

**CENTRAL BOARD OF SECONDARY EDUCATION
2, COMMUNITY CENTRE, PREET VIHAR, DELHI – 110092**

D(A)/PA/CIR/05

**Dated: 25th March, 2005
Circular No. 19/2005**

All Heads of Institutions
Affiliated to CBSE

Dear Principal,

Sub: Restructuring of Science Practical Work – Reg

As a part of its ongoing exercise in improving curricular transactions in schools, the Board has decided to restructure the existing pattern of science practical work in schools at the secondary level. The revised scheme of practical work envisages a written paper on practical examination along the lines of the theory examination. A concept paper on “Restructuring of science practicals at secondary level” is enclosed.

The salient feature of the scheme are:

- The theory examination will be of duration of 2½ hours and will be based on 60 marks
- There will be a separate paper on practical skills in Science and Technology for 20 marks
- The duration of the examination on practical skills will be 1½ hours
- The paper on practical skills will be based on Multiple Choice Questions
- The examination on practical skills will be conducted by the Board soon after the theory examination on a separate date notified by the Board
- There will be an internal assessment in Science & Technology with an allocation of 20 marks
- The marks for theory and practical will be indicated separately in the statements of Marks issued by the Board

The scheme will come into force with effect from the ensuing academic year (2005-06) commencing from April 2005 in class IX. In other words, the class X examination of March 2007 will be held according to the revised scheme. You are requested to kindly go through the concept paper carefully and ensure its effective implementation in your school. Kindly bring it to the notice of all the stakeholders of your school.

Yours faithfully,

**(G. BALASUBRAMANIAN)
DIRECTOR (ACADEMIC)**

Restructuring Science Practicals at Secondary Level

Relevance of Science Education:

The subject of science occupies a central place in the learning paradigm of school education. It is one of the subjects in the core curriculum as envisaged in the National Policy of Education. All commissions on education have laid adequate emphasis on the learning of science at the school level in order to develop right scientific attitude and aptitude among the younger generation of the country. Learning of science provides skills of rational thinking, enhances the qualities of observation, logic, analysis, critical thinking. Objective interpretation, problem-solving and decision making apart from several other skills. The applications of science and the emergence of technology have enhanced the learning climate to empower productive and profitable use of matter, materials and energy for better quality of life.

The school Science curriculum

In the school education climate, in the first few years of primary schooling emphasis is laid on environmental sciences. At the middle school level, an integrated approach is adopted so that the learners are able to envisage science in a holistic manner as a mode of thinking based on certain established scientific procedures rather than as a conglomeration of some ideas and concepts of individual disciplines. This is a stage where learners tend to develop the ability of questioning the concepts and procedures with questions of ‘why, how and why not?’ It is also required at this level that demonstration be given in the classroom so as to develop the quality of keen observation and enhance interest in learning of the subject.

The secondary level provides the most appropriate climate for finding answers to many of the questions they had raised earlier and to indulge in probing into the systems to find answers. This is a stage which empowers them to develop skills of logical thinking, scientific aptitude and attitude. The curriculum and textual materials provide necessary foundational inputs to meet the challenges in the learning process of science and technology. However, it is the transaction of science that goes a long way in achieving the above objectives.

The context of Practical work:

It is an established fact that science and technology is not learnt exclusively from textbooks and other reading materials. The students should have adequate opportunity to learn by doing. The skills learnt during practical work in a laboratory facilitate them to explore, discover and innovate. The study of Science & Technology should enable the learners to pursue the subject with a sense of joy, a spirit of inquiry and a sense of adventure.

Some of the skills the students learn in laboratory include:

- Planning
- Manipulation
- Analysis
- Observation
- Comparison
- Interpretation
- Problem-solving
- Calculation
- Decision-making

Several other skills could also be identified and facilitated.

Laboratory work has been incorporated in the science curriculum as an essential component. Schools are expected to use meaningful pedagogical skills in classrooms through demonstrations and in laboratories through hands-on experience to the students. The objective of Practical work is not only facilitating the learners in the use of laboratory equipments and instruments, but to use them in a scientific manner with safety precautions. The hands-on experience is aimed to provide a sense of confidence and a feeling of discovery in the minds of learners apart from basic manipulative skills.

Evaluation of practical work – the current scenario:

Keeping in view that these skills are not measurable during a short interval of time during the conduct of a practical examination, especially up to the secondary level, the Board had proposed the scheme of continuous and comprehensive evaluation of the practical work during the entire academic year when various practical activities are carried out by the students in the classroom.

