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EXPERIENCE IN MULTIPLE-CHOICE PROBLEMS AND ASSIGNMENTS

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Abstract: It is known that in the last five years, the number of higher education institutions in our republic and the level of admission of students to them have increased sharply. The issue of sufficient educational and methodological provision of this contingent has arisen. This article is about the experience of creating multiple-choice problems and tasks for students.

Key words: theoretical mechanics, base reaction force, coordinate axis, kinematics, law of motion, progressive motion, velocity, velocity projection, acceleration, rotational motion, linear velocity, rotational acceleration, centripetal acceleration, motion transmission, rack, gear wheel.

Great changes are being made in the field of education in our country. The number of students of existing higher educational institutions and the number of educational fields is constantly expanding and increasing. Non-state higher educational institutions are joining the ranks of state higher educational institutions operating in the field of education. For example, 10 new state and non-state higher educational institutions were added to the existing 3 higher educational institutions in Namangan region in recent years. Therefore, the increase in the number of students, along with providing them with quality education, also puts the issue of improving the educational and methodological support of subjects on the agenda. It is necessary to improve the methodological support of Latin alphabet students. They need textbooks, study guides and problem sets that are printed in quality and in color to meet the requirements of the times. The sets of problems and tasks developed in the subjects are obsolete, most of them have ready-made solutions on the Internet.

Author Makhmudov Z.S. developed multiple-choice problems and tasks for students in the departments of theoretical mechanics. Senior teacher Q.S. Azamov applies them to the educational process. The set of problems and assignments compiled for the sections of statics and kinematics

was approved by the ministry and recommended to be published as a study guide. Compilation of questions and assignments for the dynamics section is nearing completion.

The questions offered to students in the science classes are multi-variable. This situation creates an opportunity for students to solve individual problems. Below is a recommended multiple-choice problem for students from the kinematics department:

1.3. Problem. A material point moves in the plane according to the law $x = f_1(t)$, $y = f_2(t)$. Find the trajectory equation of the material point, draw its shape, indicate the starting point of the movement and the direction of the movement. The necessary quantities for calculations are given in table 1.3.

Table 1.3.

Variations	Funktions	
	$x = f_1(t)$ m	$y = f_2(t)$ m
1	$2\sin(\pi t/3)$	$2\cos(\pi t/3)$
2	$5\sin(\pi t/6)$	$5\sin(\pi t/6)$
3	$9\sin(\pi t/6)$	$6\sin(\pi t/6)$
4	$4\sin(\pi t/3)$	$3\cos(\pi t/3)$
5	$3+2\cos(\pi t/2)$	$5-2\sin(\pi t/2)$
6	$2\sin(\pi t/4) — 3$	$4+2\cos(\pi t/4)$
7	$4+\cos(\pi t/3)$	$3-2\sin(\pi t/3)$
8	$1- 5\sin(\pi t/6)$	$2+4\cos(\pi t/6)$
9	$6\sin(\pi t^2/4)$	$6\cos(\pi t^2/4)$
10	$5\cos(\pi t^2/3)+2$	$5\cos(\pi t^2/3)-3$

Also, students were offered test questions prepared for theoretical mechanics departments. These test-issues allow to determine in a short time how well they have mastered the curriculum, their ability and knowledge. Below is a test case from the statics section:

3.68. The test - the problem. The horizontal beam shown in Fig. 3.68 is balanced at point A on a movable hinged support and two booms. The base reaction forces of the beam are shown in the correct answer (options of answers are presented in figures *3.68 a, 3.68 b, 3.68 c, 3.68 d*). Justify your answer.

