/content area. But no unit can be nil.

2. SAQ in reading comprehension should ensure that 1 mark will be assigned per element expected (**a word/chunks of words/an expression/a sentence**) as correct response.
3. Textbook based SAQs should ensure that 2 marks will be assigned for an expected correct response in about 50-75 words whereas 5 marks will be assigned for 3 short paragraphs not exceeding 150 words for each expected correct response in LAQ.

4. The distribution of cognitive domain of questions should be nearly 20% knowledge/remembering (**Literal comprehension**), 20% understanding (**Reorganization**), 28% applying (**Inference**) and 32% higher ability (**Evaluation & reflection**) level. **Literal Comprehension** covers the explicitly stated information whereas **Reorganization** covers the literal understanding of the text by combining information from various parts of the text. **Inference** level covers use of cognitive process to deduce implied, inferred or assumed meaning based on evidence and reasoning. **Evaluation and Reflection** level covers reading beyond lines that requires personal judgment i.e. analyzing, evaluating and creating.
5. In the case of textbook based SAQ, there will be 2 "OR" questions and in the case of textbook based LAQ there will be 1 "OR" question.
6. Figures in each cell indicate the number of questions whereas figures in the parentheses indicate full marks for each respective question.
7. VSAQ refers to all question-types that carry 1 mark (i.e. items for testing reading comprehension, grammar and vocabulary skills), SAQ refers to Textbook Based Short Answer Questions and LAQ refers to Textbook Based Long Answer Questions and questions for testing Writing Skills.
8. Abbreviations used in the cells above refers to Very Short Answer Questions (VSAQ), Short Answer Questions (SAQ) and Long Answer Questions (LAQ).
9. Flexibility to create a similar matrix in or between the sub contents is open as far as the content coverage and cognitive behaviours are maintained. Test developers can create a new SG should they desire to write items from the content areas not covered in this SG as far as the cognitive behaviours are maintained.

3.2.2 Internal Assessment

Internal assessment covers 25 marks. For the purpose of internal assessment, all classroom activities along with student's individual personal work will be documented. Along with the skills of language, the participation of students in classroom activities as well as their score from terminal exams will be included in the internal assessment component. Table 4.11 below shows the marks allocated to each assessment area in the internal assessment.

Table 3.6: Allocation of Marks for Internal Assessment

Assessment Area	Marks
Participation	3
Listening Test	6
Speaking Test	10
Score from Terminal Examinations	6
Total Marks	25

The SG for internal assessment is elaborated as below:

(i) Elaboration of Test Specification Grid for Internal Assessment: Participation

The specification grid mentions three different areas of assessment under participation. Table 4.12 below illustrates this.

Table 3.7: Specification Grid for Participation

S. N.	Areas	Criteria	Marks	Remarks
1	Participation	Attendance	1	Marks to be awarded on daily basis and an average of the total marks to be allocated
		Classroom Performance and activities	1	
		Assignments and project works	1	

(ii) Elaboration of Test Specification Grid for Internal Assessment: Listening

The respective schools/colleges administer the listening test based on the elaborated SG for listening below.

Table 3.8: Specification Grid for Listening

S. N.	Types of Sound Files	Length of Sound files	No. of items and marks	Item Types	Constructs to be assessed
1	lectures, talks, presentations, poetry, interviews, conversations, short discussions, advertisements, personal accounts (oral	Maximum 3 minutes	Two sound files each with 3 questions carrying 1	Any two of: - Multiple Choice Questions - Fill in the	- Specific information - Gist - Main information

S. N.	Types of Sound Files	Length of Sound files	No. of items and marks	Item Types	Constructs to be assessed
	anecdotes, past experiences) narratives (e.g. radio dramas), instructions and directions, factual accounts (e.g. eye news reports, eye witness accounts) explanations, public announcements operating instructions, weather forecast)		mark each	blanks • Matching • Short answer questions	and supporting details • Specific information and important details
Note: The sound files should be authentic and clearly articulated with normal speed of delivery.					
Alternative test methods for students with speech and hearing difficulties For the students with speech and hearing difficulties, any one of the following types of questions can be asked: • Paragraph writing on a given topic • Writing a letter • Writing a description of the given picture • Time: 20 minutes					

(iii) Elaboration of Test Specification Grid for Internal Assessment: Speaking

The respective schools/colleges administer the speaking test based on the elaborated specification grid for speaking below.

Table 3.9: Specification Grid for Speaking

S. N.	Areas	Marks	No. of questions and expected responses	Guidelines	Time
1	Context creation: Greeting and introduction	0		The teacher creates the context by introducing himself/herself.	1 minute
2	Interview	3	3	The students will be asked at least any three questions on their personal affairs and immediate situation. (How are you preparing for the exam? What will you study after grade 12? What's your aim in life? Do you like English? Why?/Why not?)	2-3 minutes
3	Picture description	4	8 sentences	The students are given a picture or a set of pictures. They are expected to describe the picture in at least 8 sentences.	4-6 minutes
4	Speaking on a given topic	3		The students will be given a topic like; my school, my hobby, my family. They will get one-minute time to think over the topic and then they will speak on the topic. This will also be done individually.	3-5 minutes
Alternative test methods for students with visual difficulties For the students with visual difficulties, ask them to narrate a sequence of events instead of the task 2 'describing pictures' above.					

(iii) Elaboration of Test Specification Grid for Internal Assessment: Written Tests

The respective schools/colleges conduct terminal examinations, and, based on those examinations, the scores of individual students are converted as specified in the following grid.

Table 3.10: Specification Grid for Scores from Terminal Examination

S. N.	Exams	Marks	Guidelines
1	First Term	3	The obtained marks in the terminal exams should be converted into 3 in each term.
2	Second Term	3	

3.3 Test Development

Items are developed to assess students' achievement of the learning outcomes prescribed by the curriculum. The SG provides explication of the sampling of items to make the test representative in terms of content area, cognitive skills, and format of items. Item writers should pay attention to the following considerations when they are developing items for the standardized test.

- The objective of each item should be a learning outcome prescribed in the curriculum.
- The item should be developed based on one of the cells of the elaborated SG.
- The answer key for the select type or the MS or the rubric for the constructed response items should be developed along with the first draft of the item (see Section 4.3.5. Sample rubrics).
- The test matrix should correspond with the SG, but it should be different for each assembled test set for pretesting as well as each final set.

3.3.1 Elaboration of Intended Objectives in Curriculum

The Grade 12 standardized test is supposed to assess and certify students' learning achievements at the end of secondary education. This is the certification of the level of learning achievement mandated by the curriculum. Each item included in the test should assess an objective of the curriculum. Therefore, the item writer should be clear about the learning outcomes in the curriculum and then plan for the development of items. The item writers would be provided a matrix of the content area, and intended learning outcome.

3.3.2 Specification of Cell Code

Each item developed should be linked to the learning outcomes in the curriculum and it should align with the SG. For this purpose, the SG is further elaborated for reading and writing domains of English language below.

3.3.2.1 Specification of Cell Code: Reading

Table 3.11: Example of Cell Code - Reading

Test area/ Constructs	Sentence Completion					True/False/ Not Given					Multiple Choice Question					Matching					Sequencing					Summary Completion					Short Answer Question					Long Answer Question	
Reading 1: One unseen prose text One type of comprehe nsion question each carrying 1 mark	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
Reading 2: Seven text-based questions from Literature Section Short Answer Questions = 5x2 = 10 Long Answer Questions = 2x5 = 10	- Short and long answer questions should cover the following skills: - Comprehending - Narrating - Summarizing writing character sketch - Paraphrasing - Writing theme/central idea of the text - Comparing and contrasting - Making judgment (e.g., title justification - Arguing - Analyzing and interpreting - Explaining with reference to context - Literary interpretation critical appreciation																														36	37	38	39	40	41	42

The table assigns the number for each cell of the types of items. Therefore, the item bank accumulates the individual item in the specified cell.

3.3.2.2 Specification of cell code: Writing

Similarly, the SG for writing domain is elaborated below.

Table 3.12: Example of Cell Code - Writing

Writing Task 1						Writing Task 2						Writing Task 3					
PG	SW	IGT	NSW	NT	SS	PL	JAL	LTE	BL	EM	WCV	ES	TLM	BFR	BG	DE	CPR
43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

The writing items are given the numbers as specified in the cell code given in Table 3.12.

Abbreviations used:

Writing Task 1

Paragraph writing (PG), Summary writing (SW), Interpreting graphic text(IGT), News story writing(NSW), Note taking(NT), and Skeleton stories(SS).

Writing Task 2

Personal letter (PL), Job application letter(JAL), Letter to the editor(LTE), Business letter(BL), Emails(EM), Writing a CV(WCV).

Writing Task 3

Essay (ES), Travelogue/memoir(TLM), Book/film review(BFR), Biography(BG), Diary entry(DE), Communique and press release(CPR).

3.3.2.3 Specification of cell code: Grammar

The SG for grammar aspects is elaborated below.

Table 3.13: Example of Cell Code - Grammar

GT1				GT2				GT3				GT4				GT5				GT6				GT7				GT8				GT9				GT10			
S	I	M	S	S	I	M	S	S	I	M	S	S	I	M	S	S	I	M	S	S	I	M	S	S	I	M	S	S	I	M	S	S	I	M	S	S	I	M	S
C	C	C	A	C	C	C	A	C	C	C	A	C	C	C	A	C	C	C	A	C	C	C	A	C	C	C	A	C	C	C	A	C	C	C	A	C	C	C	A
	M	Q	Q		M	Q	Q		M	Q	Q		M	Q	Q		M	Q	Q		M	Q	Q		M	Q	Q		M	Q	Q		M	Q	Q		M	Q	Q
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Abbreviations used:

Grammar Task (GT), Sentence completion (SC), Identifying/correcting mistakes (ICM), Multiple Choice Question (MCQ), Short Answer Questions (SAQ)

The grammar items are given the code number as given in Table 3.13 in such a way that the desired types of items can be withdrawn for the assembled test.

3.3.2.4 Specification of cell code: Vocabulary

The SG for vocabulary aspects is elaborated below.

Table 3.14: Cell Code for Vocabulary Items

VOC1			VOC2					VOC3												VOC4			VOC5																					
Consonants and vowels			Stem/root			Suffixes Prefixes		Derivation Inflexion		Synonyms/antonyms			Parts of speech		Nouns-number		Verb conjugation		Spelling		Punctuation		Dictionary use			Idioms		Phrasal verbs																
101	SC		102	ICM		106	ICM		110	ICM		114	ICM		118	ICM		122	ICM		126	ICM		130	ICM		134	ICM		138	ICM		142	ICM		146	ICM		150	ICM				
103	MCQ		104	SAQ		107	MCQ		111	MCQ		115	MCQ		119	MCQ		123	MCQ		127	MCQ		131	MCQ		135	MCQ		139	MCQ		143	MCQ		147	MCQ		151	MCQ				
105	SC		108	SAQ		109	SC		112	SAQ		113	SC		120	SAQ		124	SAQ		125	SC		128	SAQ		133	SC		136	SAQ		140	SAQ		144	SAQ		145	SC		149	SC	
106	ICM		109	SC		110	ICM		113	SC		114	ICM		121	SC		125	SC		126	ICM		127	MCQ		133	SC		137	SC		141	SC		142	ICM		146	ICM				
107	MCQ		112	SAQ		111	MCQ		116	SAQ		115	MCQ		122	ICM		123	MCQ		125	SC		128	SAQ		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
108	SAQ		113	SC		112	SAQ		117	SC		116	SAQ		121	SC		126	ICM		127	MCQ		129	SC		135	MCQ		139	MCQ		143	MCQ		144	SAQ		145	SC				
109	SC		114	ICM		113	SC		118	ICM		117	SC		122	ICM		125	SC		126	ICM		128	SAQ		133	SC		137	SC		141	SC		142	ICM		146	ICM				
110	ICM		115	MCQ		114	ICM		119	MCQ		118	ICM		123	MCQ		127	MCQ		128	SAQ		129	SC		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
111	MCQ		116	SAQ		115	MCQ		120	SAQ		119	MCQ		124	SAQ		125	SC		126	ICM		128	SAQ		133	SC		137	SC		141	SC		142	ICM		146	ICM				
112	SAQ		117	SC		116	SAQ		121	SC		120	SAQ		125	SC		126	ICM		127	MCQ		129	SC		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
113	SC		118	ICM		117	SC		122	ICM		121	SC		125	SC		126	ICM		127	MCQ		129	SC		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
114	ICM		119	MCQ		118	ICM		123	MCQ		122	ICM		126	ICM		127	MCQ		128	SAQ		129	SC		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
115	MCQ		120	SAQ		119	MCQ		124	SAQ		123	MCQ		125	SC		126	ICM		127	MCQ		129	SC		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
116	SAQ		121	SC		120	SAQ		125	SC		124	SAQ		126	ICM		127	MCQ		128	SAQ		129	SC		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
117	SC		122	ICM		121	SC		125	SC		125	SC		126	ICM		127	MCQ		128	SAQ		129	SC		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
118	ICM		123	MCQ		122	ICM		126	ICM		125	SC		126	ICM		127	MCQ		128	SAQ		129	SC		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
119	MCQ		124	SAQ		123	MCQ		127	MCQ		126	ICM		128	SAQ		129	SC		129	SC		130	ICM		133	SC		136	SAQ		140	SAQ		144	SAQ		145	SC				
120	SAQ		125	SC		124	SAQ		128	SAQ		127	MCQ		129	SC		130	ICM		130	ICM		131	MCQ		133	SC		136	SAQ		140	SAQ		144	SAQ		145	SC				
121	SC		126	ICM		125	SC		129	SC		128	SAQ		129	SC		130	ICM		131	MCQ		132	SAQ		133	SC		136	SAQ		140	SAQ		144	SAQ		145	SC				
122	ICM		127	MCQ		126	ICM		130	ICM		129	SC		130	ICM		131	MCQ		132	SAQ		133	SC		134	ICM		138	ICM		142	ICM		143	MCQ		147	MCQ				
123	MCQ		128	SAQ		127	MCQ		131	MCQ		130	ICM		132	SAQ		133	SC		134	ICM		135	MCQ		136	SAQ		137	SC		141	SC		142	ICM		146	ICM				
124	SAQ		129	SC		128	SAQ		132	SAQ		131	MCQ		133	SC		134	ICM		135	MCQ		136	SAQ		137	SC		138	ICM		142	ICM		143	MCQ		147	MCQ				
125	SC		130	ICM		129	SC		133	SC		132	SAQ		134	ICM		135	MCQ		136	SAQ		137	SC		138	ICM		139	MCQ		142	ICM		143	MCQ		147	MCQ				
126	ICM		131	MCQ		130	ICM		134	ICM		133	SC		136	SAQ		137	SC		138	ICM		139	MCQ		140	SAQ		141	SC		142	ICM		143	MCQ		147	MCQ				
127	MCQ		132	SAQ		131	MCQ		136	SAQ		135	MCQ		137	SC		138	ICM		139	MCQ		140	SAQ		141	SC		142	ICM		143	MCQ		144	SAQ		145	SC				
128	SAQ		133	SC		132	SAQ		137	SC		136	SAQ		138	ICM		139	MCQ		140	SAQ		141	SC		142	ICM		143	MCQ		144	SAQ		145	SC		146	ICM				
129	SC		134	ICM		133	SC		138	ICM		137	SC		139	MCQ		140	SAQ		141	SC		142	ICM		143	MCQ		144	SAQ		145	SC		146	ICM		147	MCQ				
130	ICM		135	MCQ		134	ICM		139	MCQ		138	ICM		140	SAQ		141	SC		142	ICM		143	MCQ		144	SAQ		145	SC		146	ICM		147	MCQ		148	SAQ				
131	MCQ		136	SAQ		135	MCQ		140	SAQ		139	MCQ		141	SC		142	ICM		143	MCQ		144	SAQ		145	SC		146	ICM		147	MCQ		148	SAQ		149	SC				
132	SAQ		137	SC		136	SAQ		141	SC		140	SAQ		142	ICM		143	MCQ		144	SAQ		145	SC		146	ICM		147	MCQ		148	SAQ		149	SC		150	ICM				
133	SC		138	ICM		137	SC		142	ICM		141	SC		143	MCQ		144	SAQ		145	SC		146	ICM		147	MCQ		148	SAQ		149	SC		150	ICM		151	MCQ				
134	ICM		139	MCQ		138	ICM		143	MCQ		142	ICM		144	SAQ		145	SC		146	ICM		147	MCQ		148	SAQ		149	SC		150	ICM		151	MCQ		152	SAQ				
135	MCQ		140	SAQ		139	MCQ		144	SAQ		143	MCQ		145	SC		146	ICM		147	MCQ		148	SAQ		149	SC		150	ICM		151	MCQ		152	SAQ							
136	SAQ		141	SC		140	SAQ		145	SC		144	SAQ		146	ICM		147	MCQ		148	SAQ		149	SC		150	ICM		151	MCQ		152	SAQ										
137	SC		142	ICM		141	SC		146	ICM		145	SC		147	MCQ		148	SAQ		149	SC		150	ICM		151	MCQ		152	SAQ													
138	ICM		143	MCQ		142	ICM		147	MCQ		146	ICM		148	SAQ		149	SC		150	ICM		151	MCQ		152	SAQ																
139	MCQ		144	SAQ		143	MCQ		148	SAQ		147	MCQ		149	SC		150	ICM		151	MCQ		152	SAQ																			
140	SAQ		145	SC		144	SAQ		149	SC		148	SAQ		150	ICM		151	MCQ		152	SAQ																						
141	SC		146	ICM		145	SC		150	ICM		149	SC		151	MCQ		152	SAQ																									
142	ICM		147	MCQ		146	ICM		151	MCQ		150	ICM		152	SAQ																												
143	MCQ		148	SAQ		147	MCQ		152	SAQ		151	MCQ																															
144	SAQ		149	SC		148	SAQ					152	SAQ																															
145	SC		150	ICM		149	SC																																					
146	ICM		151	MCQ		150	ICM																																					
147	MCQ		152	SAQ		151	MCQ																																					
148	SAQ																																											
149	SC																																											
150	ICM																																											
151	MCQ																																											
152	SAQ																																											

The vocabulary items are given the code numbers as given in Table 3.14.