It is also important to note that adequate opportunities need to be given to the students to adopt an open ended approach while dealing with problems of science and technology, so that they are not conditioned necessarily by a pre-conceived end result. There is also adequate scope for extended learning through practical experiences which cannot be framed into a pre-fabricated record of work. It is essential that the performance of practical in the school should give better understanding of the concepts and promote critical inquiry among the learners so that they are able to apply this knowledge whenever called for both in similar as well as other different situation.

It has been observed by the Board, over a period of time, that the practical work is not being conducted by a large number of schools in the true spirit in which they have to be done. Even in places, where adequate infrastructural facilities and support mechanisms exist, the practical work is being conducted in a very ceremonious manner as if it is a part of a formality to complete in the process of learning science. The evaluation of practical work also raises many debatable issues including the credibility and validity of such assessments. There is poor correlation in many cases between the performance

of students in theory and practical work, though it may be incorrect to correlate their relevance in all cases. Nevertheless it is a meaningful indicator.

Most often, the fact that the assessment is conducted internally makes the schools to adopt a very casual approach to the practical work. The students, having completed the course do score marks, though they have, in many cases, not acquired the essential scientific skills. The situation needs to be addressed. A paradigm shift in the approach seems to be essential to give adequate thrust to practical work so that there is seriousness and sincerity of purpose and it also empowers the learners with the objectives which have been defined for the same.

The proposed change:

It is in this context, that the Board has decided to make some changes in the subject of Science & Technology for assessment at secondary level.

Present position (for secondary classes):

Total Marks for science and technology : 100 marks

- Marks for Theory Examinations(3 hours): 75 Marks
- Marks for Internal Assessment of Practical work: 25 Marks

The Revised Scheme:

Total Marks for Science & Technology: 100 Marks

- Marks for Theory Examination (2 ½ hours): 60 Marks
- Marks for Written Examination Science & Technology (practical skills) (1½ hours): 20 marks
- Marks for Internal Assessment: 20 Marks

Theory Examination:

The time of the theory examinations would be reduced to 2½ hours from the existing time of 3 hours. The syllabi for the theory examination will be suitably pruned and marks for different units would be modified and intimated. A revised sample question papers would also be issued by the Board in this regard.

Written Examination In Practical work:

The Board will conduct a written examination on the practical syllabi notified for the practical work in the subject of Science & Technology. The objective of the examination would be to assess the depth of understanding of the work done by the students during the year. It will test apart from the concept, the skills involved, the critical thinking competencies and the ability to apply the hands-on skills. The Board would bring out a sample question paper shortly to facilitate the schools to adopt themselves with comfort to this new scheme.

The pattern of the question paper will be based on Multiple Choice. An OMR sheet will be used for answering questions and evaluation will be done using computers. The duration of this examination will be 1½ hours. This examination will be held on a day later than the theory examination as would be notified in the schedule of the examination.

Internal Assessment:

The internal assessment of the learners would be made during the school academic year and the weightage of twenty (20) marks will have the following components:

- Testing of skills (skills will be listed) : 15 marks
- Record of Practical work and Viva : 5 marks (3+2)

The Board will bring detailed guidelines to schools on effective implementation of the internal assessment.

Certification:

The marks obtained by the candidate will be reflected in the statement of marks issued by the Board in the following manner:

- Theory (60 Marks)
- Practical (40 Marks)
- Total (100 Marks)

Marks obtained by a student in theory and practical will be indicated separately in the certificate to be issued by the Board.

This revised scheme will come into effect from the ensuing academic session (2005-06) for class IX and hence the students appearing in class X in March 2007 examination will take up the secondary examinations in the revised scheme.

The need:

The schools need to understand the objective of the proposal and ensure its effective implementation. This calls for review of the existing curriculum transaction in the classrooms. The quality of teaching science has to be made more pragmatic, relevant, life-oriented and facilitate critical inquiry in the minds of the learners. This will help the learners to acquire self confidence, a sense of enterprise and focus on productivity. It needs intense discussion with science teachers, planning of the pedagogy and close monitoring. As such the Board hopes that this would bring an appropriate climate building even in the middle level of the school with due emphasis on demonstrations and hands-on experience. The effective implementation of this scheme calls for commitment and synergy on the part of all affiliated schools, but it is an important

emerging requirement of the system, if we have to usher the nation to the status of a developed country.