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AUTHOR Shisler, Clifford L.
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 *Vocational High Schools

ABSTRACT

The purpose of this project was the development of comprehensive articulation policies and procedures in three instructional areas common to Greenville Technical College and the Greenville County School System. The areas were Machine Tool Technology/Machine Shop, Engineering Graphics Technology/Drafting, and Industrial Electricity/Electricity. Project activities included development of a competency-based placement program to replace credit and clock-hour requirements, development of counselor skills in implementation of the articulation process, and statements of compatible and sequential behavioral objectives for both secondary and postsecondary instruction. Procedures were developed to allow advanced placement of vocational center students in postsecondary programs, a guidance information form was developed to give feedback to counselors on the progress of articulated students, teacher visitations were encouraged, and a counselor workshop was held. The bulk of this report consists of Program Articulation Booklets for each of the three instructional program. The Booklets contain student articulation flowcharts, articulation evaluation procedures, transcript evaluation forms, guidance information forms, a list of instructional units, and a detailed list of performance objectives. (JDS)

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Grant No.: G00-75-00453

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Period Covered: July 1, 1975 to September 30, 1976

Project Director: Clifford L. Shisler

OCCUPATIONAL EDUCATION PROGRAM ARTICULATION BETWEEN SECONDARY VOCATIONAL
EDUCATION CENTERS AND GREENVILLE TECHNICAL COLLEGE

Final Program Performance Report

2

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ACCOMPLISHMENTS

The overall accomplishment of the Occupational Education Program Articulation Project was the development of comprehensive articulation policies and procedures in three instructional areas common to Greenville Technical College and the Greenville County School System. The areas were Machine Tool Technology-Machine Shop, Engineering Graphics Technology-Drafting, and Industrial Electricity-Electricity.

The attainment of the articulation policies and procedures was facilitated by the following:

Statement of compatible and sequential behavioral objectives by both secondary and post-secondary instructors

Adjustment of classroom evaluation techniques to conform to a competency-based placement program

Broadening of counselor information and skills in the implementation of articulation procedures

The Articulation Project was funded for FY-76 and a three month extension (July 1-September 30, 1976).

The status of the grant activities is explained in the following narrative.

Specific performance objectives were developed for three occupational training programs to replace credit and clock-hour requirements. (Included in the appendices of this report are Program Articulation Booklets which contain copies of performance objectives.) The objectives for the Machine Tool Technology program were specified through the South Carolina State Department of Education Career Cluster Project.

The Career Cluster Project provides objectives, materials, and evaluation methods whose usage is required of the area vocational centers. Vocational center and Greenville TEC instructors specified performance objectives for the Industrial Electricity and Engineering Graphics Technology Programs.

Procedures were adopted to allow advanced placement of vocational center students in post-secondary programs. Following the specification of program objectives, instruments to rate student skills were constructed. The Engineering Graphics Technology program will be using a "Skills Proficiency Rating Form" and the Machine Tool Technology Program will use a "Machine Shop Transcript Evaluation Form." Each of the three programs uses a placement exam. (The Industrial Electricity Program uses a competency exam exclusively to determine advanced placement.)

Effective advanced placement is a bilateral decision. The institution must determine a student's competencies and prescribe appropriate instruction. The student must also feel confident of his abilities and of the placement. Students have the option of requesting lower program placement. Counselors encourage students, however, not to choose an entry level lower than the one prescribed.

The vocational centers and Greenville TEC programs utilize advisory committees to ensure instructional compatibility with industrial reality. These committees advise on the specification of curricula, selection of equipment and instruction of new methodologies. The committees also make certain that training practices are commensurate to industrial needs.

Special Articulation Project Committees were established early in the project funding period. Committee membership was composed of counselors, instructors, program administrators, community representatives, and project staff. The varied membership

provided effective constructive criticism of project activities and commitment to the implementation of the project.

Program Completion Requirements were based on graduation standards established by the State Board for Comprehensive and Technical Education and skills levels demanded by employers. The principal goal of the technical college and the vocational centers is to provide opportunities for individuals to enter the labor market with maximum skills.

An integral function of the articulation process was the regularly scheduled meetings of technical college and vocational school instructors. Instructors were able to discuss common goals and frustrations, share teaching methodologies, and become generally more informed about each other's programs.

MAJOR ACTIVITIES AND EVENTS

The major activities and events of the project are described below.

Tuition Scholarships--Greenville TEC established a tuition scholarship for the three departments of each vocational center involved in the project. The ten scholarships are awarded each June and provide one quarter of free tuition. The scholarships are renewable for one quarter after the student's work is satisfactorily reviewed by his college department faculty.

Guidance Information Form--This form was developed to provide feedback to the College and vocational center counselors on the progress of articulated students.