Abbreviations used:

- Vocabulary (VOC)
- Sentence completion (SC),
- Identifying/correcting mistakes (ICM),
- Multiple Choice (MCQ),
- Short Answer Questions (SAQ)

In order to trace individual items, sort the items into different categories or assemble them in a set of tests, develop code(s) and tag the items. In the absence of an item banking system, each item needs to be coded in two ways – one with the cell code to identify the item in the elaborated SG and the second one with the distributed code to identify specific characteristics of the item in terms of content area, item format, and mark weightage as exemplified below.

Table 3.15: Example of Code for the Elaborated Specification Grid - Reading 2

Item Format	Lesson/Chapter in the textbook (from Section 2- Literature)			
	Unit 1: Short Stories	Unit 2: Poems	Unit 3: Essays	Unit 4: One-act Plays
Long Answer Questions	6		7	
Short answer question	1	2	3	4,5

Table 3.16: Example of Code for the Elaborated Specification Grid: Writing

Response Type	Item Format		
	Free Writing 1	Free Writing 2	Free Writing 3
Story			
Paragraph	1		
Summary			
Interpret Graphic text			
News			
Note taking			
Skeleton story writing			
Personal Letter			
Job Application Letter		2	
Letter to the editor			
Business letter			
Email			
CV			
Essay			3
Travelogue/Memoir			
Book/Film Review			
Biography			
Diary Entry			
Communique			
Press Release			

The item will be given the code number of the cell where it falls on the matrix. This code will indicate content area, format of the item, etc. as mentioned in the SG. For example, item with cell code number 1 is Paragraph for Task 1, cell code number 2 is Job Application Letter for Task 2 and cell code number 3 for Task 3 is the Essay. As long as the initial phase of item development remains manual, i.e., until an item banking software is in place, an elaborate code

will also be maintained for each item in order to identify the different aspects of an item including content area, item format, marks weightage as following:

Table 3.17: Example of Item Code for Manual Operation

Sub: English (0041)	Unit	LO	Format	Marks
Elaborated item code	1	2		

The coding for manual operation will be done assigning numbers to each area such as units, learning outcomes, types of comprehension and item formats as given below.

Lesson/Unit/Chapter: 1, 2, 3.....

Learning Outcomes: 1, 2, 3, 4, 5

Types of comprehension/Cognitive Level:

- Literal Comprehension/ Knowledge: 1
- Reorganization/ Understanding: 2
- Inference/Application: 3
- Evaluation and Reflection/ Higher Abilities: 4

Item Format:

- Fill in the gaps/Sentence Completion: 1,2,3...
- True/False/Not Given: 1,2,3...
- Multiple Choice: 1,2,3...
- Matching: 1,2,3...
- Ordering: 1,2,3...
- Short Answer Questions: 1,2,3...

Assigned Marks: Actual Marks (e. g. 1, 2, 5, 7, 8, 10)

Format for Item Card

Item card will be used from the beginning of the item writing process. Along with the item writing, the key or the MS or rubrics will also be developed simultaneously. Item and its answer key/MS/rubrics would pass through the standardization process as one unit. The item writer as well as moderator need to use the item card while constructing and moderating the item. Each item writer and the moderator will be given a code. Finally, the item will be placed in the specific cell for item banking. Given below is the format of an item card.

Table 3.18: Sample Item Card for Item Construction

Subject Code	0	0	4	1		Unit/Chapter/Lesson					0	1	Topic		0	1	
Cell Code	0	0	1	LO	0	1	Cognitive Level	1	2	3	4	Item Format		1	Item Type	0	1
Objectives: This objective of constructing this item is to measure the following learning outcome(s).																	
.....																	
Item: (Constructed/Selected Response)																	
.....																	
Answer Key/Marking Scheme/Rubrics with all possible answers and marks break down.																	
.....																	
Item writer code	0	1	Item Moderator Code	0	1	1	1	Draft/Final									

3.3.3 Test Matrix for Assembled Test Set

The test standardization process will involve assembling of the test, pre-testing, item analysis, and item selection, revision or discarding based on pre-testing outcome, etc. Based on the items accepted after pre-testing, the final set would be prepared and tested to derive various parameters of the test. From the calibrated item bank, parallel sets would be developed. These assembled tests are expected to differ from one another at least to some degree. In order to check such variation, a test matrix would be created for each of the assembled tests and superimposed with the other test matrices to check for variation. A test matrix is shown below.

Table 3.19: Sample Test Matrix for One Assembled Test Set

Area	True/False/NG	Fill in the gaps	MCQ	SAQ	Ordering	LAQ	Marks
Reading 1	5 marks	5 marks		5 marks			15
Reading 2				Lesson: 1,2,3,4,5 5 items x2 marks=10		Lesson: 5, 6 2 items x5 marks =10	20
Writing	Free Writing			Paragraph Writing			7
	Free Writing			Letter Writing			8
	Free Writing			Essay			10
Grammar and Vocabulary	Reproduction and Fill in the blanks						10
	Multiple choice						5

The sample above is an example of the test matrix for one test set. The other sets of the test will differ at least in some of the cells when superimposed as per the elaborated SG.

3.3.4 Marking Schemes

This section provides with the sample answer key, MS and rubrics for scoring SAQ and LAQ from reading sections and for free writing tasks from writing sections. The MS is just a guide to awarding marks to examinees' answers and they should not be considered as model answers. Sample rubrics are provided with two different options for questions carrying two or more marks. Option A uses holistic rubrics and option B uses analytic rubrics. Teachers can develop their own rubrics as given in the sample and use any of them for classroom purposes.

3.3.4.1 Option A: Holistic Rubrics

(i) Sample Holistic Rubrics for Textbook Based Short Answer Question

Holistic rubrics will be used to score the responses for textbook based SAQs. A sample is given in Table 3.20. The teachers can prepare their own scheme similar to the sample for classroom purposes. Alternatively, they can prepare analytic rubrics as given in option B.

Table 3.20: Sample Holistic Rubrics for Textbook Based SAQ

Q. N.	Textbook Based Questions: Short Answer Questions (5 questions each carrying 2 marks)	10
	Descriptors	Marks
2	Chapter 1 SUGGESTED VALUE POINTS:	2
	• Uses rich content relevant to the topic as given in the text. • Makes use of all possible value point. • Demonstrates the ability to use references, allusions, tone and meaning. • Identifies authors, materials, plot and other relevant characteristics • Explicates specific literary, cultural and biographical information when required. • Uses varied vocabulary and sentence structures and linking words • Expresses interesting and unexpected ideas. • Communicates ideas clearly and coherently • Demonstrates fluent and authentic use of the language. • Shows ability to use stylish expression	2
	• Makes use of one or two value points. • The organization of ideas is clear but could be improved • Shows evidence of continuity • Overall communication of ideas is clear with some grammatical, punctuation and spelling errors • Uses limited and often inconsistent vocabulary and sentence structures	1
	• Blank or un-attempted answer • Transliterated language use • Uses completely irrelevant ideas	0

(ii) Sample Holistic Rubrics for Free Writing Task 3.

Holistic rubrics will be used to score the responses for all writing tasks. A sample rubrics for writing task 3 is given in Table 3.21. The teachers can prepare their own scheme similar to the

sample for classroom purposes. Alternatively, they can prepare analytic rubrics based on the criteria mentioned here.

Table 3.21: Sample Holistic Rubrics for Writing Task 3

Q.N.	Descriptors	Marks
6	Essay, Travelogue/memoir, Book/film review, Biography, Diary entry, Communique, Press release	10
Suggested Value Points		
Q.N.	Descriptors	Marks
	- Clearly demonstrates the basics of essay writing such as topic sentence with facts, examples, statistics, anecdotes, reasons etc. - Demonstrates the ability to present ideas with supporting information. - Mentions reasons logically and coherently. - Describes the conditions/contexts very well - Describes or narrates contents/ places/events/characters/atmosphere clearly - Uses appropriate vocabulary and varied sentence structures and transitions - Uses adequate content relevant to the topic - Uses all the given/expected contexts/cues/outlines - Expresses interesting and unexpected ideas. - Uses varieties of linking words - Communicates ideas clearly and coherently - Makes negligible mistakes - Demonstrates fluent and authentic use of the language. - Shows ability to use stylish expression - Uses appropriate layout and/or format	10
	- Clearly demonstrates the basics of essay writing such as topic sentence with examples, statistics, anecdotes, reasons etc. - Demonstrates the ability to present ideas with supporting information. - Mentions reasons logically and coherently. - Describes the conditions/contexts very well - Describes or narrates places/events/characters/atmosphere clearly - Uses appropriate vocabulary and varied sentence structures with transitions - Uses rich content relevant to the topic - Uses most of the given/expected contexts/cues/outlines - Expresses interesting and unexpected ideas. - Uses varieties of linking words - Communicates ideas clearly and coherently - Makes minor mistakes - Demonstrates fluent and authentic use of the language. - Uses appropriate layout and/or format	9
	- Clearly demonstrates the basics of essay writing such as topic sentence with examples, statistics, anecdotes, reasons etc. - Demonstrates the ability to present ideas with supporting information. - Mentions reasons logically	8

Q.N.	Descriptors	Marks
6	Essay, Travelogue/memoir, Book/film review, Biography, Diary entry, Communique, Press release	10
Suggested Value Points		
Q.N.	Descriptors	Marks
	- Describes or narrates places/events/characters/atmosphere clearly - Uses often repeated vocabulary and sentence structures - Uses rich content but often irrelevant to the topic - Uses some of the given cues/outlines - Uses linking words repeatedly - Makes some considerable mistakes without impeding comprehension - Communicates ideas clearly but often incoherent - Demonstrates fluent and authentic use of the language. - Often lacks appropriate layout and/or format	
	- Clearly demonstrates the basics of essay writing such as topic sentence with examples, statistics, anecdotes, reasons etc. - Demonstrates the ability to present ideas with supporting information. - Mentions reasons - Presents meaning often lacking in clarity - Describes or narrates places/events/characters/atmosphere partly - Uses repeated vocabulary and sentence structures - Uses rich content but often irrelevant to the topic - Uses some of the given cues/outlines - Uses linking words repeatedly - Communicates ideas clearly but often incoherent - Makes repeated mistakes - Does not demonstrate fluent and authentic use of the language. - Often lacks appropriate layout and/or format	7
	- Demonstrates the basics of essay writing such as topic sentence with examples, statistics, anecdotes, reasons etc. often incoherently - Demonstrates the ability to present ideas with supporting information. - Presents some of the given cues/outlines used but some effort is required to understand the overall meaning - Uses often irrelevant content and shows little or no originality - Organizes ideas, reasons and circumstances often illogically - Careful and systematic flow of details/events in a story - Shows evidence of continuity - Overall communication of ideas is clear with some grammatical, punctuation and spelling errors - Makes repeated and inconsistent use of vocabulary and sentence structures	6
	- Provides inadequate use of the cues/outline - Overall meaning can be understood but with considerable difficulty - Content is often not relevant - Just follows the given guideline - Organizes ideas haphazardly - Comprehension is frequently impeded	5

Q.N.	Descriptors	Marks
6	Essay, Travelogue/memoir, Book/film review, Biography, Diary entry, Communique, Press release	10
Suggested Value Points		
Q.N.	Descriptors	Marks
	• Uses clumsy expression, lacking in clarity, not easy to follow • Uses ineffective communication of ideas • Frequent grammatical, punctuation and spelling errors • Limited and inconsistent use of vocabulary and sentence structures	
	• Uses the given cues/outlines partially and the meaning is unintelligible • Often uses irrelevant content • Follows the given guideline but with several major points missing • Uses ideas often impossible to understand • Uses confusing and illogical ideas just repetitively arranged with no attempt of organization • Comprehension is often impeded with constant and significant errors in grammar, punctuation and spelling • Makes use of limited and often inappropriate vocabulary and sentence structures	4
	• Does not use the given cues/outlines and the meaning is unintelligible • Often uses irrelevant content • Follows the given guideline but with several major points missing • Uses muddled ideas often impossible to understand • Uses confusing and illogical ideas just repetitively arranged with no attempt of organization • Comprehension is seriously impeded with constant and significant errors in grammar, punctuation and spelling • Makes use of inappropriate vocabulary and sentence structures • Has numerous mistakes of various types	3
	• Comprehension is seriously impeded with constant and significant errors in grammar, punctuation and spelling • Makes use of inappropriate vocabulary and sentence structures • Has numerous mistakes of various types • Irrelevant or just copying question/instruction • Hardly comprehensible • Uses rarely fitted structures	2
	• Ideas just copied • Irrelevant or just copying question/instruction • Hardly comprehensible • Uses rarely fitted structures	1
	• Blank or un-attempted answer • Transliterated language use • Gives completely irrelevant ideas	0

Marking Scheme and Answer Key

Marking Scheme with answer key

Question No. and Questions	Answer Key	Marking Scheme		
		Criteria	Answer-Wise FM	Question-Wise FM
Complete the sentences with correct words highlighted in the text.				
I did not understand what he is saying. Can you explain it to me in which he is talking?	a. Correct Answer: language	Correct Answer:	1	1
		Intelligible answer*:	0.5	
		Wrong/blank answer:	0	
Write whether the statement agrees with the information given in the text. If the statement contradicts the information given in the text. WRITE if there is no information in the text.				
Root college was founded forty years ago.	a. Correct answer: FALSE	Correct answer: Wrong/blank answer:	1 0	1
Answer the questions in ONE SENTENCE each.				
What way do you think that college is different from other colleges?	a. Any answer that mentions: College without walls, professors or classrooms/ admits rural women often grandmothers & teaches them the basics of solar engineering and freshwater technology.	Correct Answer:	1	1
		Intelligible answer*:	0.5	
		Wrong/blank answer:	0	
Minor spelling error that does not impede meaning/ comprehension.				

Chapter IV : Mathematics

Mathematics curriculum for grade 12 specially focuses on future planning of science and engineering practices, disciplinary core ideas, crosscutting concepts, connections of numeracy to different social sciences and as an integral part of the secondary education in Nepal. The curriculum of mathematics of grade 11 and 12 is designed for those students who need mathematics as key concepts in other subjects and use mathematics as the basics of their journey to university level mathematics study.

Mathematics encourages learners to be confident by sharing information and using mathematical techniques to solve problems. These skills not only build up confidence but support them to work in other subjects as well. Knowledge of mathematics helps them to prepare for future academic studies ultimately leading them to become numerate members of the society. They are able to make connections between different branches of mathematics through problem solving and modeling. The learners equip themselves to solve both familiar and unfamiliar problems in a variety of contexts, selecting from a range of mathematical and problem-solving techniques. The students are able to appreciate the beauty and structure of mathematics, its patterns and apply mathematics to real life situations.

Study of variety of topics opens-up path to courses of their choices. Students develop deep understanding of the subject including higher order thinking skills, critical thinking, problem solving and independent thinking and research. The students should be able to model situations mathematically, analyze results and reflect on the findings. Learners should be able to apply these skills and prepare them for progression to higher education or direct entry into employment.