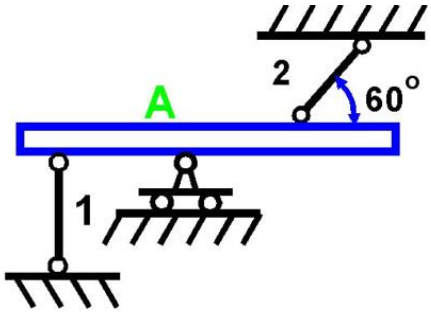

Figure 3.68

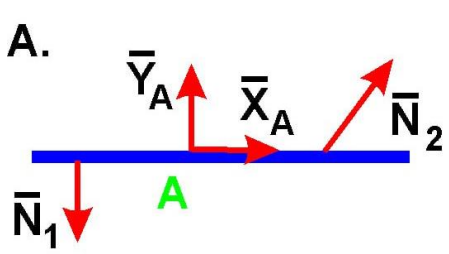

Figure *3.68 a*

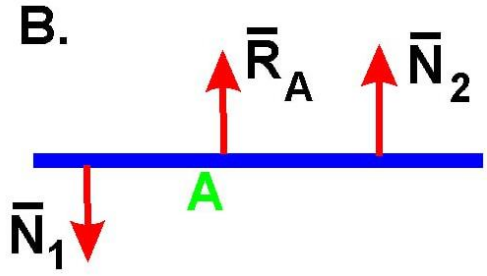

Figure *3.68 b*

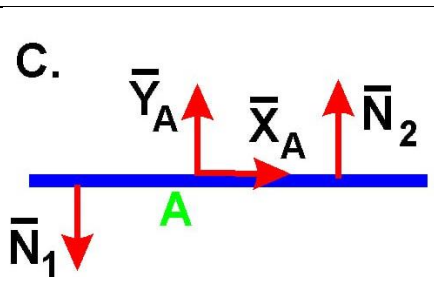

Figure *3.68 c*

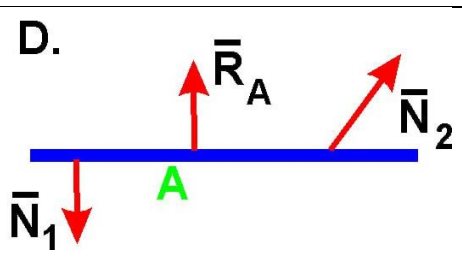

Figure *3.68 d*

Multiple-choice (100-choice) tasks were created for students of theoretical mechanics for computer-graphic work and individual problem solving. In it, 10 forms and 10 conditional problems were presented to the students' attention, which were compiled independently by

Makhmudov Z.S. It contains the text of the assignment, a diagram, and an example of the assignment. Below is this assignment in its entirety.

K9 Assignment. Determination of velocity and acceleration of rigid body points in forward and rotational motion

A mechanical system consists of four bodies that are in contact with each other or connected by an inextensible rope. According to the law $x_1=f(t)$, the 1st body in forward motion drives the 2nd gear wheel by means of a rope (in some variants, the 4th gear rack drives the 3rd gear wheel). The 2nd wheel is in turn meshed with the 3-speed wheel externally (or internally) and the drive is transmitted to the 3rd wheel. In turn, the 3rd gear wheel drives the 4th gear rack. Assignment forms are presented in forms K9.0-K9.9. The movement starts with the forward movement of load 1 according to the law $x_1=f(t)$ (in some variants, the 4th rack moving according to the $s_4=f(t)$ law drives the 3rd gear wheel). Find the linear velocities and accelerations of the indicated points and the angular velocities and angular accelerations of the indicated wheels for the given time $t=t_1$ and represent the quantities found in the figure. The necessary quantities for calculations are given in table K9.

Table K9

№	$x_1=f(t)$ sm	$s_4=f(t)$ sm	t_1 sec	R_2 sm	r_2 sm	R_3 sm	r_3 sm
0	$10t^2$		1	20	10	24	12
1		$3t^2-1$	2	80	40	60	30
2	$9t^2+2$		1	90	45	70	35
3		$2t+5t^2$	2	24	12	28	14
4	$2t^3$		1	48	24	52	26
5		$6t^2-2t$	2	12	6	18	9
6	$1+2t+t^2$		1	32	16	36	18

7		$7t+4t^2$	2	42	21	38	19
8	$3t^3+1$		1	4	2	6	3
9		$5t^2$	2	8	4	10	5

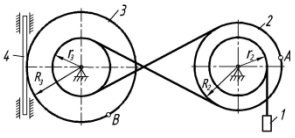

Fig. - K9.0

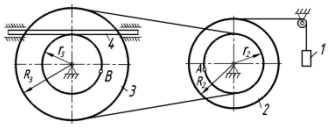

Fig. - K9.1

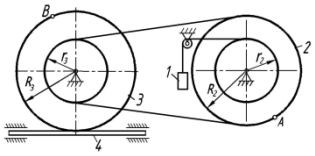

Fig. - K9.2

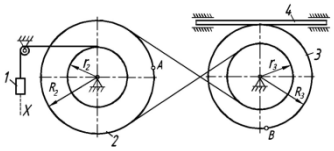

Fig. - K9.3

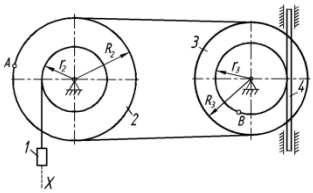

Fig. - K9.4

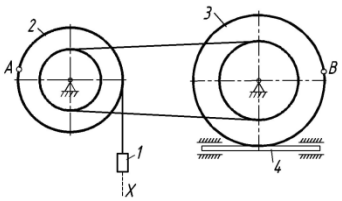

Fig. - K9.5

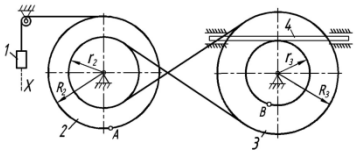

Fig. - K9.6

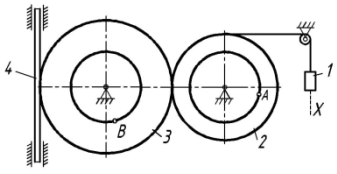

Fig. - K9.7

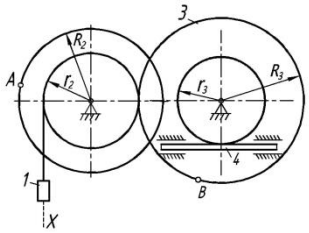

Fig. - K9.8

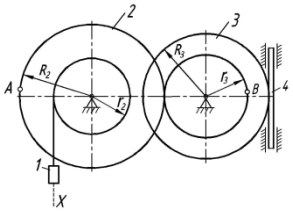

Fig. - K9.9

Therefore, the structure of multiple-choice problems and assignments for students in the theoretical mechanics department is a positive event today, and they are useful and necessary for students, they form individual problem-solving skills in them, they are a step towards increasing the level of knowledge.

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