Teacher Visitations--Instructors in the drafting and engineering graphics programs exchanged teaching positions for one day. This exchange facilitated understanding

of the particular instructional needs of each program level.

Counselor's Workshop--Project Staff coordinated a September workshop for Greenville TEC and vocational center counselors. The workshop allowed counselor to "walk through" the program. Program administrators presented synopses of the articulation process as it applied to their instructional areas. Vocational center instructors were given information and materials to use in advising their students.

PROBLEMS

The project was not completed within the fiscal year for which it was funded. At the end of June, four activities remained unfinished. These activities were the validation of the Industrial Electricity Articulation Test, the completion of the counselor training program, the establishment of a testing center to handle placement exams, and the dissemination of developed materials.

The Industrial Electricity Articulation exam was validated during the late summer. Test items were matched with program objectives and difficulty and discrimination indices calculated for each item. A college testing center has not been established. The lack of these facilities, however, has not inhibited the program. The counselor training workshop and procedures for dissemination of materials are explained elsewhere in this report.

Fall 1976, was the first quarter the articulation process had been used to place students in instructional programs. Although comprehensive evaluation of the program is premature, the program does appear to have the necessary mechanisms to support efficient placement of students. The program needs to become more widely accepted, but this acceptance will be a function of time as the participants become more

comfortable with the process.

PUBLICITY ACTIVITIES

Included in the appendices are four articles which were published by the Greenville TEC "in-house" newspaper, "Tectonics". The "Tectonics" circulation includes all full and part-time instructors and administrators and officials of forty other institutions throughout the country. Two newspaper articles were published to promote the program. These articles, also included in the appendices, were announcements of scholarship awards.

DISSEMINATION ACTIVITIES

Copies of the final report and the program articulation booklets will be sent to the ERIC Clearinghouse for Junior Colleges, the Center for Vocational Education (Ohio State University), the sixteen technical colleges of South Carolina, each vocational center in Greenville County, and the offices of the Greenville County School System. Additional copies will be printed and made available to any institution requesting materials.

PROGRESS ON DATA COLLECTION AND EVALUATION PLANS AND PROCEDURES

The Articulation Project was funded for one year only. The year was spent in the activities of initiating the project. The grant did not provide for a formal evaluation process, however, as the program is fully implemented it will be evaluated through the institutional research and program auditing function of the College.

This evaluation will be examining such program aspects as:

Are the levels of advanced placement appropriate for the student?

What is the effect of the articulation program on retention/attrition rates?

What is the effect of the program on length of study of vocational center graduates?

How do vocational center students compare with non-vocational center students on characteristics as academic success, job placement, and wage levels?

What are the attitudes of vocational center and college faculty toward the articulation process?

Greenville TEC hopes to answer these questions when the program enters its second and third years. The grant funded seed activities only and therefore, the College deems it more valuable to assess the effectiveness of the total program rather than the initiating activities.

OTHER ACTIVITIES

(not applicable)

STAFF EMPLOYMENT AND UTILIZATION

(not applicable)

STAFF DEVELOPMENT

The staff development activities which resulted from the accomplishment of the objectives of this grant are best described with respect to those groups served.

Instructors participated in all of the articulation program meetings and became involved in the design and implementation of the program. Instructors also worked individually with a curriculum specialist as they specified their instructional objectives and correlated test items with those objectives.

Counselors participated in the initial and final articulation program meetings. Efforts were made to increase the level of program information, to inform the counselors of the advantages of advanced placement, and to train them in the evaluation of student skills.

Appendix A
Publicity Activities

ARTICULATION GRANT ACTIVITIES

Progress is being made on the goals of the articulation grant. The grant is funding activities to improve articulation between Greenville TEC and the vocational education centers.

Recently DAVE TITUS, J. D. WARREN, OLIVER ROGERS, JANIE McPHERSON, and LARRY SANKEY met with guidance counselors and instructors from the vocational centers and HAROLD KAY of the Greenville County Schools.

The participants agreed on a policy of evaluation for machine technology students. Some of the objectives are based on the Career Cluster Project.

The student placement system will be evaluated four weeks after the quarter begins.

BILL BAILY, RANDY LUCAS, and BRUCE CARDALL are writing objectives in Industrial Electricity for the articulation project.

Engineering Graphics Technology instructors LES CARAWAY and WALTER RICE have met with the area vocational instructors and are coordinating objective writing in their departments.