A mathematically competent person is one who is able to master the essential aspects of mathematics effectively, shows clear understanding and ability to express it, and uses it with degree of certainty of judgement. This implies that the knowledge of content and procedures is not sufficient enough to be proficient in mathematics but it also requires the ability to use the knowledge and understanding of content appropriately in real life situations for making judgements.

4.1 Competencies

The curriculum aspires students to gain the under mentioned competencies cumulatively only after completing the study of grade 11 and 12. These two grades are taken as a cluster of secondary level in Nepal. The curriculum does not mention grade wise competencies. Therefore, the present AF also regards level wise competencies as the basis of learning mathematics in

Grade 12. Study of mathematics in grade 11 scaffolds learning of mathematics in grade 12. The particular learning outcomes under these competencies for grade twelve can help for particular grade study in terms of the content (CDC, 2077 B.S and revised 2078).

- Use basic properties of elementary functions and their inverse including linear, quadratic, reciprocal, polynomial, rational, absolute value, exponential, logarithmic, sine, cosine, and tangent functions.
- Use principle of elementary logic to find the validity of statement and also acquire knowledge of matrix, sequence and series, and combinatory.
- Identify and derive equations for lines, circles, parabolas, ellipses, and hyperbolas.
- Solve the problems related to real and complex numbers.
- Articulate personal values of statistics and probability in real life.
- Use vectors and mechanics in day to day life.
- Apply derivatives to determine the nature of the function and determine the maxima and minima of a function in daily life context.
- Explain anti-derivatives as an inverse process of derivative and use them in various situations.
- Apply numerical methods to solve algebraic equation and calculate definite integrals and use simplex method to solve linear programming problems(LPP)
- Use relative motion, Newton's laws of motion in solving related problems.

4.2 Assessment Domain

The School Leaving Certificate Examination (SLCE) includes the assessment of students' achievement levels at Grade 12. The objective of the examination is to assess students understanding of mathematics.

The Secondary Education Curriculum is designed to develop knowledge, competencies and the right attitudes required at the secondary level along with the ability to apply the skills to solve real world problems. The curriculum also ensures that the learning at secondary level has the rigour to equip students to pursue mathematics at higher levels of education or related vocational courses providing opportunities to students in other areas as well. Aligned with the National Qualification Framework (NQF), the curriculum envisions a holistic approach towards teaching and learning mathematics at the secondary level.

The curriculum prepared under the guidelines of NCF is structured for two academic years, it incorporates the level wise competencies, grade wise learning outcomes, scope, and sequence of contents, suggested practical/project activities, learning facilitation process and assessment

strategies to enhance the learning on the subject systematically. Mathematics has two optional streams namely Mechanics and computational methods with students choosing one of the two.

4.3 Learning outcomes

On completion of this course, students are expected to achieve 44 learning outcomes (LOs) altogether. Specifically, the curriculum mentions sixteen learning outcomes in Algebra, two in Trigonometry, five in Analytic Geometry, six in Vectors, Statistics and Probability and Calculus each, and three learning outcomes in Computational methods or Mechanics respectively.

4.4 Contents

The curriculum has allocated specific working hours for both theoretical as well as practical activities to achieve specified knowledge and skills for academic programme of secondary mathematics of Grade 12 based on student performance. These content areas bring academic knowledge and skills through mathematical activities, project-based learning and problem-based learning. The content areas of Algebra, for instance, are given in Table 4.1 below. (Refer to the curriculum for detail)

Table 4.1: Contents of Mathematics

Content Area	Contents	Working hrs (Theory/Practical)
1. Algebra	1.1. Permutation and combination: basic principles of counting, permutation of (a) set of objects all different (b) set of objects not all different (c) circular arrangement (d) repeated use of the same objects, combination of things all different, properties of combination 1.2. Binomial theorem: binomial theorem for a positive integer, general term, binomial coefficient, binomial theorem for any index (without proof), application to approximation, Euler's number, expansion of e^x , a^x , and $\log(1+x)$ (without proof) 1.3. Complex numbers: polar form of complex numbers, De-Moivre's theorem and its application in finding the roots of the complex number, properties of cube roots of unity, Euler's formulae. 1.4. Sequence and series: sum of finite natural numbers, sum of squares of first n -natural numbers, principle of mathematical induction and use of it to find the sum 1.5. Matrix based system of linear equation: Solution of a system of linear equations by Cramer's rule and matrix method (row-equivalent and inverse) up to three variables.	44

4.5 Assessment Types

Evaluation is an integral part of learning process. Both formative and summative evaluation system will be used to evaluate the learning of the students. Students should be evaluated to assess their learning achievements. There are two basic purposes of evaluating students in Mathematics: first, to provide regular feedback to the students and improve student learning - the formative purpose; and second, to identify student's learning levels for decision making.

This assessment framework provides guidelines for the assessment of students at the end of Grade 12 in the form of SLCE. This assessment framework serves as the source of reference for designing and creating robust assessment, which is valid, reliable, and fair to all students. The test specifications and the descriptions of different domains have been put together in a coherent way to help test writers create a standard mathematics assessment paper aligned to the expectations of the curriculum.

Internal Assessment

In grade 12, certification in mathematics is based on two components namely internal assessment and external/final examinations. Internal assessment comprises of a total of 25 marks with marks allocated for the components of classroom participation, project work/mathematical activity, and demonstration of competency in classroom activity and marks from terminal examinations. Table 4.3 shows the distribution of marks for the components in internal assessment.

Project Work: Each student should do one project work from each of eight content areas and has to give a 15-minute presentation for each project work in classroom. These eight projects are documented in a file and, are submitted at the time of final examination. Out of eight projects, one should be presented at the time of final examination by each student.

Mathematical activity: Mathematical activity means various activities in which students willingly and purposefully work on Mathematics. Mathematical activities include various activities like (i) hands-on activities (ii) experimental activities (iii) physical activities. Each student should do one activity from each of eight content area (altogether eight activities). These activities will be documented in a file and will be submitted at the time of final examination. Out of eight activities, one should be presented at the time of final examination by each student.

Demonstration of Competency in Classroom Activity: During teaching learning process in classroom, students demonstrate 11 competencies through activities. The evaluation of students' performance should be recorded by subject teacher on the following basis:

- Through mathematical activities and presentation of project works.
- Identifying basic and fundamental knowledge and skills.
- Fostering students' ability to think and express with good perspectives and logically on matters of everyday life.

- Finding pleasure in mathematical activities and appreciate the value of mathematical approaches.
- Fostering and attitude to willingly make use of mathematics in their lives as well as in their learning.

Marks from Trimester Examinations: Marks from each trimester examination will be converted into full marks and total marks of two trimesters are calculated in each grade. The weightage for internal assessment is provided in Table 4.2.

Table 4.2: Internal Assessment in Mathematics

Internal Assessment	Total Marks
Classroom participation	3
Project work/Mathematical activity	10
Demonstration of competency in classroom activity	6
Marks from terminal exams	6
Total	25

External Examination

In addition to the internal examination in grade 12 there is also an external examination comprising 75 marks. This examination focuses on the theoretical aspects of mathematics and will be a written examination. This framework provides guidelines for developing the external written examination based on the elaborated SG prepared by NEB which is based on the SG developed by CDC. The test items of external examination at the national level will be developed by strictly following the elaborated SG and the curriculum.

4.6 Specification Grid

SG is an overall plan for constructing the test items. CDC prepared the latest SG after rearrangement of contents in 2078. The SG should cover the content sampling and item validity. The detail marks distribution per item and information of sub-content areas and coverage of each content is fair work of test developers. So for this purpose present SG has been elaborated.

4.6.1 Present Specification grid:

Table 4.3 shows the present specification grid of mathematics of grade 12.

Table 4.3: Present Specification of Mathematics

SN	Content Area	Working hour	Area wise Marks	Number of questions	Competency level																					
					Knowledge				Understanding						Application						Higher Ability					
					MCQ		SAQ		MCQ		SAQ		LAQ		MCQ		SAQ		LAQ		MCQ		SAQ		LAQ	
					Number of questions	Marks	Number of questions	Marks	Number of questions	Marks	Number of questions	Marks	Number of questions	Marks	Number of questions	Marks	Number of questions	Marks	Number of questions	Marks	Number of questions	Marks	Number of questions	Marks	Number of questions	Marks
1	Algebra	44	20	MCQ: 2 SAQ: 2 LAQ: 1	2	2	2	10	5	5	1	5	1	8	2	2	4	20	1	8	2	2	1	5	1	8
2	Trigonometry	12	6	MCQ: 3 SAQ: 2 LAQ: 1																						
3	Analytic Geometry	20	9																							
4	Vector	12	6																							
5	Statistics and Probability	12	6	MCQ: 1 SAQ: 1																						
6	Calculus	48	22	MCQ: 4 SAQ: 2 LAQ: 1																						
7	Computational methods or Mechanics	12	6	MCQ: 1 SAQ: 1																						

4.6.2 Elaborated Specification Grid:

The elaborated SG of mathematics is presented in Table 4.4 below.

Table 4.4: Elaborated Specification Grid

Content	Sub-Content	Knowledge (12)			Understanding (18)			Application (30)			Higher Ability (15)			Total no. of each type of question		
		MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ
1. Algebra (44)	1.1 Permutations and combinations 1.2 Binomial theorem 1.3 complex numbers 1.4 Sequence and series 1.5 Matrix based system of linear equations	1(1)	1 (5)		1 (1)				*1 (2) *1 (3)	*1 (2) *1 (2) *1 (4)				2 (2)	2(10)	1 (8)
2.Trigonometry (12)	2.1 Properties of triangle 2.2 Solution of triangle					*1 (2)				*1 (3)	1 (1)			1 (1)	*1(2)	*1(3)
3. Analytical Geometry(20)	3.1 Conic Sections				1 (1)	*1(3)			*1 (3)		*1 (2)			1 (1)	*1(3) *1(2)	1(3)
4. Vector(12)	4.1 Product of Vectors				1(1)				1(2)		1(3)			1(1)	*1(3)	*1(2)
5. Statistics and Probability(12)	5.1 Correlation & Regression 5.2 Probability								1(2+3)		1(1)			1(1)	1(5)	
6. Calculus(48)	6.1 Derivatives 6.2 Anti-derivatives 6.3 Differential Equations	1(1)	*1(1) *1(2) *1(2)		2(2)			1(1)	*1(2) *1(3)				*1(2) *1(3) *1(3)	4(4)	2(10)	1(8)
7.	7.1 System of linear				1(1)				1(3+2)					1(1)	1(5)	

Content	Sub-Content	Knowledge (12)			Understanding (18)			Application (30)			Higher Ability (15)			Total no. of each type of question		
		MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ
Computational Methods Or Mechanics(12)	equations 7.2 Linear programming Problem(LPP) Or 7.1 Statistics 7.2 Dynamics															
Total number of questions and their marks		2(2)	2(10)	-	5(5)	1(5)	1(8)	2(2)	4(20)	1(8)	2(2)	1(5)	1(8)	11(11)	8(40)	3(24)

Note:

Note: 1. The numbers in the parentheses indicate the full marks.

2. The asterisk () in front of the numbers in the cells indicates sub questions.*

3. The numbers in the parentheses of the columns of cognitive behaviour represent the full marks in each cognitive behaviours.

*4. Flexibility to create a similar matrix in or between the sub contents is open as far as the content coverage and cognitive behaviours are maintained.
Test developers can create a new SG should they desire to write items from the content areas not covered in this SG as far as the cognitive behaviours are maintained.*

4.7 Development of Test Items

The test developer must be fully acquainted with the SG and should develop the test item following the types of items, marks for each item, different level of cognitive skills mentioned in the SG.

4.7.1 Test Format

The test items designed will have three item formats, MCQ, SAQ and LAQ. Each format carries a score as planned in the SG and provides indication of the time that a student is likely to invest while answering items designed on a format. Besides this, each item format will be mapped to each cognitive skill as described in the test specification.

Multiple-Choice Question:

MCQs typically consist of a question followed by four options including three distractors. While writing items, item writers should ensure that the distractors are plausible and that there is only one correct key. Plausibility of distractors helps provide rich diagnostic information about students' performance. Each MCQ will carry 1 mark. A total of eleven MCQs will be designed as described in the table of specification.

~~**Multiple-choice question:** MCQs consist of typically a question followed by four options. While writing items, item writers should ensure that the distractors are plausible and that there is only one correct key. Plausibility of distractors help provide rich diagnostic information about students' performance. The marks and number of MCQs is as described in the table of specification.~~

Constructed Response Items:

This kind of item format includes SAQ and LAQ, and, requires students to provide written answers to questions.

Short Answer Question: Short answer questions consist of questions that could be broken down into parts and each part would require a brief answer. Items that need short explanation or calculation etc. can be grouped under SAQ. A total of eight SAQ's each carrying 5 marks will be developed as mentioned in the table of specification.

Long Answer Question: The specification table suggests 3 long answers questions each carrying 8 marks. LAQs are written response questions that require respondents to write detailed close constructed or open-ended constructed answers. Responses could be in the form of multiple sentences, paragraph, or mathematical calculations.

CRIs such as SAQ and LAQ provide insight to the variety of students' thought processes. However, written response questions must carry a MS (scoring guide) so that all students are marked in a fair and uniform manner. MS is an important factor that contributes to reliability and consistency of the test.

Table 4.5: Different item Formats Mapped to Cognitive Skills

Competency level	MCQ		SAQ		LAQ	
	No. Of questions	Marks	No. Of questions	Marks	No. Of questions	Marks
Remembering or Knowledge	2	2	2	10		
Understanding	5	5	1	5	1	8
Applying	2	2	4	20	1	8
Higher Ability	2	2	1	5	1	8
Total No. Of Questions	11	11	8	40	3	24
Score per item	1		5		8	
Time	25 minutes		155 minutes			

4.7.2 Item Writing Template

Items developed for the assessment should be linked to the curriculum and the elaborated SG prepared for exam purpose. In order to keep track of individual items, sort them into different categories or assemble them in a set of tests, develop code(s) and tag the items. In the absence of an item banking system, each item needs to be coded in two ways – one with the cell code to identify the item in the elaborated SG and the second one with the distributed code to identify specific characteristics of the item in terms of content area, cognitive level, item format, mark weightage as exemplified below in Table 4.6. Each item will have an item cell code that enables tagging item content area and the item format and the cognitive skill.

4.7.3 Test Matrix and a Sample Test

Table 4.6: Example of cell code for the elaborated specification grid

S N	Area	Chapter	Knowledge		Understanding			Application			Higher Ability		
			MC Q	SA Q	M CQ	SA Q	LA Q	M CQ	SA Q	LA Q	M CQ	SA Q	L A
1	Algebra	Permutation and combination	1	2	3	4	5	6	7	8	9	10	11
		Binomial theorem	12	13	14	15	16	17	18	19	20	21	22
		Complex number	23	24	25	26	27	28	29	30	31	32	33
		Sequence and series	34	35	36	37	38	39	40	41	42	43	44
		Matrix based system of equations	45	46	47	48	49	50	51	52	53	54	55

Each item will be given a cell code number of the cell where the item falls in the matrix. For example, item with cell code number 30 is from the area Algebra – complex number, is a LAQ and covers the cognitive area of Application.

Along with the item cell code an elaborated item code will also be maintained while writing the item in order to sort it at different indicators in terms of content area, cognitive skill level, item format, marks weightage as following:

The table below shows the details of the elaborated item code.

Table 4.7: Example of Elaborated Item Code

	Area	Unit	LO	Cognitive skill	Format	Marks
Elaborate Item Code	Algebra	Permutation and combination(1)	1.1	K	MCQ	1

Following code list will be used

Area:1,2,3,4,5,6,7,8

Unit:1,2,3,4,5,6,7,8,9, ...

Learning Outcome:1.1, 1.2, 2.1, 2.2, 2.3, ...

Cognitive skill:

Knowledge – 1

Understanding – 2

Application – 3

Higher Ability – 4

Format:

- MCQ – 1
- SAQ – 2
- LAQ – 3

Marks (assigned marks):Actual Mark 1, 5, 8

4.7.4 Item Card

Item card will be used from the beginning of the item writing process. Along with the item writing, the key or the marking scheme or rubric will also be developed simultaneously. Item and its answer key/MS/rubric will pass through the standardization process as one unit. Given below is the format of an item card.

