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Computer Grading of Examinations

Examinations have been graded by computers for some years, but these examinations are limited to multiple-choice questions; the ordinary computational problems cannot be used. A method of grading examinations by computer has been required in which the student can generate his own answers.

A method, using IBM cards and computer processing, has now been developed to automate examination grading and recording; it permits use of the computational problems so common in home assignments and written examinations. The student generates his own answers, and the instructor has much greater freedom in writing questions than is possible with multiple-choice examinations. Processing takes only from 2 to 10 minutes for a class of 100 students who can be examined more frequently; thus students are encouraged to keep up with their work rather than cram for big examinations.

Port-a-Punch IBM cards are used for recording the answers to questions. The first few columns of each card are reserved for identification numbers of student, course, and examination, and so on. Then one column is reserved for each "choice" answer; six, for each numerical answer. These six are coded in modified exponential form, with the first three columns used for significant figures, the last two for exponents, and the fourth for exponent sign or special symbol. In this fourth column, 1 signifies "minus", 2 signifies "plus", and 3 signifies an unconditional zero. Thus the student can differentiate an intended answer of zero from a blank one. Thus 6.03×10^{23} is punched as 603$\underline{2}$23; 5.67×10^{-5}, as 567$\underline{1}$08; and 0.00, "none," or "impossible," as 000$\underline{3}$00. The fourth column, here underlined, is printed in red on the student cards for emphasis.

The instructor generates correction cards by punching the correct choice(s) for the "choice" answers, and upper and lower limits for the numerical answers. The ranges between these limits permit acceptance of answers differing from the ideal answers because of small slide-rule or round-off errors. Besides the straight numerical answers, this method has proved to be applicable to answers involving chemical equations and analytical unknowns.

With this system four examinations can be written in less time than is required for one of the standard multiple-choice type. This time advantage has been used for giving students in the same classroom four similar but scrambled examinations. Each version carries a code number which the student punches onto his answer card(s); the computer senses this number and grades the student according to the corresponding answer card(s).

This system has been kept well within the capabilities of the small computers now at many colleges, such as the IBM 1620 and the CDC 160A. Outputs include complete listings of each student's answer to each question, of grades by student number, of student numbers and grades in class-rank order, of student performance on each question by question and examination version, and of class means, medians, and modes.

Reference:

1. N. A. Frigerio, *J. Chem. Educ.* **44**(7), 413 (July 1967).

Notes:

1. This information may interest those concerned with educational methods and techniques.

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2. Inquiries may be directed to:

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Patent status:

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