ARTICULATION GRANT ACTIVITIES

(TECTONICS, Vol. I, No. 4, Dec., 1975)

Greenville Tec has a grant to promote articulation and instructional agreements between Tec and the vocational high schools in the area. J. D. WARREN, LES CARAWAY, and SHIRLEY DENTON are coordinating most of the activities from the Tec end. The grant will be of mutual benefit to the schools concerned, but will help students the most. By agreeing on instructional objectives, the faculty at both schools will be able to place students into the Tec program at their skill level. Then students would not have to repeat material they had already learned. The grant is quite comprehensive and requires the involvement of administration, faculty, and counselors from both educational systems.

(TECTONICS, Volume I, No. 7, March 1976)

HAVE AN IDEA?



LES CARAWAY, WALTER RICE, and area vocational instructors are developing objectives for the articulation project. SHIRLEY DENTON is working with BRUCE CARDALL to write industrial electronic objectives.

ARTICULATION GRANT

(TECTONICS, Vol. I No. 8, April 1976)

Greenville Tec faculty continue to meet with instructors from the vocational education centers. On April 6, instructors from the various institutions met to review program and course objectives. A model for the process has been developed. The model depicts student progress through the system.

J. D. Warren has developed a slide-tape set for the Machine Tool Technology program. The program will be used by counselors with prospective students.

10 honored

Ten high school seniors from Greenville, selected as outstanding graduates of industrial and technical programs at area vocational centers, received scholarship awards from Greenville TEC in ceremonies last week.

The students were chosen by center directors and instructors as having "outstanding records in drafting, electricity and machine shop," J.D. Warren, chairman of the industrial careers division at TEC, said.

The awards, consisting of tuition of \$50 for the first quarter of attendance at TEC, are renewable for a second quarter, contingent on the students' maintaining satisfactory progress as set by TEC.

Award recipients from Enoree Vocational Center include Jerry Matthews, Greg Stoudenmire and Kermit Shelton; from Foothills, James Liner, Ricky Pruitt and Warren Lewis Anderson; from Donaldson Center, Dennis Finch, Douglas Edward Jackson and Joel Ambrose; and from Wade Hampton High School, David Gaze.

Foothills School Students Get Scholarships



Three seniors at Foothills Vocational Center received scholarship awards from Greenville Technical College in ceremonies this week. J.D. Warren, second from left, chairman of the industrial careers division at Greenville TEC,

made the presentations to James Limer, Greer, for drafting; Warren Lewis Anderson, Taylors, for machine shop; and Rickey Pruitt, Greenville, for electricity.

Appendix B
Program Booklets

MACHINE TOOL TECHNOLOGY ARTICULATION

Greenville Technical College GREENVILLE, SOUTH CAROLINA • 29606

The work upon which this publication is based was performed pursuant to Grant GOO-75-00453 with the U. S. Office of Education, Department of Health, Education, and Welfare.

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MACHINE TOOL TECHNOLOGY
ARTICULATION GRANT
GREENVILLE TECHNICAL COLLEGE
JUNE, 1976