Table 4.5: Sample Item Card

1.	Subject:												
2.	Item cell code:												
3.	Elaborated item code:												
	<table border="1"> <tr> <th>Area</th> <th>Unit</th> <th>LO</th> <th>Cognitive skill</th> <th>Format</th> <th>Marks</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	Area	Unit	LO	Cognitive skill	Format	Marks						
Area	Unit	LO	Cognitive skill	Format	Marks								
4.	Objective of the item (in line with learning outcome)												
5.	Item:												
6.	Key answer/marketing scheme/rubric:												
7.	Code no. of item writer:												

4.7.5 Finalization of Test Paper

Finalization of test paper will be completed on the basis of check list. The check list specially focuses on curriculum, SG and characteristics of good test items. Some examples of test items are given below.

Table 4.6: Question paper format

S. No.	Content area	MCQ (1 mark each)	SAQ (5 marks each)	LAQ (8 marks each)	Total Questions	Total Marks
1	Algebra	2	2	1	5	20
2	Trigonometry	1	1* (2)	1*(3)	1(1)+2*(2+3)	6
3	Analytical Geometry	1	1	1*(3)	2(6)+1*(3)	9
4	Vectors	1	1*(3)	1*(2)	1(1)+2*(3+2)	6
5	Statistics and Probability	1	1		2	6
6	Calculus	4	2	1	7	22
7	Computational method or Mechanics	1	1		2	6
Total		11	8	3	22	75

Note: Asterisk () refers to sub questions and the numbers in the parentheses refer to marks.*

4.8 Marking Scheme

CRIs such as SAQ and LAQ provide insight to the variety of students' thought processes. However, written response questions must carry a MS (scoring guide) in order to bring consistency in scoring. MS is an important factor that contributes to reliability and consistency of the test. MS will be set simultaneously with the question paper development itself and will be again finalized by the lead examiners before the actual evaluation starts. This finalized MS will be used by all other examiners to evaluate student responses.

Marking of student responses will follow the general marking guidelines along with the MS for mathematics evaluation. Marks will be awarded in accordance with the MS or based on the description provided for the question. Marks are awarded only in whole numbers only, and that half mark or fractional marks will not be awarded. Marks will be given for valid responses that are not covered in the marking guides and may go beyond the syllabus. Marks will be awarded when there is clear demonstration of what students know and can do. Marks are not deducted for omitted steps or content and quality of language unless it is a feature of the domain being assessed and is specified in the MS and that the intended meaning is clearly understood. MS will be consistently used. Marks will be awarded based on the MS only.

Unless explicitly stated in the question to use a particular method to solve a question, full marks will be awarded for use of any correct method. If calculations are required to be shown then marks will not be awarded for work where calculations are not provided. Answers can

be provided in any form by a student as a fraction, decimal, standard form unless explicitly stated in the question to do so in the desired form. Marks gained in any stage of the marking will not be deducted or lost unless it is indicated in the question. Where a student incorrectly reads the number provided in the question or value is changed due to a transcription error and uses it to solve the question 1 mark may be deducted if the difficulty of the question has not been altered with the misread value. The MS will be applied to evaluate using the changed values. Marks will not be deducted where an incorrect notation is used but the intent clearly shows the usage of the correct one. ~~An analytic MS will be used to score student responses. This marking scheme allows the examiner to evaluate a student's performance in a more detailed and objective manner thereby reducing individual biases that arise from the examiner's own experiences.~~

The MS will be finalized by a panel of experts in a meeting before the evaluation starts. ~~An~~ **analytic** MS has three parts: criteria, standards, and performance descriptors.

The important steps in an **analytic** marking scheme are:

- Identify the key components.
- Assign marks for each criterion.
- Create a rubric.

4.8.1 Marking Scheme Guidelines:

The SG focuses on SRIs and CRIs. Selected response items are only MCQs. These items score 1 point for correct response and no point (0) for incorrect response. The CRIs are SAQ and LAQ as given in the SG. The scoring is given as process measure i.e. each correct step from beginning will score 1 point. Right from the beginning if all the steps are correct, the item response will be awarded 100% according to weightage of test item. The CRIs are scored on the basis of following steps.

- For correct methods or correct formulae,
- For correct substitution of the correct values in the formula or method,
- For final step, that is answer of the item. The wrong steps are not awarded the marks, up to wrong steps the marks will be awarded. After wrong steps in process measure, no marks will be awarded.

4.8.2 Type of Marks to be Indicated in the Marking Scheme

Method Mark (M) are awarded for a valid method applied to the problem. Method marks are not lost for any numerical or algebraic mistakes and incorrect units.

Accuracy Mark (A), awarded for a correct answer or intermediate step correctly obtained. Accuracy marks cannot be given unless the associated method mark is earned.

Follow through Mark (FT) implies that the mark indicated is allowed for work correctly following on from previously incorrect values or results obtained including transcription errors. Otherwise, marks are given for correct work only.

Any other convention adopted to indicate the type of marks allocated will be declared by the board in advance for student awareness regarding the classification under which marks will be awarded for student responses

4.8.3 Sample Items with Marking Scheme

In the section below, some sample items are given. They show the various item formats and how they map with the blueprint. Some sample items of different cognitive domains with MS are presented in this section

Item 1

Area	Unit	LO	Cognitive Skill	Format	Item Key	Marks
Calculus	Derivatives	6.3	Application	MCQ	A	1

The line $y = x+1$ is a tangent to the curve $y^2 = 4x$ at the point (a,b). Which one of the following is (a,b)?

- (a) (1,2) (b) (2,1) (c) (1,-2) (d) (-1,2)

Answer Key: (a)

This item focuses on the student ability to find whether the test takers (students) are able to use the slope of tangent to the curve or not

Item 2

Area	Unit	LO	Cognitive Skill	Format	Item Difficulty	Marks
Calculus	Differential equations	6.6	Understanding	MCQ	A	1

Identify the integrating factor of the differential equation

$$(x + 3y^2) \frac{dy}{dx} = y \quad (y > 0)$$

- (a) I.F. = $\log y$ (b) I.F. = $\frac{3y^2}{2}$ (c) I.F. = y (d) I.F. = $\frac{1}{y}$

Answer Key: (d)

This item focuses on more procedural aspects of finding the integrating factor of differential equation. Even though it requires some calculation steps to get the answer it is not a direct application or HA but considered in the category of understanding.

Item 3

Area	Unit	LO	Cognitive Skill	Format	Key if MCQ	Marks
Calculus	Derivatives (L' Hôpital's rule)	6.2	Application	Constructed Response	D	5

For what value of p and q does the following limit tends to 0?

$$\lim_{x \rightarrow 0} \left(\frac{\sin 2x}{x^3} + p + \frac{q}{x^2} \right)$$

Rubric:

Answer	Marks	Explanation
$\lim_{x \rightarrow 0} \frac{\sin 2x + px^3 + qx}{x^3} \left(\frac{0}{0} \text{ form} \right)$ $\lim_{x \rightarrow 0} \frac{2 \cos(2x) + 3px^2 + q}{3x^2} \text{ (Apply L' H\^opital's rule)}$	1 1	Method mark given for applying L' H\^opital's rule Correct differentiation of numerator and denominator
As $3x^2 = 0$ at $x = 0$ Value of $2 \cos 2x + 3px^2 + q = 0$ at $x = 0$ $2 + q = 0$ $q = -2$	1	Correct value of q
$\lim_{x \rightarrow 0} \frac{-4 \sin 2x + 6px}{6x} \left(\frac{0}{0} \text{ form} \right)$ $\lim_{x \rightarrow 0} \frac{-8 \cos 2x + 6p}{6}$	1	Method mark given for applying L' H\^opital's rule
$-8 \cos 2x + 6p = 0$ as $x = 0$ $-8 + 6p = 0$ $p = \frac{8}{6}$ i.e., $p = \frac{4}{3}$ So, $p = \frac{4}{3}$ and $q = -2$	1	Correct value of p

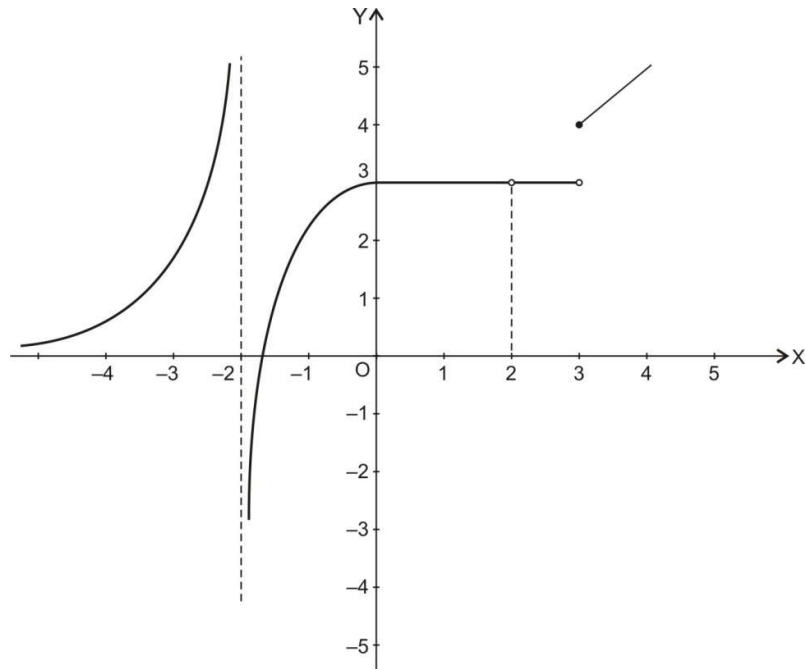
This item particularly focuses on the way the MS is laid out to explain clearly the process and conditions to award marks. This kind of marking scheme will enable standardisation and objectivity in marking for SAQ and LAQ.

Item 4

Area	Unit	LO	Cognitive Skill	Format	Item Difficulty	Marks
Calculus	Limit	6.2	Application	Assertion Reason type (MCQ)	D	1

Use the graph of the following function to answer the question:

Choose the correct option for the assertion and reason provided.



Assertion (A): $\lim_{x \rightarrow 2} f(x)$ does not exist.

Reason (R): $f(2)$ does not exist.

- I. A and R are true but R is not the correct explanation of A .
- II. A and R are true, but R is not the correct explanation of A .
- III. A is true and R is false.
- IV. A is false and R is true.

Correct answer is IV.

Chapter V : Physics

The Grade 12 Examination aims to assess students' comprehension of the fundamental scientific laws and principles that govern various phenomena in the world. It serves as a measure of students' achievement levels at Grade 12, providing insights into their understanding of scientific concepts and their application.

The Secondary Education Curriculum (2077 B.S.) aims to promote scientific knowledge, competencies, and the appropriate attitudes necessary at the secondary level. It emphasizes the application of skills to address real-world problems. Additionally, the curriculum ensures that students acquire a strong foundation in physics, enabling them to pursue further education in physics or related vocational courses. Aligned with the National Qualification Framework (NQF), the curriculum adopts a comprehensive approach to teaching and learning physics in secondary education.

The curriculum developed in accordance with the NCF spans two academic years and encompasses a structured approach to learning. It includes level-wise competencies, grade-wise learning outcomes, content scope and sequence, suggested practical and project activities as well as strategies for facilitating learning and assessing students' progress systematically.

This assessment framework provides guidelines for evaluating students' performance at the end of Grade 12 through SLCE. It serves as a primary reference for designing robust assessments that are valid, reliable, and equitable for all students. The framework outlines test specifications, descriptions of cognitive skills, and sample items aligned with specific competencies. These components work together to assist test writers in creating standardized Physics assessment papers that align with the expectation sought by the curriculum.

5.1 Level-Wise Competencies

The Secondary Education Curriculum of Physics describes the following competencies that the students are expected to demonstrate by the completion of Grade 12 examination.

- Relate the phenomena and processes of the world around them to the knowledge and understanding of physical laws, principles and theories and describe them using appropriate scientific vocabulary, terminology and conventions
- Use scientific instruments, apparatus and methods to collect, evaluate and communicate information accurately and precisely
- Design simple experiment to develop relations among physical quantities
- Carryout simple scientific research on issues related to physics
- Construct simple models to illustrate physical concepts

- Use the knowledge of physics to promote care for the environment, indigenous knowledge, social values and ethics (CDC, 2077 B. S.).

5.2 Assessment Domains and Cognitive Framework

The grade 12 physics curriculum encompasses several domains of study, reflecting the diverse fields and areas of research within the field of Physics. These domains include Mechanics, Heat and Thermodynamics, Wave and Optics, Electricity and Magnetism, and Modern Physics. Each domain encompasses a wide range of learning objectives that are essential to be assessed during the final examination administered by NEB. These learning objectives cover various aspects of theoretical knowledge, practical skills, problem-solving abilities, and critical thinking in the field of physics. The assessment of these domains not only evaluates students' understanding of fundamental concepts but also measures their ability to apply them in real-world scenarios. By assessing these diverse domains, the grade 12 physics curriculum aims to provide a comprehensive understanding of the principles and applications of physics, preparing students for further studies in physics-related careers.

Cognitive Framework

It is important that an item tests the skill that it intends to test; therefore, items should be correctly mapped to the cognitive skill. It is important for item writers to develop a common understanding of the different levels of skills so that they can develop items that match exactly to its level of learning behaviour. The SG divides the cognitive skills into four different levels viz. knowledge (15%), understanding (25%), application (30%) and higher ability (30%). However, ± 5 percent variation is allowed in overall question/assembled set.

Aligned to the Bloom's taxonomy, a brief description of different levels of cognitive skill is provided in the AF along with some sample items mapped to each type skill in the sections below.

Knowledge

This skill involves recalling, recognizing or retrieving information from long-term memory or short-term memory. It is the lowest of the taxonomic levels, but it is essential to build concepts on basic foundations of learning such as defining a concept, describing a scientific theory or a scientific phenomenon.

The following items illustrate knowledge based cognitive behaviour.

Sample 1: What is the unit of enthalpy?

Sample Answer: Joule

To answer this item, students will have to recall enthalpy and retrieve its unit from their memory.

Sample 2: State Kirchhoff's second law (or voltage law).

Sample Answer: Kirchhoff's second law states that the total voltage across the resistors is equal to the total emf in the circuit in a closed mesh.

For this item, students must recall the definition of the Kirchhoff's second law.

Understanding

This cognitive behaviour involves explaining, describing, classifying, comparing or constructing meaning from a concept. This often includes comprehension of one or more ideas in order to generate an explanation.

An example of understanding based item is shown below.

Sample 3: When will a current carrying wire that is kept in a uniform magnetic field experience maximum force?

- (a) when it is placed perpendicular to the magnetic field
- (b) when it is parallel to the magnetic field
- (c) when it is at an angle of 45° to the magnetic field
- (d) when it is at an angle of 60° to the magnetic field

Correct answer: (a) when it is placed perpendicular to the magnetic field.

For this item, a student needs to comprehend how the location of the wire affects the force it experiences when placed in a magnetic field.

Applying

This cognitive skill involves solving problems or tasks in new situations by applying acquired knowledge, facts, techniques, and rules in different ways. This might require the student to calculate, predict, solve a problem, apply, or demonstrate an idea.

Sample 4: The length of a closed pipe is 1m and velocity of sound is 330m/s. Calculate the frequency of the second mode.

Sample Answer: $f_2 = \frac{3V}{4L} = 247.5 \text{ Hz}$.

To answer this item, students must know what fundamental frequency is, and, identify first mode, second mode and their relations. They can then directly substitute the values in the relation/formula and calculate the frequency.

Higher Ability

HA includes a set of higher order thinking skills that enable a student to break down a complex structure into its constituent parts, analyze the relationships between the constituents, make judgements based on standards or scientific evidence available and reorganize the constituent parts to create a new structure.

The following example illustrates an item based on HA thinking skills

Sample 5: Laser light of wavelength 630 mm incident on a pair of slits produces an interference pattern in which the bright fringes are separated by 7.2 mm. Calculate the wavelength of another source of laser light which produce interference fringes separated by 8.1 mm using same pair of slits.

Sample Answer: $\frac{\beta_2}{\beta_1} = \frac{\lambda_2}{\lambda_1}$

$$\lambda_2 = 708.75 \text{ nm}$$

To answer this item, the student should analyse how interference pattern is formed when a laser light is incident on a pair of slits and how the wavelength of laser depends on the expression for the fringe width. With this insight, the student can evaluate the required wavelength of light.

5.3 Learning Outcomes

Based on the domains and sub-domains, and competencies, a detail learning outcomes (LOs) are given in the present curriculum. The content wise number of LOs listed in the curriculum comprises 29 in mechanics, 18 in heat and thermodynamics, 35 in wave and optics and in electricity and magnetism each, and 39 in modern physics. Most of the LOs are based on the cognitive domain especially on remembering and understanding levels. The sample list of LOs of Physics is presented below (See curriculum of physics 2077 for detail).