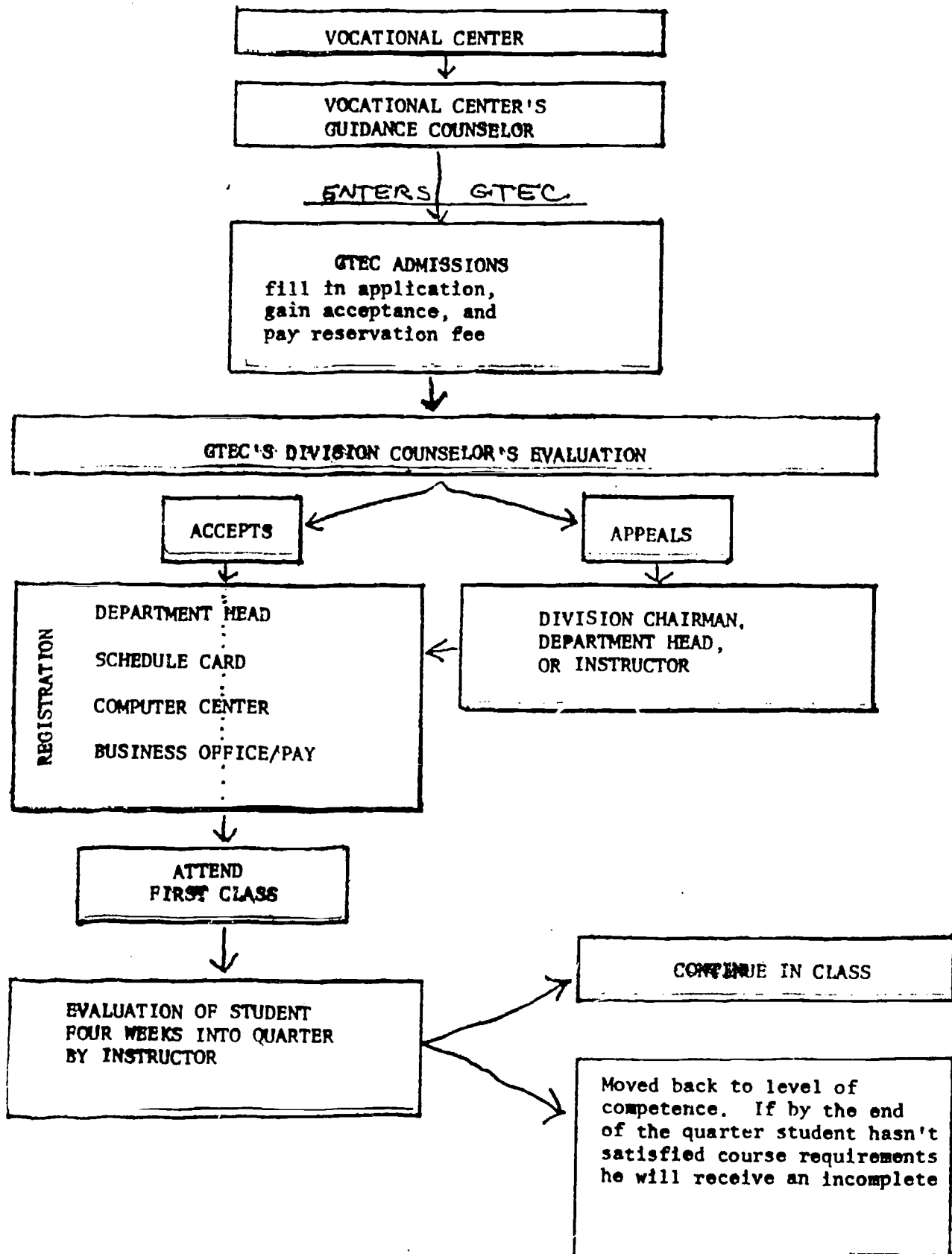
OVERVIEW

Evaluation for articulation into the Machine Tool Technology program at Greenville Technical College begins with the vocational student at his/her vocational center. The student should properly complete a release form in order to allow his/her "machine shop transcript" to be sent to the Industrial Division counselor at GTEC. This "transcript" should have been completed by the machine shop instructor at the center.

The GTEC guidance counselor will evaluate the "transcript" by the Machine Shop Transcript Evaluation Form. This form has a list of Career Cluster Project objectives that have been correlated to the machine shop courses at GTEC. Completion of objectives listed by each project within the four quarters of courses will be considered completion of that project at GTEC. A recommendation is made by the counselor for placement in the Machine Tool Technology program.

If the student disagrees with the counselor's recommendation and requests a higher placement, there is a detailed procedure for reviewing the evaluation by members of the Machine Tool Technology department. (See "Articulation Evaluation Procedure" in this booklet.) If the student requests a lower placement, his/her request will be honored at this time.

ARTICULATING MACHINE SHOP STUDENT FLOW CHART



ARTICULATION EVALUATION PROCEDURE

I. Entering Student Is Evaluated by GTEC Division Guidance Counselor with students signature for release

1. Yellow Card (MTT transcript)

II. Student Accepts- - o r - II. Student Appeals -

1. Registers for suggested quarter

1. Division Chairman, Department Head or Instructor will reevaluate student.

2. Deficiencies listed and closer evaluation given - decision re-issued with counseling on its rational

- a. appeal denied - go to #3
- b. appeal accepted - go to #4

3. If appeal denied, student allowed to register for suggested MTT course

4. If appeal accepted, time expectancies on student's performance and quality determined and noted to him

5. At the end of 4 weeks the student must meet with the instructor involved to justify continuance based on performance of heretofore listed deficiencies and appropriate progress into the quarter's work

a. If student's work acceptable, he continues through the quarter.

b. If not acceptable, student will be moved back to his level of competency. If by the end of the quarter student hasn't satisfied course requirements, he will receive an incomplete.

III. Evaluation of Student, four weeks into quarter, by instructor to verify acceptable level of performance and appropriate initial evaluation

The evaluation instrument development by the South Carolina State Department of Education for the Cluster Project in the ARC funded program for Machine Shop has been included under Machine Tool Technology by courtesy of the South Carolina State Department of Education.

TO BE COMPLETED ONLY BY THE RELEASING INSTRUCTOR

IMPORTANT: BECAUSE THIS RECORD WILL BE REVIEWED BY OTHER INSTRUCTORS IN VOCATIONAL HIGH SCHOOLS, TECHNICAL CENTERS AND COLLEGE PROGRAMS, THIS FORM SHOULD BE FILLED OUT COMPLETELY. IT IS IMPERATIVE THAT THIS FORM BE FILLED OUT COMPLETELY. ONLY NO ITEMS, IF THE INFORMATION REQUESTED IS UNKNOWN, SO INDICATE.