- Recall equations of angular motion and compare them with equations of linear motion. (Mechanics)
- Clarify the concept of thermodynamic system. (Heat and Thermodynamics)
- Describe velocity of sound in gas. (Wave and Optics)
- Use Hall probe to measure flux density of a uniform magnetic field. (Electricity and magnetism)
- Illustrate different properties of x-rays along with their application. (Modern Physics)

In order to achieve these LOs, Grade 12 Physics covers a wide range of content areas such as Mechanics, Heat and Thermodynamics, Wave and Optics, Electricity and magnetism and Modern Physics. They are carefully designed to help students achieve specific LOs, enabling them to grasp the fundamental principles and real-world applications of the subject. By dividing the content into manageable units and including designated marks for each unit, the syllabus ensures a comprehensive and fair assessment of students' knowledge and skills. By focusing on the LOs, the syllabus promotes critical thinking, problem-solving abilities, and lays a solid foundation in Physics, preparing students for further studies and successful careers in scientific fields.

Practical Courses [32 Hours]

The practical work that students do during their course is aimed at providing them learning opportunities to accomplish competency number 2 and 3 of the curriculum as well as reinforcing their learning of the theoretical subject content. This part of the syllabus focuses more on building skills rather than knowledge. Students must be aware of the importance of precision, accuracy, significant figures, range and errors while collecting, processing, analyzing and communicating data. Likewise, graphical method of analysis and drawing conclusion should be encouraged wherever possible. Students should learn;

- to use meter rule for measuring length, Vernier-calipers for measuring small thicknesses, internal and external diameters of cylindrical objects and depths of holes, spherometer for measuring radius of curvature of spherical surfaces and micrometer screw-gauge for measuring diameter of small spherical or cylindrical objects and very small thicknesses, traveling microscope with Vernier scale for measuring small distances, top-pan balance for measuring small masses, stop watch for measuring time interval, laboratory thermometer for measuring temperature, protractor for measuring angle), ammeter and milli-ammeter for measuring electric current and voltmeter for measuring electric potential difference
- learn to measure precisely up to the least count of the measuring instrument- metre rule—0.001m or 1mm
 - Vernier calipers-0.1mm
 - Spherometer-0.01mm
 - Micrometer screw gauge -0.01mm
 - mm stop watch-0.01s
 - stop watch-0.01s
 - laboratory thermometer- 0.5°C
 - protractor-1°
- learn to repeat readings and take the average value
- learn to draw a standard table, with appropriate heading and unit for every column for storing data
- learn to plot a graph using standard format, draw suitable trend lines, determine gradient, intercepts and area and use them to draw appropriate conclusion
- learn to estimate and handle uncertainties.

In the academic year, students should perform 10 experiments, either listed below or designed by teacher, so that no more than three experiments come from the same unit of this syllabus

Practical Activities for Grade 12

I. Mechanics

- Use of Simple pendulum for the determination of the value of 'g' in the laboratory by graphically analyzing the variation of period of oscillations with length of the pendulum.
- Determination of the surface tension of water by capillary tube method by graphically analyzing the variation of height of the liquid against the diameter of capillary tube for five capillaries of different diameters dipped in water simultaneously. Determination of the coefficient of viscosity of liquid by Stoke's method by graphically analyzing the variation of time taken for six metal balls of different diameters to travel the same distance in the given liquid with respect to the diameters.

II. Wave and Optics

- Determination of the wavelength of He-Ne laser light by passing a plane diffraction grating.
- Determination of the frequency of A.C. Mains using sonometer and graphically analyzing the variation of the ratio of resonating lengths with respect to the frequency of tuning fork using tuning forks of different frequencies.
- Determination of velocity of sound in air at NTP using resonance tube.

III. Electricity and magnetism

- Use of potentiometer for the:
- Comparison of emfs of two cells
- Determination of the internal resistance of a cell
- Study the variation or resistance of a thermistor with temperature.
- Use of deflection magnetometer to determination of the pole strength and magnetic moment of a bar magnet
- Determine the magnetic field strength of a bar magnet stuck on table by graphically analyzing the period of torsional motion of a freely suspended bar magnet and its distance from the near pole of the fixed magnet along its long axis.

IV. Modern Physics

Study the I-V characteristics of a semiconductor diode.

Sample project works for grade12

- Study the traffic noise level in your town using a sound pressure level (SPL) meter.
- Design and construct a step-up transformer.
- Construct a simple device to measure angle of contact of a liquid with a solid surface and also calculate the surface free energy of some hydrophobic and hydrophilic surfaces.
- Calculate the surface free energy of some hydrophobic and hydrophilic surfaces.
- Construct a simple DC motor using a disk type magnet and a battery.
- Construct a model of AC generator/dynamo.
- Construct a current balance to measure magnetic flux density of a U-shaped magnet.
- Construct a step down transformer attached with a full wave rectifier made from semiconductor diodes.

Some Examples of Innovative Works for Grade12

- Construct a thermocouple thermometer and use it to investigate how temperature of a Bunsen burner flame changes with the height of the flame from the top of the burner.
- Study of the status of hydroelectricity in Nepal.
- Study of application of laws and principle of physics in any indigenous technology.
- Verify Joule's law.
- Investigate on Peltier effect.
- Explore the history of space.
- Study on history of nuclear power in Asia.

5.4 Assessment Types

Both formative and summative assessments are integral part of students' evaluation. Formative assessment in the form of class tests, unit tests, home assignment, oral question answer etc. provide regular feedback to students, parents, and teachers about the quality of teaching and learning occurring in the classroom. Summative assessment at the end of the educational programme provides insight to students learning achievements based on which students are certified for further enrolment into a course. Year-end summative examination carries greater weightage of marks, and therefore, needs to be fair and reliable.

Internal evaluation as the formative evaluation carrying 25 marks out of 100 marks and the remaining marks are allocated to External Examination as the summative evaluation

5.4.1 Internal Evaluation

Internal evaluation comprises of practical work, marks from two trimester examinations and classroom participation which includes classroom participation and participation in learning.

Table 5.1: Aspects of internal evaluation

Aspects of Internal Evaluation	Total Marks
Practical work	16
Marks from trimester examinations (3 marks from each trimester)	6 (3+3)
Classroom participation (classroom attendance + participation in learning)	3 (1+2)

Practical activities include project work and practical work based on a list of activities mentioned in the curriculum or designed by the teacher. The following table shows the marks distribution for practical activities.

Table 5.2: Marks distribution for practical activities

S.N.	Criteria	Elaboration of criteria	Marks
1	Laboratory experiment	Correctness of apparatus setup/preparation	2
		Observation/ Experimentation	2
		Tabulation	1
		Data processing and Analysis	1
		Conclusion (Value of constants or prediction with justification)	1
		Handling of errors/precaution	1
2	Viva-voce	Understanding of objective of the experiment	1
		Skills of the handling of apparatus in use	1
		Overall impression	1
3	Practical work records and attendance	Records (number and quality)	2
4	Project work	Reports (background, objective, methodology, finding, conclusion)	2
		Presentation	1
		Total	16

5.4.2 External Examination

The external evaluation will be a written examination comprising of 75 marks out of total 100 marks. This framework provides guidelines for developing items for the external written examination based on the elaborated SG prepared by NEB which is based on the SG developed by CDC. The test items of external examination at the national level will be developed by strictly following the elaborated SG and the curriculum. Information from the Test Specification Chart 2078 has been derived to highlight different aspects of external evaluation.

5.5 Specification Grid

SG is an outline in which each and every aspect related to the test has been included. It is mandatory aspect needed to the test designer and shows the marks allocated to different areas and skills to be measured as mentioned in the curriculum. CDC has developed the SG of physics for grade 12 which is presented in the following table.

5.5.1 Description of the Present Specification Grid

Table 5.3 shows the present specification grid of Physics of Grade 12.

Table 5.3: Specification Grid 2078

SN	Content Area	Working hour	Competency level																				Unit Wise Marks		
			Remembering				Understanding						Applying						Higher Ability						
			MCQ		SAQ		MCQ		SAQ		LAQ		MCQ		SAQ		LAQ		MCQ		SAQ		LAQ		
			No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	
1	Mechanics	22	2	2	2	10	5	5	1	5	1	8	3	3	2	10	1	8	1	1	3	15	1	8	13
2	Heat and Thermodynamics	12																							7
3	Wave and Optics	26																							15
4	Electricity and Magnetism	35																							21
5	Modern Physics	33																							19
Total Marks		128	12				18						21						24						75

Item format plan					
S.N.	Type of item	Score per item	Total item	Total score	Time
1	Multiple Choice Questions	1	11	11	25 minutes
2	Short Question Answer	5	8	40	155 minutes
3	Long Question Answer	8	3	24	
Grand Total			22	75	3 hours

Note:

1. *Item format in composite should be met as per the SG.*
2. *Designated weightage in the combined cell should be met, but ± 3 marks variation will be allowed within a unit/content area. But no unit can be nil.*
3. *The responses of SAQ and LAQ should ensure that 5 and 8 marks will respectively be assigned per element expected as correct response.*
4. *The distribution of cognitive domain of questions should be nearly 15% knowledge/remembering, 25% understanding, 30% applying and 30% higher ability level, but ± 5 percent variation will be allowed in overall question set.*
5. *SAQ and LAQ can be structured (have two or more sub-items). SAQ and LAQ can be distributed to two or more cognitive behaviors. In such case these will be added to their respective cognitive behavior. In sum the distribution of cognitive behavior should be approximately to the required distribution.*
6. *In case of SAQ there will be 2 "OR" questions and in case of LAQ there will be 2 "OR" question*

5.5.2 Elaborated Specification Grid

As mentioned before, the SG is a guide for the teacher and item developers to prepare test items. As shown in the elaborated SG below, detail contents are listed in the SG. Marks allocated to each unit are distributed in each sub-unit and cognitive level. This task will help the item writers to develop the test items from the particular sub-content and particular level of cognitive skill as per SG. The following table is an example of the elaborated specification grid.

Table 5.4: Elaborated Specification Grid

Content	Sub-Content	Remembering		Understanding			Applying			Higher Ability			Total No. of questions			Total Marks
		MCQ	SAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	
Mechanics	1.1 Rotational Dynamics	-	1(5)	1 (1)	-	-	-	-	-	-	-	-	1(1)	1(5)	-	13
	1.2 Periodic Motion	-	-	1 (1)	-	-	-	-	-	-	1 (5)	-	1(1)	1(5)	-	
	1.3 Fluid Statics	-	-	-	-	-	1 (1)	-	-	-	-	-	1(1)	-	-	
Heat and Thermodynamics	First Law of Thermodynamics	-	-	-	-	-	1 (1)	-	-	1 (1)	-	-	2(1)	-	-	7
	Second Law of Thermodynamics	-	-	-	1 (5)	-	-	-	-	-	-	-	-	1 (5)	-	
Wave and Optics	Wave motion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
	Mechanical waves	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Waves in pipes and string	1 (1)	-	-	-	-	-	-	-	-	-	-	1 (1)	-	-	
	Acoustic Phenomena	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Nature & propagation of Light	-	-	1 (1)	-	-	-	-	-	-	-	1 (8)	1 (1)	-	1 (8)	
	Interference	-	-	-	-	-	-	1 (5)	-	-	-	-	-	1 (5)	-	
	Diffraction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Polarization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Electricity and Magnetism	Electrical circuits	-	-	-	-	-	-	-	-	-	1 (5)	-	-	1 (5)	-	21
	Thermoelectric effects	1(1)	-	-	-	-	-	-	-	-	-	-	1(1)	-	-	
	Magnetic Field	-	-	-	-	-	-	-	-	-	1 (5)	-	-	1 (5)	-	
	Magnetic properties of materials	-	-	1(1)	-	-	-	-	-	-	-	-	1(1)	-	-	
	Electromagnetic Induction	-	-	-	-	-	-	-	1 (8)	-	-	-	-	-	1 (8)	

Content	Sub-Content	Remembering		Understanding			Applying			Higher Ability			Total No. of questions			Total Marks
		MCQ	SAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	
	Alternating Currents	-	-	-	-	-	1 (1)	-	-	-	-	-	1(1)	-	-	
Modern Physics	Electrons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
	Photons	-	-	-	-	-	-	-	-	-	1 (5)	-	-	1 (5)	-	
	Semiconductor Devices	-	-	-	-	-	-	1 (5)	-	-	-	-	-	1 (5)	-	
	Quantization of Energy	-	-	-	-	1 (8)	-	-	-	-	-	-	-	-	1 (8)	
	Radioactivity & nuclear reaction	-	-	1 (1)	-	-	-	-	-	-	-	-	1 (1)	-	-	
	Recent trends in Physics	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total No. of questions		2	1	5	1	1	3	2	1	1	4	1	11	8	3	22
Total Marks		2	5	5	5	8	3	10	8	1	20	8	11	40	24	75

Note: 1. Numbers in the parentheses indicate the full marks.

2. There should be two “OR” questions in Short answer questions and one “OR” question in Long answer questions

3. Flexibility to create a similar matrix in or between the sub contents is open as far as the content coverage and cognitive behaviours are maintained. Test developers can create a new SG should they desire to write items from the content areas not covered in this SG as far as the cognitive behaviours are maintained.

4. MCQ refers to Multiple Choice Questions whereas SAQ stands for Short Answer Questions, and, LAQ refers to Long Answer Questions.

5.6 Development of Test Items

Developing test items for assessment of physics is a critical and meticulous task within the standardized assessment process. It involves constructing test items that are reliable, valid, consistent, and free from ambiguity. These items must align with the prescribed format and cognitive levels specific to the physics subject. The objective is to accurately measure students' understanding of the concepts of physics and their ability to apply them in various contexts. By carefully developing test items, the assessment ensures an accurate evaluation of students' knowledge and skills in physics, providing valuable insights into their proficiency in the subject matter. When designing the test paper, it is important to cover each content area and allocate the designated unit-wise marks. However, a slight variation of ± 3 marks is permissible within each unit or content area. This approach ensures comprehensive coverage of the learning outcomes and allows for flexibility in assessment within the prescribed guidelines.

5.6.1 Test Format

The test items will have three item formats, MCQ, SAQ and LAQ. Each format carries a score as planned in the SG and provides indication of the time that a student is likely to invest while answering items designed on a format. Besides this, each item format will be mapped to each of the cognitive skills as stated in the test specification.

Multiple-Choice Question: A multiple choice question consists of a problem, known as the stem, and a list of suggested solutions are known as alternatives. The alternatives consist of one correct key, which is the answer, and, the incorrect alternatives, known as distractors. Plausibility of distractors help provide rich diagnostic information about students' performance. Each MCQ will carry 1 mark. A total of eleven multiple choice questions will be designed as describe in the SG.

A Sample MCQ with a Stimulus, a Question and a Set of Distractors:

Q.N. 1. A beam of electrons is accelerated through a potential difference of V . It is then passed normally through a uniform magnetic field where it moves in a circle of radius r . What is the potential difference required to accelerate the electron beam so that it would have moved in a circular path of radius $2r$ in the same magnetic field perpendicular to it?

- (a) $\sqrt{2}V$
- (b) $2V$
- (c) $2\sqrt{2}V$
- (d) $4V$

Constructed Response Items: This kind of item includes SAQ and LAQ, and, requires students to provide written answers to questions.

Short Answer Question: Short answer questions (SAQs) can be used in examinations or as part of assessment tasks. They are generally questions that require students to construct a response. Short answer questions require a concise and focused response that may be factual, interpretive or a combination of the two. A total of eight SAQs each carrying 5 marks will be developed as mentioned in the SG.

Q.N.2. Draw the diagram showing intensity distribution of light on the screen for diffraction of light at a single slit. 1

a) How is the width of central maxima affected if

(i) the width of the slit is doubled? 1

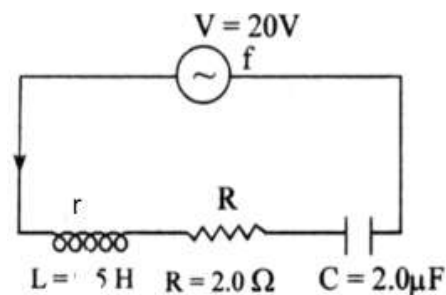
(ii) the wavelength of the light used is increased? 1

b) What happens to the width of the central maxima if the whole apparatus is immersed in water and why? 2

Long answer question: The specification table suggests 3 long answers questions each carrying 8 marks. LAQs are written response questions that require respondents to write detailed close constructed or open-ended constructed answers. Responses could be in the form of multiple sentences, paragraph, or mathematical calculations.

Q.N.3. (a) A lamp is connected in series with a capacitor. Predict your observations with dc and ac. What happens in each case if the capacitance of a capacitor is reduced? 2

(b) A constant voltage a.c. generator of 20 V r.m.s. and variable frequency is connected in series with a resistor, of resistance 2.0Ω a coil of inductance 5 H and a capacitor of capacitance $2.0 \mu\text{F}$ as shown in figure. The frequency is adjusted until the current in the circuit has a maximum value of 2.0 A r.m.s. Calculate



(i) the value of this frequency for maximum current, 1

(ii) inductive reactance and 1

(iii) capacitive reactance. 1

(c) Develop a phase relation between current and emf in an ac circuit containing capacitance only. 2

(d) What do you mean by wattless current? 1

CRIs such as SAQs and LAQs reveal students' ability to describe, explain, give reasons, create, analyze and evaluate a problem. CRIs give opportunities for students to show their higher level thinking skills and knowledge. SAQs allow students to elaborate on responses in a limited way, which assist teachers to identify the level of the students' writing ability. Such questions are

structured in a variety of ways that elicit a range of responses, from a few words to one or more paragraphs. These types of questions require MS for scoring students' responses in a fair and uniform manner. MS contributes to reliability of the test.

The SG summarizes the types of items, total number of items and mark carrying each item and also the time allocated to each types of question as mentioned in table 5.4 below:

Table 5.5: Distribution of test items according to item formats, marks distribution and tentative times.

Type of item	Score per item	Total item	Total score	Time
Multiple Choice Questions	1	11	11	25 minutes
Short Answer Question	5	8	40	155 minutes
Long Answer Question	8	3	24	
Grand total		22	75	3 hours

Table 5.6: Different item formats mapped to cognitive skills

Competency levels	MCQ		SAQ		LAQ		Total no. of questions and marks	
	No. of questions	Marks	No. of questions	Marks	No. of questions	Marks	Total questions	Total marks
Remembering	2	2	2	10			4	12
Understanding	5	5	1	5	1	8	7	18
Applying	3	3	2	10	1	8	6	21
Higher Ability	1	1	3	15	1	8	5	24
Total	11	11	8	40	3	24	22	75

Table 5.7: Example of Cell Code

Content area	Chapters/ topics	Remembering			Understanding			Applying			Higher abilities		
		MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ	MCQ	SAQ	LAQ
Mechanics	Rotational dynamics	1	2	3	4	5	6	7	8	9	10	11	12
	Periodic motion	13	14	15	16	17	18	19	20	21	22	23	24
	Fluid statics	25	26	27	28	29	30	31	32	33	34	35	36
			...	...		...							

In the standardized test, each item will have its own cell code. The cell code of the item indicates the content area, cognitive skill level and format of the item. For example, item with cell code number 20 represents an item from mechanics section unit 2 and it is application level and a short question carries 5 marks.

5.6.2 Item Writing Template

An item development template or a card will be used by test developers while writing the items. This will ensure that all characteristics related to the item are recorded by the test developer for designing the test form. A record of metadata will also help in referencing to future cycles of assessment.

Table 5.8: Proposed design for an item template

Subject	Date of creation	Item number	Unique Item ID	Name of the item writer
Physics				

Table 5.9: Proposed design for an item difficulty template

Area/ Unit	Learning indicator	Cognitive skill	Item format	Item difficulty	Marks
Physics					

**5.7
Finaliz**

Finalization of Test Paper

The finalization of the test paper is a crucial responsibility in the examination preparation process. A moderation board, consisting of subject experts, is appointed to review and approve the test paper. They ensure the accuracy, relevance, and alignment with learning outcomes. The board verifies adherence to guidelines, format, and difficulty levels, and addresses any errors or ambiguities. Their goal is to create a high-quality, unbiased test paper that effectively assesses students' knowledge and skills. The moderation board's work contributes to the fairness and reliability of the examination process.

5.8 Marking Scheme

The MS provides clear guidelines for assigning marks or weightage to each test item. It includes a breakdown of marks, specifying how they should be allocated. The marking scheme also outlines the expected answers and steps for awarding marks, ensuring consistent and uniform marking across different examiners. This helps maintain fairness and reliability in the evaluation process, enabling accurate assessment of students' performance.

5.8.1 Marking Scheme Guidelines

The marking scheme plays a vital role in providing clear instructions for assigning marks to each question. It specifies whether partial marks, such as 0.5 are permissible or only full marks should be given. The guidelines outline the expected answer formats, calculation steps, and criteria for awarding marks. They also cover any special considerations, such as penalties or bonuses. Adhering to these guidelines ensures a fair, consistent, and accurate assessment process.

5.8.2 Types of Mark to be Indicated in Marking Scheme

The MS encompasses different types of marks that are to be indicated during the assessment process. It delineates the allocation of full marks, and half marks, depending on the specific criteria for each question or item. By specifying these mark types, the marking scheme ensures transparency, consistency, and fairness in evaluating students' performance. It facilitates an accurate assessment of their understanding and proficiency in the subject matter, providing valuable insights into their knowledge and skills.

Chapter VI : Economics

Secondary education curriculum was developed on the basis of NCF (CDC, 2077). The curriculum of Economics was also developed as an optional subject i.e. optional – I for grade 9-10 and optional group – III, for grade 11 and 12 (CDC, 2077 B.S).

Economics assists us to study the utilization of the available resources for the fulfilment of our necessities. It helps to develop the capacity to identify and utilize the resources from one's own surrounding of the larger society, to produce and distribute goods and services related to the events and behaviour of consumption, identify and analyse its behaviour and take appropriate decision in accordance with the situation. Economics is included in secondary level of grade 11 and 12 due to being the related subject of daily practical life. In accordance with the format and guidance of National Curriculum 2076, the curriculum focuses on connecting economics with the activities of daily life, creating the interest of students in Nepalese economics through emphasizing on the knowledge and application of micro and macro-economic and prepares the foundation for the development of high-level manpower in the related subject.

6.1 Description of Assessment Domain in Economics

The curriculum of Grade 12 organizes the domain for economics along three dimensions, namely content, cognitive, and competency(Figure 6.1).

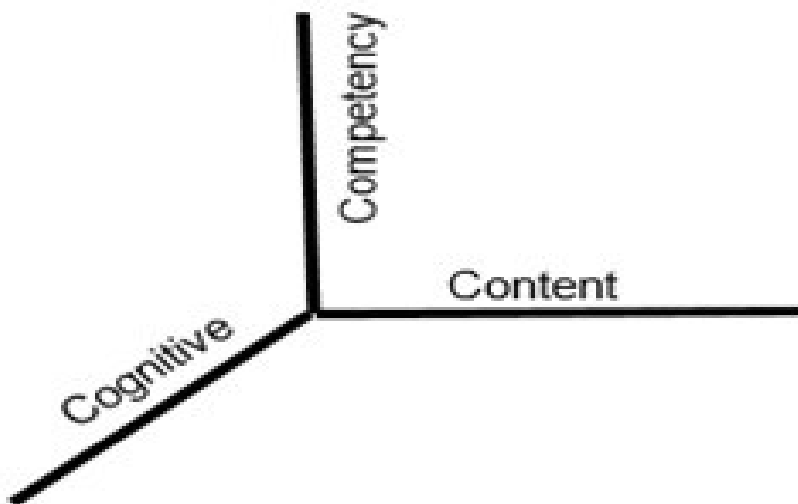


Figure 6.1: Dimensions of Economics Domain

Though the organization is not explicit, the learning expectations for economics as well as the chapters/units for economics domain in the curriculum follow this broad framework. The domains of economics for this level are tabulated below.

Table 6.1: Assessment Domains in Economics

Basic concept of economics and allocation of resources	• Concept of scarcity and choice • opportunity cost • production Possibility curve • allocation of resources • division of labour and specialization
Microeconomics	• Market and revenue curve • cost and cost curve • theory of price and output determination • Price determination of factor of production.
Macroeconomics	• Banking system and monetary policy • Government finance • International trade
Development Economics	• Poverty • Inequality • Unemployment and Human Resource
Nepalese Economy	• Nepal's Foreign Trade and Foreign Employment • Development Planning in Nepal • Sustainable Development Goals and Nepal
Quantitative Techniques in Economics	• Basic Statistics • Data collection methods • Dispersion • Coefficient of variation and Index Number: Laspeyre's and Paasche's index number.

6.2 Competencies

The Secondary Education Curriculum for Economics describes level-wise competencies that the students are expected to demonstrate at the completion of the course for 11 and 12. There are sequences of various topics and sub-topics in grade XI and XII. The curriculum mentions 14 competencies to be achieved by the students on completion of Grade 12. These competencies are as follows:

- Understand and present basic concept of Economics, resource allocation and economic system.
- Develop concept of equilibrium among demand, supply and market and make presentation of market price determination process by preparing application of cost, revenue, and knowledge, and consumer behaviours.
- Understand, inquire and practically apply theory of production.

- Understand and apply macroeconomic variables.
- Present concept of national income accounting.
- Understand inflation, deflation, and its effect.
- Understand and appraise the relationship between banking system, monetary policy, and government finance.
- Analyze the relationship between international trade and Nepal's foreign employment, and solve problems related to them.
- Conceptualize the relationship of economic development and economic growth and their practical application
- Understand and make appraisal of the current situation of Nepali Economics.
- Identify and review the prospects and status of natural resources of Nepal.
- Identify and analyze the necessity of the situation of agriculture, tourism, transportation and communication.
- Understand and present the concept of poverty, inequality, unemployment and human resource development.
- Understand basic concept of mathematics and statistics in economics and its application in problem solving

6.3 Learning Outcomes

There are various topics included in grade XI and XII. So the grade wise outcomes are slightly different in spite of some sequence. There are various topics included to achieve different level of competencies i.e. knowledge, understanding, application and higher ability. In this regard, the curriculum mentions six (LOs) for Basic concept of economics and allocation of resources whereas there are 19 LOs in Microeconomics. Similarly, 21 in Macroeconomics, 7 in Development Economics, 13 in Nepalese Economy and there are 6 LOs in Quantitative Economics. Table 7.2 below shows some of the LOs of Microeconomics as outlined in the curriculum. (Refer to the curriculum for detail)

Table 6.2: Learning Outcomes of Grade 12 in Economics

Scope/ Unit	Grade 12 Unitwise learning outcome
Microeconomics	Market and revenue curve Identify different forms of market at local level and understand practical implication.(understanding and application)
	Cost curves Derive short run cost curves.(understanding, application and higher ability)
	Theory of Price and Output Determination - Explain price and output determination of monopoly firm or industry(understanding, application and higher ability) - Understanding and explain the practical knowledge about the price determination process in local level.(understanding, application and higher ability)
	Price determination of Factor of Production - Define the gross profit and net profit and explain the risk theory of profit and uncertainty bearing theory of profit.(understanding and understanding) - Understand and present the behavioural knowledge of factor's price determination.(understanding)

6.4 Contents

The curriculum includes a wide range of content areas in order to achieve the LOs in the teaching and learning of Economics as a subject in Grade 12. Table 6.3 shows an instance of the content areas on Microeconomics. (See Curriculum for the detail)

Table 6.3: Contents of Grade 12 in Economics

Scope/ Unit	Contents
2. Microeconomics	2.1. Market and revenue curve 2.1.1 Concept of Market: Perfect competition and imperfect competition, types of imperfect competition (Oligopoly, Monopoly and Monopolistic Competition). 2.1.2 Concept of total revenue, average revenue and marginal revenue. 2.1.3 Derivation average revenue and marginal revenue from total revenue curve under perfect competition and monopoly markets. 2.1.4 Simple Numerical examples.
	2.2: Costs Curves 2.2.1 Concept of explicit, implicit, fixed variable, total, average cost, marginal cost. 2.2.2 Short run cost and derivation of short-run cost curves 2.2.3 Simple numerical examples

Scope/ Unit	Contents
	2.3. Theory of Price and Output Determination 2.3.1 Definition of perfect competition, features, firm and industry, short run and long run equilibrium price and output determination 2.3.2 Meaning and features of monopoly market, price and output determination of firm and industry 2.3.3. Simple numerical examples
	2.4. Price determination of Factor of Production. 2.4.1 Concept of factors pricing 2.4.2 Rent: Concept of economic Rent and contract Rent and Ricardian theory of rent. 2.4.3 Wages: Nominal and real wage, subsistence theory of wage and wage fund theory. 2.4.4 Interest: Gross interest and Net interest, Classical Theory of Interest. 2.4.5 Profit: Gross profit and net profit risk theory of profit and uncertainty bearing theory of profit.

6.5 Assessment Types

To ensure the student learning attainment, both formative as well summative evaluation have to be employed. Student should be engaged in various forms of formative assessment activities such as class work, project work, presentations, achievement test as part of teaching learning process through which students will develop theory and practical based knowledge and skills. The evaluation process should be carried on as a regular part of classroom process and need to be based on the competencies and learning outcomes intended by the curriculum. The student learning will be assessed through internal and external evaluation. Out of 5 credit hours 25 % will be assessed through internal process and 75% through external one. External evaluation consists only of written test.

6.5.1 External Assessment

Out of total marks, 75%marks is allocated to the external examination. Test paper should be constructed based on the SG. The questions related to the various levels of cognitive skills like knowledge, comprehension, problem solving, critical appreciation, and creativity will be asked in the examination of this subject. There should be three types of questions; VSAQ, SAQ and LAQ as mentioned in the curriculum. Achievement level of the students in each subject and the average achievement level of all the subjects will be reported through

6.5.2 Internal Assessment

Out of 100 marks 25% marks is allocated in the internal assessment. This mark is separated for three different areas such as class participation; practical and project works and tri-semester examination which is given in table no. 6.4

Table 6.4: Details of Internal Evaluation

S. N.	Scope	Evaluating aspects	Mark weight	Basis of Evaluation
1	Learning participation	Class participation	3	• daily attendance, • Classroom participation in individual, group wise and class wise participation
2	Practical and project work	Practical and project work	16	• Involvement in at least one project work or community work or field visit from each unit. • Involvement, individually or in group, in various steps such as formulation of plan, observation, interview, data collection, report writing, presentation. Of report.
3	Subject evaluation	Tri-semester examination	6	• Records of trimester evaluation
Total			25	

As shown in the above table, 64% of total marks allocated for internal assessment is separated for students' participation and practical and project works. More specifically, the subject teacher assesses students' learning through class work, project work, community work, extra co-curricular activities, participation in the classroom etc. under internal assessment. It implies that emphasis is laid on learner-cantered teaching learning process through internal evaluation system. Besides, unit tests, monthly tests, terminal written tests are also conducted for the marks allocated in trimester examination. However, more discretion is left to the subject teachers as breakdown of marks of each area is not found in the curriculum, so that NEB needs to breakdown such marks.

6.5.2.1 Basis for Internal Evaluation

Out of 25 marks allocated to internal evaluation, 3, 16 and 6 marks are separated for the areas such as "classroom and learning participation", "practical and project works", and "tri-semester examination" respectively as mentioned in the curriculum. With a view to make the marking system consistent, marks allocated for each area of internal evaluation is further breakdown with its criteria/basis which is presented in the Table 6.5 below.

Table 6.5: Marking Basis of Internal evaluation

Scope	Areas of assessment	Evaluation Criteria	Marks	Area-wise marks	Scope wise marks
Classroom and learning participation	Daily class attendance	attendance up to 50%	0.5	1.5	3.0
		attendance from 51 to 79 %	1.0		
		Attendance 80 more than 80%	1.5		
	Marks in classroom participation	Individual participation	0.5	1.5	
		group wise participation	0.5		
		class wise participation	0.5		
Practical and project work	Involvement in a project work or community work or Field visit	preparation	4.0	8.0	16.0
		Involvement in work	4.0		
	involvement individually or in group project report preparation	Data analysis	2.0	8.0	
		Draft report writing	2.0		
		Presentation	2.0		
		Final report or Field visit	2.0		
	Subject evaluation	Tri-semester examination	First terminal	2.0	
Second terminal			2.0		
Third terminal			2.0		
Total					25.0

Note: Out of 2 full marks in each first, second and third terminal examination, obtained marks should be calculated based on the percentage of marks that the students secured in each terminal examination

6.6 Specification Grid

While developing the test paper for any sort of examination, particularly the final examination, as an achievement test, an attention should be paid in content validity and construct validity. Similarly, test paper should possess adequate technical qualities. For this purpose, test items should be developed based on the SG. So, this section presents the present SG and the elaborated SG in the following sections.