STUDENT'S NAME _____ WT _____
 LAST _____ FIBRE _____
 HIGH SCHOOL _____
 RELEASE DATE _____
 CONDITION OF RELEASE: _____
 Completed course () Dropped course () Moved () Other _____

EVALUATION OF STUDENT BY RELEASING INSTRUCTOR

CIRCLE THE MOST APPROPRIATE RESPONSE IN YOUR JUDGMENT; USING THE SCALES PROVIDED. IN THE LAST ITEM, WRITE "UNKNOWN" TO THE SIDE OF THE ITEM IF NECESSARY. BE SURE TO INDICATE THE CLASS SIZE ON THE LAST ITEM.

KNOWLEDGE AND USE OF SAFETY RULES.	Excellent	Good	Acceptable	Poor	Unacceptable
KNOWLEDGE AND USE OF TOOLS.	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY TO USE HANDS (MANUAL DEXTERITY).	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY TO ACCOMPLISH MULTIPLE PROGRAM DIAGNOSIS AND REPAIR.	Excellent	Good	Acceptable	Poor	Unacceptable
INTEREST IN THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY TO FUNCTION ACADEMICALLY (READING AND MATH PROBLEM SOLVING) IN THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	Unacceptable
ANTICIPATED CHANCES OF SUCCESS IF STUDENT TAKES A JOB IN THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	Unacceptable
ANTICIPATED DEPTH OF ADDITIONAL TRAINING IN THE MACHINIST FIELD. THE STUDENT WILL NEED TO BE SUCCESSFUL IN _____ FIELD.	Much More	More	Little More	None	
ABILITY OF STUDENT TO BENEFIT FROM FURTHER TRAINING IN THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY OF STUDENT TO HANDLE THE PERFORMANCE OF TASKS AND PROCEDURES RELATING TO THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY OF THE STUDENT TO CONCENTRATE OVER A PERIOD OF TIME.	Excellent	Good	Acceptable	Poor	Unacceptable
OVERALL RANKING OF STUDENT AS COMPARED WITH OTHER STUDENTS IN THE SAME COURSE.	Upper 5%	Upper 10%	Upper 25%	Upper 50%	Lower 50%

OF A CLASS OF _____ STUDENTS.

PERMISSION TO RELEASE THIS RECORD TO OTHER SCHOOLS AND/OR PROSPECTIVE EMPLOYERS FOR THEIR USE IN WHOLE OR IN PART IS HEREBY GRANTED.

DATE: _____
 SIGNATURE OF STUDENT: _____
 SIGNATURE OF PARENT OR GUARDIAN IF STUDENT IS LESS THAN 18 YEARS OLD: _____

UNITS OR SECTIONS COMPLETED BY STUDENT

NOTE: PLACE A CHECK IN THE BOXES BESIDE THE UNITS OR SECTIONS WHICH WERE AT LEAST PARTIALLY COMPLETED BY THE STUDENT. USE THE FIGURES IN THE BACK OF THIS FORM TO DETERMINE THE PERCENTAGE OF THE UNITS OR SECTIONS CHECKED HERE MUST AGREE WITH THE PROGRESS RECORD ON THE BACK OF THIS FORM.

- | | | | |
|-----------------------|--------------------------|----------------------------|--------------------------|
| 1. SHOP MATH | <input type="checkbox"/> | 15A. PLUMBER | <input type="checkbox"/> |
| 2. BLUEPRINT READING | <input type="checkbox"/> | 16. SURFACE GRINDING | <input type="checkbox"/> |
| 3. MEASURING | <input type="checkbox"/> | 17. TOOL POST GRINDING | <input type="checkbox"/> |
| 4. LAYOUT | <input type="checkbox"/> | 18. UNIVERSAL GRINDING | <input type="checkbox"/> |
| 5. BENCH WORK | <input type="checkbox"/> | 19. METALS - HEAT TRT. | <input type="checkbox"/> |
| 6. BENCH-FED GRINDING | <input type="checkbox"/> | 20. JIG BURNER | <input type="checkbox"/> |
| 7. DRILL GRINDING | <input type="checkbox"/> | 21. DETACHABLE WELDING | <input type="checkbox"/> |
| 8. POWER SAWS | <input type="checkbox"/> | 22. ARC WELDING | <input type="checkbox"/> |
| 9. MACHINE LATHES | <input type="checkbox"/> | 23. MIG WELDING | <input type="checkbox"/> |
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| 12. MILLING MACHINERY | <input type="checkbox"/> | 26. DRILL JIG DESIGN | <input type="checkbox"/> |
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RECORD OF GRADES FOR THIS COURSE

PERIOD	(SEN)	(OTR)	(OUI)	OTHER	GRADE	INSTRUCTION
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SIGNATURE OF RELEASING INSTRUCTOR: _____
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SHOT BATH
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 1-4 0 DATE: _____
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BLENDEPRINT READING
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BEARING

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LAYOUT

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REAR HOLE

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REAR-PIN GRINDING

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DRILL PRESS

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DRILL GRINDING

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POUR SAWS
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ENGINE LATHE

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MILLING MACH. INSTR

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VERT. MILLING MACH.