6.6.1 Present Specification Grid

As the decision made by CDC, new curriculum of grade 12 has been implemented from the academic year 2078 B.S. Based on it, SG has also been prepared by CDC as the guidelines for the test developers, which consists of major heading of contents, total number of each type of question, full marks and level of cognitive behaviour. The present SG is presented in the following table.

Table 6.6: Sample distribution and weightage of content area as per the specification grid for Economics

Unit	Marks	Knowledge			Understanding			Application			Higher Abilities			Total no. of questions	Total marks
		Very Short (1 Mark)	Short (5 Marks)	Long (8 Marks)	Very Short (1 Mark)	Short (5 Marks)	Long (8 Marks)	Very Short (1 Mark)	Short (5 Marks)	Long (8 Marks)	Very Short (1 Mark)	Short (5 Marks)	Long (8 Marks)		
Basic Concept of Economics and allocation of resources	8	1				1								2	6
Microeconomics	38					1		1	1	1		1		5	24
Macroeconomics	25	1	1		1					1				4	15
Development Economics	8	1										1		2	6
Nepalese Economics	28	1			1			1	1				1	5	16
Quantitative Economics	13	1						1			1	1		4	8
Total questions each column		5	1	-	2	2	-	3	2	2	1	3	1	22	75
Total marks each column		5	5	-	2	10	-	3	10	16	1	15	8		75
Total marks each level		10			12			29			24				

Note: 1. Numbering of questions should be arranged from VSAQs (Q. No. 1 to 11), SAQs (Q. No. 12 to 19) and LAQs (Q. No. 20 to 22).

- 2. The very short answer questions carry 1 mark each and should cover all units making a total of 11 items.*
- 3. The short answer questions carry 5 marks each. There will be 8 questions representing all units and two questions can have OR questions.*
- 4. The long answer questions carry 8 marks each. There will be 3 questions and 1 question can have OR question.*
- 5. Knowledge level questions should not exceed 20% while the higher ability questions should not be less than 20% and the other domains can include questions as per the requirements.*
- 6. There will be VSAQ, SAQ and LAQ representing all cognitive levels as per the demand and nature of the contents. It is not mandatory that all cognitive levels have all types of questions. HA questions should include items that require analysis, evaluation and creativity.*

6.6.2 Elaborated specification grid for item development

Items are developed to assess learning achievement of the students that are intended in the curriculum as LOs. The elaborated SG provides explication of sampling of items to make the test representative in terms of the detail content area, cognitive skills and format of items. The item should be developed based on one of the elaborated SG cells. The present SG has been elaborated to make the grid more specific, clear and self-explanatory in order to make it user friendly for the item writers.

Table 6.7: Elaborated Specification Grid

Scope/Unit	Detailed content and working hour		Knowledge (13.33%)			Understanding (16.%)			Application (38.7%)			Higher ability (32%)			Total questions			Total marks
			VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	
Basic Concept of Economics and Allocation of Resources.	Scarcity and choice	8	1 (1)	-	-		1 (5)	-	-	-	-	-	-	-	1 (1)	1 (5)	-	6
	Opportunity cost																	
	Production Possibility curve:																	
	Allocation of resources.																	
	Division of labour and specialization																	
	Economic system: types and characteristics																	
Microeconomics	Market and Revenue curve	3 8	-	-	-	-	1 (5)	-	1 (1)	1 (5)	1 (8)	-	1 (5)	-	1 (1)	3 (15)	1 (8)	24
	Costs Curves																	
	Theory of Price and Output Determination																	
	Price determination of Factors of Production.																	
Macroeconomics	Banking System and Monetary Policy	2 5	1 (1)	1 (5)		1 (1)					1 (8)				2 (2)	1 (5)	1 (8)	15

Scope/Unit	Detailed content and working hour	Knowledge (13.33%)			Understanding (16.%)			Application (38.7%)			Higher ability (32%)			Total questions			Total marks
		VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	
	Government Finance																
	International Trade																
Development Economics	Poverty, Inequality, Unemployment and Human Resource	8	1 (1)									1 (5)		1 (1)	1 (5)		6
Nepalese Economics	Nepal's Foreign Trade and Foreign Employment	2	1 (1)		1 (1)			1 (1)	1 (5)				1 (8)	3 (3)	1 (5)	1 (8)	16
	Development Planning in Nepal	8															
	Sustainable Development Goals and Nepal																
Quantitative Economics	Review of basic statistics: Definition, scope, importance and limitations	1	1 (1)					1 (1)			1 (1)	1 (5)		3 (3)	1 (5)		8
	Data collection Methods: primary and secondary data	3															
	Dispersion, coefficient of variation and their characteristics																

Scope/Unit	Detailed content and working hour	Knowledge (13.33%)			Understanding (16.%)			Application (38.7%)			Higher ability (32%)			Total questions			Total marks
		VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ	
	Index Number: Laspeyre's and Paasche's index number																
Total No. of Questions		5	1	-	2	2	-	3	2	2	1	3	1	11	8	3	22
Total Marks		5	5	-	2	10	-	3	10	16	1	15	8	11	40	24	75

Note: 1. Questions in the assembled test paper should be arranged from VSAQs (Q.N. 1 to 11), SAQs (Q.N. 12 to 19) and LAQs (Q.N. 20 to 22).

2. The numbers in the parentheses indicate full marks.

3. Knowledge level questions should not exceed 20% while the higher ability questions should not be less than 20% and the other domains can include questions as per the requirements

4. There will be VSAQ, SAQ and LAQ representing all cognitive levels as per the demand and nature of the contents. It is not mandatory that all cognitive levels have all types of questions. HA questions should include items that require analysis, evaluation and creativity

5. Flexibility to create a similar matrix in or between the sub contents is open as far as the content coverage and cognitive behaviours are maintained. Test developers can create a new SG should they desire to write items from the content areas not covered in this SG as far as the cognitive behaviours are maintained.

6.7 Test Development and Marking Scheme

The answer key and the MS for the constructive response items should be developed along with the first draft of the item and revise/update key answer/MS whenever item is revised/updated. Test matrix should correspond with the SG, but it should vary with other assembled multiple test sets for pretesting as well as final sets.

6.7.1 ItemFormat

The item formats proposed in the SG of economics are “VSAQ”, “SAQ” and “LAQ”. The marks allocated for them are 1, 5, and 8 respectively. The marks should correspond to the number of elements or identifications that are expected in the answer. These items require responses either through writing or drawing. Length of a written response may vary from a phrase to a short paragraph and several paragraphs. These types of items have their own challenges, including the need for creating an elaborate marking guide to ensure fairness and consistency. Three types of items, “VSAQ”, “SAQ” and “LAQ” are presented below.

Very Short Answer Questions

VSAQ can be used in examinations or as part of assessment tasks. They are generally questions that require students to construct a response. The VSAQs require only a one - or two-word answer, or supply the missing word, and a range of acceptable responses is usually very small. Each item carries 1 mark.

Short Answer Question

SAQs are open-ended questions that require students to create an answer. SAQ needs more complex answer than VSAQ, however; answer should not be very lengthy in comparison to LAQ. Questions may require answers such as short descriptive or qualitative answers, diagrams with explanations etc. The answer is usually short, and written them in bullet form. Each item carries 5 marks

Long Answer Question

LAQ also known as written response questions require respondents to write answers for open-ended questions. Responses can be given using multiple sentences, paragraph answers, or mathematical explanations and calculations. Long answer questions require students to generate more complex answers and, therefore, a wide range of responses is acceptable. The LAQ type is designed for collecting essay-style or paragraph-length response. Each item carries 8 marks.

6.7.2 Development of Test Items with Different Level of Cognitive Behaviour

The distribution of cognitive skills in Economics curriculum for Grade 12 is given below in Table 7.8. These cognitive aspects are mentioned in the specification grid but not explicitly stated and defined in the curriculum.

Table 6.8: Item Weightage as per Cognitive skills

Cognitive Level	Weightage in instrument (% of items)
Knowledge	13.0
Understanding	16.3
Application	38.7
Higher Abilities	32.0

More countries are now moving from curriculum-based assessment to competency-based assessment of students in order to prepare them for the rapidly changing economic environment (OECD, 1999). To develop reliable assessments that assess HAs, it is necessary to define these skills in the context of each subject domain. These definitions would then form the basis for the development of assessment materials that target specific skills as per the defined criteria. Also, in the absence of definitions it is not clear under which domain the skills like application, analysis, evaluation, synthesis and critical thinking would be categorized.

Hence, precise definition of each cognitive skill is essential to align test items with the corresponding cognitive skills and to determine the overall skill-based distribution of the items. In the absence of standard definitions, the exercise of developing question papers could become subjective, thus affecting the validity of examination results. Therefore, cognitive skills required by the curriculum and SG need to be clarified in order to guide item writers on what they are expected to do in order to develop test items. Similarly, Items writers should pay attention to the following aspects when developing items from each of the cognitive level for the standardized test.

Intended LOs in the curriculum should be translated as the objective of the item. The item should be developed based on one of the elaborated SG cells. The answer key and the marking scheme for the constructive response items should be developed along with the first draft of the item and revise/update key answer/marking scheme whenever item is revised/updated. Test matrix should correspond with the SG, but it should vary with other assembled multiple test sets for pretesting as well as final sets.

Assembled test sets should cover the marks designated for each content area as given in the SG. SG has further divided each of the areas into units and distributed marks for the units. Item writers should be careful that the assembled test sets should fulfil the mark distribution assigned to the individual units as well.

Knowledge

This is the lowest level of skill and requires students to recall information. Knowledge questions usually require students to arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, and reproduce.

Sample Items for ‘Knowledge’ level:

- A. Define government finance.
- B. What is capital market?
- C. Name the central bank of Nepal.
- D. List the any two qualities of good tax system.

Sample Item for Very Short Answer Question: The answers to these questions should be in one word or in one sentence as in the example below.

Question. What is capital market?

Answer: Capital market is the market where long term financial assets (i.e. maturity period more than 365 days) are included in transaction.

Marking Scheme: 1 mark for correct answer as well as the answer giving similar meaning.

Sample Item for Short Answer Question

Question: Describe any five functions of Central Bank.

Answer: The functions of central bank are:

- monopoly power of note issue,
- banker’s adviser and agent of government,
- Banker’s Bank,
- Lender of last resort
- Clearing house function
- control of credit
- Management of exchange rate, etc.

Understanding

At the understanding level, students show that they can go beyond basic recall by understanding what the facts mean. The verbs at this level includes classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate.

Sample Items for Very Short Answer Question

Question: Write down any two differences between money market and capital market.

Answer: The differences of money market and capital markets are

- Differences in maturity period,
- Use of instruments,
- Differences in risk, etc.

Sample items for Short answer question

Question: What is socialist economy? Explain any four characteristics of socialist economy.

Answer: Socialism is an economic system under which government control all businesses, means of production. Private sectors are not allowed to run and operate business companies and other economic activities. Features of capitalism are-

- No provision of private property,
- No government control,
- Focus to welfare rather than the profit motive,
- No role of price mechanism, etc.

Marking Scheme:

1 mark for meaning and similar writing,

1 mark for explaining each point,

0.5 mark for mentioning only the each point

Applying

At the application level, students must show that they can apply the information they have learned. Students can demonstrate their grasp of the material at this level by solving problems and creating projects.

Sample Items for Short Answer Questions

Question: If total revenue of a firm is Rs. 18,000 and total cost is Rs. 13,000 then find the total profit by using formula.

Answer: Profit = Total revenue – Total cost = 18000-13000 = 5000

Marking Scheme: 0.5 marks for formula and 0.5 marks for calculation

Sample Items for Short Answer Question:

Question: Explain the steps to formulate the effective development plan in Nepal.

Answer: Plan formulation steps in Nepal are

- Evaluation of previous plans
- Collection and presentation of new project proposals
- Discussion
- Determination of objectives, targets and priorities
- Authorization, Implementation and Evaluation of Plan

Marking Scheme:

- 1 mark for explaining each point,
- 0.5 mark for mentioning only the each point

Sample Item for Long Answer Question:

Question: How the comparative advantage theory of international trade is useful for international trade expansion? Explain with suitable example.

Answer:

David Ricardo has developed the comparative cost theory of international trade. There are differences in availability of productive resources such as natural resources, human resources, capital in different countries. In this situation they cannot produce all goods in their favour.

As the cost of production varies in the different nations for the same goods, they compare the cost of production and cost of import of goods from other countries. If the cost of production is higher than the import, they become ready to import from other countries rather than the production in the country. So, country entering into international trade compares the cost of its products with import cost of same goods. One country exports those goods which can be produced at relatively lower costs and imports those goods that require higher costs producing in the country. So the comparison of the cost of production is most important determinant of trade.

This theory reveals that main cause of expansion of international trade is cost difference which indicates the comparative advantage. In the present context, most of the nations are comparing the benefit or advantages either production or importing from other countries.

Higher Ability

Such questions push students to dig deeper into the material and help them form a more comprehensive understanding to effectively apply the information in real-world settings. Higher-level thinking questions are open-ended questions that encourage learners to explore the topic on a deeper level by allowing them to use their knowledge and skills.

Sample Item for Very Short Answer Question

If coefficient of variance (CV) is 0.39 and standard deviation is 7.48, find the mean.

$$CV = \frac{SD}{Mean}$$

$$\text{Or, } 0.39 = \frac{7.48}{Mean}$$

$$\text{Or, Mean} = 19.2$$

0.5 marks for formula

0.5 marks for calculation

Sample Item for Short Answer Question

Question: What measures do you suggest to reduce unemployment in Nepal? Explain any five.

Answer: The measures to reduce the unemployment are modernisation of agriculture, use of labour-intensive techniques, industrialization, population control, practical education, promotion

of small enterprises, development of infrastructure, High rate of capital formation, decentralisation of industrial activity, etc.

Marking Scheme:

1 mark for explaining each point,

0.5 mark for mentioning only the each point

Sample Item for Long Answer Question

Question: Examine the direction of foreign trade in Nepal.

Answer: International trade is important for all countries. It has increased the interdependency among the economies in various aspects. The direction of foreign trade indicates the scenario of trade, import and export situation, balance, etc. Nepal is experiencing the widening trade deficit. Nepal's foreign trade largely depends on India for import and export. However, in recent years the dependency with India is gradually changing.

Marking Scheme:

8 marks for detailed explanation with table or data

6.8 Guidelines for Writing Items

The item should be developed based on one of the elaborated SG cells. The answer key for the selected response type or the MS for the constructive response items should be developed along with the first draft of the item and revise/update key answer/MS whenever item is revised/updated. Test matrix should correspond with the SG. Assembled test sets should cover the marks designated for each content area as given in the SG. SG has further divided each of the areas into units and distributed marks for the units. Item writers should be careful that the assembled test sets should fulfil the mark distribution assigned to the individual units as well.

6.8.1 Elaboration of Intended Objectives in Curriculum

Item included in the test should assess important objective of the curriculum. Therefore, item writer should be clear about the learning outcome intended in the curriculum and then plan development of the item. Item writers should be provided with a matrix of the content area, intended learning outcome and expected cognitive skill level in teaching learning as well as in the assessment. A sample of the matrix of cognitive skills designed in the curriculum in terms of expected cognitive skill is presented here.

Table 6.9: Skills Prescribed in the Curriculum and Specification Grid for Economics

Content area	Learning Outcomes (LO)	Expected cognitive level	
		Based on LO	Intended by specification grid
MICROECONOMICS	Explain about the perfect competition and types of market imperfect competition.	K,U,A, HA	Sample distribution of this unit as per the cognitive level can be: U=1 mark A= 1 marks HA=1mark
	Define total revenue, average revenue and marginal revenue.	K,U,A, HA	
	Identify different forms of market at local level and understand practical implication.	K, U,A,HA	
	Derivation of various market revenue curves with numerical examples.	K,U,A, HA	
MACROECONOMICS	Define public finance and explain its importance.	K, U,A, HA	
	Classify the government expenditure in context of Nepal.	K, U,A,HA	
	Define balance of trade and balance of payment.	K,U, A, HA	

Note: K-Knowledge, U-Understanding, A-Application, HA- Higher Ability

Cognitive skills designed in the curriculum and expected in the SG as presented in the above table show possibility of development of items at various cognitive skills. Therefore, item writer needs to pay attention to the expected cognitive skill level designed in the SG and formulate the item accordingly.