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 12-12 0 DATE: _____

REL. MILLING MACH.

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 13-10 0 DATE: _____

SHAPER

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 14-6 0 DATE: _____
 14-7 0 DATE: _____

PLAYER

15-1 0 DATE: _____

SURFACE GRINDING

16-1 0 DATE: _____
 16-2 0 DATE: _____
 16-3 0 DATE: _____
 16-4 0 DATE: _____
 16-5 0 DATE: _____
 16-6 0 DATE: _____

POOLPOST GRINDING

17-1 0 DATE: _____
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 17-3 0 DATE: _____
 17-4 0 DATE: _____
 17-5 0 DATE: _____

UNIFRSL. GRINDING

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 18-2 0 DATE: _____
 18-3 0 DATE: _____

DETAILS-BEAT TIT

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JIG BOKING

18-1 0 DATE: _____
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 18-10 0 DATE: _____

ORACY WELDING

19-1 0 DATE: _____
 19-2 0 DATE: _____
 19-3 0 DATE: _____
 19-4 0 DATE: _____
 19-5 0 DATE: _____
 19-6 0 DATE: _____
 19-7 0 DATE: _____
 19-8 0 DATE: _____
 19-9 0 DATE: _____
 19-10 0 DATE: _____

ARC WELDING

20-1 0 DATE: _____
 20-2 0 DATE: _____

MUSIC DIE WRENG

21-1 0 DATE: _____
 21-2 0 DATE: _____
 21-3 0 DATE: _____
 21-4 0 DATE: _____
 21-5 0 DATE: _____
 21-6 0 DATE: _____
 21-7 0 DATE: _____
 21-8 0 DATE: _____
 21-9 0 DATE: _____
 21-10 0 DATE: _____
 21-11 0 DATE: _____
 21-12 0 DATE: _____
 21-13 0 DATE: _____
 21-14 0 DATE: _____
 21-15 0 DATE: _____
 21-16 0 DATE: _____
 21-17 0 DATE: _____
 21-18 0 DATE: _____
 21-19 0 DATE: _____
 21-20 0 DATE: _____
 21-21 0 DATE: _____

STUDENT'S NAME _____

LAST HIGH SCHOOL _____ FIRST _____

ENTRY DATE _____

OFFICIAL STUDENT PROGRESS RECORD
 for
 Machine Shop

NOTICE TO INSTRUCTOR(S): This is an OFFICIAL record of the student's progress in the course. Please follow these directions EXACTLY!

1. Draw a line through all LAPS which you do not require of the student to get credit for the unit.
2. Place a check in the blank beside each required LAP when,
 - a. You have PASSED the student on the LAP, or
 - b. You are giving the student CREDIT for the LAP because of YOUR PERSONAL JUDGEMENT that the student has completed the training required by the LAP.
3. Optional: Space is provided for your initials and the date.
4. Be sure to complete ALL other relevant information about the student on this form.
5. If the student completes the course or withdraws from the course for any reason, complete the reverse side of this form and IMMEDIATELY forward to the records office.

Instructor's signature: _____

MACHINE SHOP TRANSCRIPT EVALUATION FORM

- AV-AV used, not necessarily objective
- () - objective but not necessarily AV used
- I - Introduced at this point, proficiency expected next quarter
- * - increased expectation tolerance with usage
- I* - Introduced in specific units, expected proficiency by end of quarter
- + - performance evaluated
- "pencil & paper" evaluated
- †, I - tolerance initially less than stated objective

Complete information on back of form before beginning evaluation.

Name of student being evaluated

Vocational center attended

Date of graduation / Date of evaluation

Name of evaluator



MACHINE SHOP TRANSCRIPT EVALUATION FORM

- 1st QUARTER -

- 2nd QUARTER

- 3rd QUARTER

- 4th QUARTER

Name	Project 1-A	Project 2-A	Project 3-A	Project 4	Project 6-A	Project 10
Introduction	3-1+	3-1+	3-1+	3-19+	5-6+	3-12+
5-1.	3-8+	3-8+	3-8*	(8-1)+	6-1+	10-22+
5-3.	3-10+	3-10-AV+	3-17-1	10-7-AV-1+	6-2+	12A-10+
5-4.	9-1-AV.	3-13+	9-11+	10-8+	(7-4)+	(13-1).
(5-7)+	9-11+	3-19-I*+	(10-14)+	10-9+	7-5+	(13-2).
7-1.	10-3-AV+	9-11+	(10-15)+	10-10+	10-6+	(13-3).
(10-5).	10-4+	10-3+	10-17+	10-12-AV+	10-7+	13-4+
(10-26)+	10-6-I+	10-4+	10-22-I*+	10-17+	11-6+	(13-5)+
11-1.	10-12-I	10-6-AV-I+	11-6-I*+	10-18+	11-7+	(13-7)+
(11-2).	10-13+	10-8-AV-I+	11-7-I*+	10-22+	11-9	14-2+
(11-3).	10-15-AV+	10-13-AV+	11-9-I+	10-25.	12A-10+	14-3+
(11-4)	10-23-I+	10-15-AV+	12A-10	11-6+	12B-6+	14-4+
11-5.	Project 1-B	10-17+	Project 3-B	11-7+	Project 6-B	
(12A-2).	3-1+	10-20-AV	3-1+	11-9+	5-6+	
(12A-6)+	3-16-AV+	10-22-AV-1*+	9-11-	11-10+	6-1+	
(12A-7).	3-19-AV-1	Project 2-B	10-22-I*	12B-6-I+	6-2+	
End of First Quarter	4-1+	3-1+	10-23-I+	15-1+	(7-4)+	
(7-12).	5-2+	3-7	10-24	Project 5	7-5+	
(7-13).	5-5+	3-8+	10-25-L	3-10-AV-Rev. +	10-6+	
(8-1-1)+	7-2+	3-10+	11-6-I*+	3-12-AV-1+	10-7+	
(9-2).	(7-3)+	3-16+	11-7-I*+	10-12+	10-21-AV.	
(9-3).	(7-4)+	3-19-AV	11-9-I+	10-16+	11-11+	
(9-5)+	7-5+	3-24+	12A-10	10-18+	12A-10+	
	(7-6)+	4-3+	Project 2-B	10-23+	14-2+	
	7-7	4-7-AV	Continued	15-1+	14-3+	
	9-11+	5-2+	10-1.	15-2+	14-4+	
	10-4+	5-5+	10-2.			
	12A-10+	(7-4)+	10-3+			
	14-1.	7-5+	11-11-I+			
	14-2-1+	(7-9)+	12A-3-AV+			
	14-3-1+	(7-10)+	12A-4-AV+			
	14-4-1+	(7-11)+	12A-10+			
		9-11+	14-2-1*			
			14-3-1*			
			14-4-1			

AV-AV used, not necessarily objective
 () - objective but not necessarily AV used

1 - Introduced at this point, proficiency expected next quarter

* - increased expectation tolerance with usage

I* - Introduced in specific units, expected proficiency by end of quarter

+ - performance evaluated
 "pencil & paper" evaluated

+, I - tolerance initially less than stated objective



TUITION SCHOLARSHIP

Greenville Technical College is proud to offer tuition scholarships in each of the Articulation Grant programs: Machine Tool Technology, Industrial Electricity, and Engineering Graphics Technology. These scholarships were suggested at an Articulation Grant Advisory Committee meeting and hardily approved by the Greenville Technical College administration. It is hoped their inception will stimulate interest in continuing quality education and training in these fields.

The Donaldson, Enoree, and Foothills Vocational Centers will each select their most outstanding and/or worthy student in their drafting, electricity, and machine shop programs. Wade Hampton High School will select a student from their electricity program. The three scholarship students from each center will receive one quarter of tuition free study at Greenville Technical College. After their first quarter, each student may receive an extension for another quarter based upon review and approval by his or her instructors and department head.

After the selection of the students by their instructors, the director or principal of each school should send a copy of all the names to the heads of the Industrial and Technical Divisions, Mr. J.D. Warren and Mr. Les Caraway. This is necessary to insure the tuition waiver be available when the student begins.

GUIDANCE INFORMATION FORM

This form was designed to supply feedback to guidance counselors, instructors, and administrators. It will be sent by the Greenville Technical College department involved to the vocational center each time there is a horizontal line of asterisks. The information on the form will supply data to evaluate our effectiveness and suggest continuation or change in our procedures.