6.8.2 Elaboration of Specification Grid with Cell Code

Each item should be linked to the LO of the curriculum and SG. In order to trace the individual item, the test writer is expected to sort items into different categories or assemble them in a set of tests. The code(s) need to be developed and tagged with the item. In the absence of the item banking system in place, each of the items need to be coded in two ways – one with cell code to identify the item in the elaborated SG and second one with distributed code to identify specific characteristics of the item in terms of content area, cognitive level, item format, marks weightage as exemplified below.

Table 6.10: Example of Item Code in the Elaborated Specification Grid

SN	Item cell code									
	Area/Unit	K	U		A					HA
		VSAQ	VSAQ	SAQ	VSAQ	SAQ	LAQ	VSAQ	SAQ	LAQ
1	Microeconomics									
	Market and revenue curve									
	1. Identify different forms of market at local level and understand practical	1	2	3	4	5	6	7	8	9
	2. Derivation of various market revenue curves with numerical examples.	10	11	12	13	14	15	16	17	18

Item will be given code number of the cell where the item falls in the matrix. This code will indicate content area, cognitive skill level and format of the item. For example, item with cell code number 4 is unit 1, learning outcome 1, application level and short item type carrying 1 mark. As initial task of the item development would be more of manual type until item banking software is in place, an elaborated item code will also be maintained while typing the item in order to sort it at different indicators in terms of content area, cognitive skill level, item format, marks weightage as follows:

Table 6.11: Elaborated Item Code

	Area	Unit	LO	Cognitive skill	Format	Marks
Elaborated item code						

Following code list will be used:

- Area:
1. Fundamental Concept of Economics and Allocation of Resources.
 2. Microeconomics
 3. Macroeconomics
 4. Development Economics
 5. Nepalese Economics
 6. Quantitative Economics

Unit: 1, 2, 3 in order of area

Learning Outcome: 1, 2, 3

Cognitive skill

- 1 Knowledge
- 2 Understanding
- 3 Application
- 4 Higher Ability

Item Format

- 1 Very Short
- 3 Short
- 4 Long

Marks (assigned marks): 1, 2 or 3

Elaborated item code for an item in cell 4 would be as below:

Table 6.12: Elaborated item code

	Area	Unit	LO	Cognitive skill	Format	Item difficulty	Marks
Elaborated Item code	2	1	1	3	3	60% Average	1

6.8.3 Format for item card

Item card will be used from the beginning of item writing process. Along with the item writing key answer and marking scheme need to be developed simultaneously. Item and its answer key/marking scheme would pass through standardized process as single element. Sample Item card is given below.

1. → Subject:¶

2. → Item cell code:¶

3. → Elaborated item code:¶

Unit	LO	Cognitive skill	Format	Marks

4. → Objective of the item (in line with learning outcome).....

¶

5. → Item:¶

6. → Key answer/markings scheme/rubric:¶

7. → Code no. of item writer:¶

6.8.4 Test matrix for assembled test set

Test standardization process will involve assembling of the test, pre-testing, item analysis, and selection, revision or discarding of the item based on pre-testing outcome. Based on accepted items from the pre-testing, final set would be prepared and tested to derive various parameters of the test. From the calibrated item bank, parallel sets would be developed. These assembled tests are expected to differ from one another at least in some degree. In order to check such variation, test matrix would be prepared for each of the assembled test and superimposed with other set of tests if it is replica only or varies from others. Part of test matrix that will look like is shown below.

Table 6.13: Sample of a test matrix

S. N.	Areas	Working Hour	Cognitive Level				Total Marks
			K (13%)	U (16%)	A (39%)	HA(32%)	
1	Basic Concept of Economics and Allocation of Resources.	8	VSA $\times$ 1 1 VSQ $\times$ 1=1 mark	SA $\times$ 1 1 SAQ $\times$ 5=5 marks			6
2	Microeconomics	38		SA $\times$ 1	VSA $\times$ 1 SA $\times$ 1 LA $\times$ 1	SA $\times$ 1	24
3	Macroeconomics	25	VSA $\times$ 1 SA $\times$ 1	VSA $\times$ 1	LA $\times$ 1		15
4	Development Economics	8	VSA $\times$ 1			SA $\times$ 1	6
5	Nepalese Economics	25	VSA $\times$ 1	VSA $\times$ 1	VSA $\times$ 1 SA $\times$ 1	LA $\times$ 1	16
6	Quantitative economics	13	VSA $\times$ 1		VSA $\times$ 1	VSA $\times$ 1 SA $\times$ 1	8
Detail Item Plan							
S.N.	Type of item	Weightage per item	Number of items				Total weightage
1	Very short question	1 mark	5	2	3	1	11
2	Short question	5 marks	1	2	2	3	40
3	Long question	8 marks	0	0	2	1	24
			10	12	29	24	75

Note:1. Test matrix will look different if specification grid is improved in different form.

2. This is a sample of the marks distribution of the set of a test set. Other sets of test should differ at least in some of the cells and marks weightage in the cell while superimposing them.

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APPENDICES

Appendix 1: Present Eight Scale Grading System

S.N.	Interval in Percent	Grade Point	Grade	Descriptor
1	90 to 100	4.0	A+	Outstanding
2	80 to below 90	3.6	A	Excellent
3	70 to below 80	3.2	B+	Very Good
4	60 to below 70	2.8	B	Good
5	50 to below 60	2.4	C+	Satisfactory
6	40 to below 50	2.0	C	Acceptable
7	35 to below 40	1.6	D	Basic
8	below 35	-	NG	Not Graded

2: List of Subject Committees

S.No	Name of the Participants	Designation	Organization
Compulsory English			
1	Ms. Yasodhara Joshi Pant	Evaluation Expert	TU
2	Prof. .Dr. Balmukund Bhandari	Chairman, Sub.Comm., Eng. CDC	TU
3	Dr. Tika Ram Bhatta	STL C. English	Sangla Balkumari SS
4	Dr. Netra Prasad Sharma	STL C. English	TU
5	Mr. Nabin Khadka	Curriculum Officer, English	CDC

S.No	Name of the Participants	Designation	Organization
6	Mr. Nogendra Khanal	Subject Coordinator	NEB
Compulsory Mathematics			
1	Dr. Bishwabala Thapa	Evaluation Expert	TU (Retired)
2	Prof. Dr. Hari Prasad Upadhyay	Chairman, Sub.Comm.Maths, CDC	TU (Retired)
3	Mr. Ramesh Prasad Awasthi	STL C. Maths	Amrit Campus
4	Mr. Medani Prasad Kadel	STL C. Maths	Ambition academy SS
5	Mr. Shyam Acharya	Technical Officer, Science	ERO
6	Reetu Shrestha	Curriculum Officer	CDC
7	Mr. Shreeram Khadka	Vice-Chairman	Nepal Mathematical Society
8	Mr. Bil Bahadur Nepali	Subject Coordinator	NEB
Physics			
1	Dr. Dhruba Prasad Neure	Evaluation Expert	TU
2	Prof.Dr.Krishnabhakta Maharjan	Chairman, Sub.Comm.Maths, CDC	TU (Retired)
3	Mr. Netra Prasad Aryal	STL Physics	TU
4	Mr. Roshan Adhikari	STL Physics	Goldengate Int.SS
5	Mr. Yubraj Adhikari	Curriculum Officer, Science	CDC
6	Mr. Labdev Bhatta	Curriculum Officer, Science	CDC
7	Dr.Narayan Sharma Chapagain	Ex-Chairperson	Nepal Physical Society
8	Mr. Deb Raj Rawat	Subject Coordinator	NEB
Economics			
1	Mr. Kiranram Ranjitkar	Evaluation Expert	TU (Retired)
2	Prof.Dr.Surya Bahadur	Chairman, Sub.Comm.Eco.,	TU

S.No	Name of the Participants	Designation	Organization
	Thapa	CDC	
3	Dr. Chakrapani Luitel	STL Economics	TU
4	Mr. Puspa Prasad Neupane	STL Economics	Prabhat SS
5	Mr. Lekh Raj Khanal	Curriculum Officer, Economics	CDC
6	Mr. Subash Pant	Subject Coordinator	NEB

8.2-Appendix2 3: List of Participants in Workshop of Subject Teachers and Experts

S.No	Name of the Participants	Designation	Organization
1	Dr. Mahashram Sharma	Chairman	NEB
2	Mr. Durga Prasad Aryal	Member Secretary	NEB
3	Prof. Dr.Prakash Man Shrestha	Expert, Member	NEB
4	Mr. Jung Bahadur Aryal	Chief P.Adm and HRD	NEB
5	Mr. Govind Raj Khaniya	Chief Planning & Monitoring	NEB
6	Mr. Krishna Prasad Sharma	Controller Of Examinations	NEB
7	Prof.Dr.Balmukunda Bhandari	Chairman, Sub.Comm.,Eng. CDC	TU
8	Prof.Dr. Hari Prasad Upadhyay	Chairman, Sub.Comm.Maths, CDC	TU
9	Prof.Dr.Krishnabhakta Maharjan	Chairman, Sub.Comm.Maths, CDC	TU
10	Prof.Dr.Surya Bahadur Thapa	Chairman, Sub.Comm.Eco., CDC	TU
11	Dr. Bishwabala Thapa	Evaluation Expert	TU
12	Mr. Kiranram Ranjitkar	Evaluation Expert	TU
13	Dr. Dhruba Prasad Neure	Evaluation Expert	TU
14	Ms.Yasodhara Joshi Pant	Evaluation Expert	TU
15	Dr. Rabindra Shiwakoti	Program Facilitator, ADB	TU
16	Dr. Netra Prasad Sharma	STL C. English	TU
17	Dr. Tika Ram Bhatta	STL C. English	Sangla Balkumari SS
18	Mr. Yandra Kumar Dahal	C. English	Mahendra Gram SS
19	Mr. Ramesh Dhakal	C. English	Panchyakanya SS
20	Mr. Debendra Bdr. Shah	C. English	Janamaitri M. Campus
21	Mr. Pramod Acharya	C. English	Herald SS

S.No	Name of the Participants	Designation	Organization
22	Ms. Kalpana Paneru	C. English	Manohar SS
23	Mr. Ramesh Prasad Awasthi	STL C. Maths	Amrit Campus
24	Mr. Medani Prasad Kadel	STL C. Maths	Ambition academy SS
25	Mr. Sushil Khanal	C. Maths	Koteshwor Saraswati SS
26	Mrs. Tara Paudel	C. Maths	TU
27	Dr. Ruma Manandhar	C. Maths	TU
28	Mr. Murari Pandeya	C. Maths	Sainik SS
29	Dr. Indra Kumari Bajracharya	C. Maths	TU
30	Mr. Netra Prasad Aryal	STL Physics	TU
31	Mr. Roshan Adhikari	STL Physics	Goldengate Int.SS
32	Mr. Bhagirath Neupane	Physics	Sainik SS
33	Mr. Ganapati Nath Jha	Physics	TU
34	Mr. Dipak Kafle	Physics	Nepal Police SS
35	Mr. Ramraja Prasad Timalsina	Physics	Kanjirowa SS
36	Mr. Purna Bahadur Shrestha	Physics	Kathmandu World SS
37	Prof.Dr.Chakrapani Luitel	STL Economics	TU
38	Mr. Puspa Prasad Neupane	STL Economics	Prabhat SS
39	Dr. Chandra Prasad Dhakal	Economics	TU
40	Mr. Sanjaya Gnawali	Economics	Sahid Smarak Campus
41	Mr. Arjun Prasad Ghimire	Economics	St. Xavier's SS
42	Mr. Megh Nath Dahal	Economics	Adarsha SS
43	Ms. Labanya Devi Ghimire	Economics	Baneshwor Campus
44	Mr. Ramchandra Dhakal	Curriculum Officer Mathematics	CDC
45	Mr. Lekh Raj Khanal	Curriculum Officer Economics	CDC
46	Mr. Khagendra Shrestha	Technical Officer, Science	ERO

S.No	Name of the Participants	Designation	Organization
47	Mr. Shyam Acharya	Technical Officer, Science	ERO
48	Mr. Bednath Adhikari	Under Secretary	NEB
49	Mr. Subash Pant	Deputy Controller, Exam Impvt.Unit	NEB
50	Mr. Krishna Prasad Ghimire	Deputy Controller	NEB
51	Mr. Raju Karki	Account Comptroller	NEB
52	Mr. Nogendra Khanal	Subj. Coordinator, English	NEB
53	Mr. Bil Bahadur Nepali	Subj. Coordinator, Maths	NEB
54	Mr. Deb Raj Rawat	Subj, Coordinator, Science	NEB
55	Mr. Narayan Pokhrel	GIS	NEB
56	Ms. Supragya Devkota	Computer Officer (IT Support)	NEB
57	Mr. Ramesh Adhikari	Section Officer	NEB
58	Mr. Nirmal Subedi	Section Officer	NEB
59	Ms. Nisa Sharma	Section Officer	NEB
60	Mr. Pradip Paudel	Section Officer	NEB

4:List of Participants in Central/National Level Workshop

S.No	Name of the Participants	Designation	Organization
1	Dr. Mahashram Sharma	Chairman	NEB
2	Mr. Durga Prasad Aryal	Member Secretary	NEB
3	Dr. Hari Prasad Lamsal	Joint Secretary	MOEST
4	Dr. Baburam Dhungana	Under Secretary	CDC
5	Mr. Chandra Kant Bhusal	Director General	ERO
6	Prof. Dr.Prakash Man Shrestha	Board Member (Examination Expert)	NEB
7	Mrs Rabina Maharjan	Board Member (Principal)	Public School
8	Mr. Bishnu Khanal	Asst. Dean, FOE	TU
9	Prof. Dr. Ganesh Bdr. Singh	Evaluation Expert	TU
10	Dr. Rabindra Shiwakoti	Program Facilitator, ADB	TU
11	Mr. Gyanendra Pd. Bhatta	Education Officer	Madhyapur Municipality
12	Mr. Ratna Bdr Katwal	Education Officer	Suryavinayak Municipality
13	Mr. Jung Bahadur Aryal	Chief P.Adm and HRD	NEB
14	Mr. Krishna Prasad Sharma	Controller Of Examinations -12	NEB
15	Mr. Bishnu Narayan Shrestha	Controller Of Examinations - 10	NEB
16	Dr. Bishwabala Thapa	Evaluation Expert	TU
17	Mr. Kiranram Ranjitkar	Evaluation Expert	TU
18	Dr. Dhruva Prasad Neure	Evaluation Expert	TU
19	Prof.Dr. Hari Prasad Upadhyay	Chairman, Sub.Comm.Maths, CDC	TU
20	Prof.Dr.Surya Bahadur Thapa	Chairman, Sub.Comm.Eco., CDC	TU
21	Dr. Netra Prasad Sharma	STL C. English	TU
22	Dr. Tika Ram Bhatta	STL C. English	Sangla Balkumari SS
23	Mr. Shreeram Khadka	Vice-Chairman	Nepal Mathematical Society
24	Mr. Medani Prasad Kadel	STL C. Maths	Ambition academy SS
25	Prof. Dr.Narayan Sharma Chapagain	Ex. Chairman	Nepal Physical Society
26	Mr. Netra Prasad Aryal	STL Physics	TU
27	Mr. Roshan Adhikari	STL Physics	Goldengate Int.SS
28	Dr. Chakrapani Luitel	STL Economics	TU

S.No	Name of the Participants	Designation	Organization
29	Mr. Puspa Prasad Neupane	STL Economics	Prabhat SS
30	Mrs. Reeta Tiwari	Principal	Padhyakanya Bidhyashra SS
31	Mr. Krishna Prasad Dhancha	Principal	Bagishwori SS
32	Mr. Laxmi Prasad Karmacharya	Principal	Khowpa SS
33	Mr. Shyam Prasad Acharya	Technical Officer, Science	ERO
34	Mr. Bhashkar Datt Pant	Deputy Director	NEB
35	Mr. Subash Pant	Dy, Controller, Exam Imt.Unit	NEB
36	Mr. Krishna Prasad Ghimire	Deputy Controller	NEB
37	Mr. Raju Karki	Account Comptroller	NEB
38	Mr. Nogendra Khanal	Subj. Coordinator, English	NEB
39	Mr. Bil Bahadur Nepali	Subj. Coordinator, Maths	NEB
40	Mr. Deb Raj Rawat	Subj, Coordinator, Science	NEB
41	Mr. Subas Shiwakoti	Section Officer	NEB
42	Mr. Nirmal Kumar Subedi	Section Officer	NEB
43	Mr. Narayan Pokhrel	GIS Expert	NEB
44	Mr. Bhakta Prahla Basnet	Computer Asst. (IT Support)	NEB
45	Arjun Prasad Dahal	Comp. Asst.	NEB
46	Mr. Shubhas Sapkota	Admin Support	NEB