+ + * +

IT IS EXTREMELY IMPORTANT THAT THE STUDENT OR HIS/HER PARENT IF THE STUDENT IS UNDER 18 SIGNS THE PERMISSION BLANK ON THE SIDE OF THE FORM. IT WOULD BE ILLEGAL TO DISSEMINATE THIS INFORMATION FROM GREENVILLE TECHNICAL COLLEGE WITHOUT THE PROPER SIGNATURE.

MACHINE SHOP
ARTICULATION STUDENT'S PROGRESS

Your student, _____, from _____ Vocational Center has exempted through MTT _____ (quarter _____) and may (conditionally, unconditionally) enroll in MTT _____ (quarter _____).

This placement was based on
 _____ the "machine shop transcript" only
 _____ the "machine shop transcript" and an interview requested by _____ and conducted by _____
 _____ vocational instructor's recommendation

The student
 _____ readily accepted placement
 _____ requested a lower placement - outcome _____
 _____ requested a higher placement - outcome _____

Date of evaluation _____

The student at mid-term has been re-evaluated and is
 _____ progressing satisfactorily
 _____ moved back to level of competence
 (may. be able to finish quarter's work, may have to take Inc.)

Student's signature

Instructor's signature

Date _____

The student at the end of the first quarter of work
 _____ successfully completed MTT _____ (grade _____) on _____ (date).
 _____ received an incomplete
 _____ dropped out before end of quarter

Student's status at the end of the first year of work- _____

I GIVE MY PERMISSION FOR THE INFORMATION ON THIS SHEET TO BE RELEASED TO GREENVILLE COUNTY SCHOOL SYSTEM.

SIGNATURE OF PARENT IF UNDER 18

LEGAL SIGNATURE

DATE

MACHINE SHOP UNITS

UNIT 1 MATH - MATH DEPT.
UNIT 2 BLUEPRINT READING - ENGINEERING GRAPHICS DEPT.
UNIT 3 MEASURING
UNIT 4 LAYOUT
UNIT 5 BENCH WORK
UNIT 6 BENCH/PEDISTAL GRINDING
UNIT 7 DRILL PRESS
UNIT 8 DRILL GRINDING
UNIT 9 POWER SAWS
UNIT 10 ENGINE LATHES
UNIT 11 MILLING MACHINES
UNIT 12A VERTICAL MILLING
UNIT 12B HORIZONTAL MILLING
UNIT 13 SHAPER
UNIT 14 SURFACE GRINDING
UNIT 15 TOOL POST GRINDING
UNIT 16 UNIVERSAL GRINDING

UNITS TO BE USED AT GREENVILLE TEC

1ST QUARTER AT GREENVILLE TEC

INTRODUCTION

| | |
|---------|--------|
| MS-3-1 | MS-4-1 |
| MS-3-7 | MS-5-1 |
| MS-3-8 | MS-5-3 |
| MS-3-10 | MS-7-1 |

PROJECT 1A

MS-9-1
MS-9-11
MS-10-3
MS-10-12
MS-10-23
MS-10-15
MS-10-6
MS-10-13
MS-3-8
MS-3-1
MS-3-10

PROJECT 1B

MS-9-11
MS-12A-10
MS-3-10
MS-3-16
MS-3-19
MS-12A-10
MS-3-16
MS-7-2
MS-7-7
MS-14-1
MS-14-2
MS-14-3
MS-14-4
MS-14-5

1ST QUARTER (Continued)

PROJECT 2A

MS-10-1
MS-10-2
MS-10-3
MS-10-4
MS-10-6
MS-10-8
MS-10-13
MS-10-15
MS-10-20
MS-10-22
MS-3-13
MS-3-8
MS-3-10

PROJECT 2B

MS-12A-10
MS-3-16
MS-3-19
MS-3-18
MS-3-24
MS-3-8
MS-3-7
MS-7-5
MS-4-7
MS-12A-3
MS-12A-4
MS-12A-10 BORING
MS-3-10

PROJECT 3A

MS-11-6
MS-11-7
MS-11-9

INSTRUCTOR MAY SUGGEST REVIEW OF SLIDES AND TAPES AS NEEDED.

PROJECT 3B

MS-10-22
MS-10-23
MS-10-24

INSTRUCTOR MAY SUGGEST REVIEW OF SLIDES AND TAPES AS NEEDED.

PROJECT 4 (2ND QUARTER)

MS-10-25
MS-10-12
MS-11-10
MS-10-11
MS-10-18
MS-10-22 (if needed)
MS-12B-6
MS-11-7
MS-11-9

2ND QUARTER (Continued)

PROJECT 5A
MS-3-10 REVIEW
MS-3-12
MS-15-1 OPTION
MS-15-2 OPTION

THIS PROJECT MUST BE ASSEMBLED.

PROJECT 6A (3RD QUARTER)
MS-10-7
MS-11-7 REVIEW
MS-11-9 REVIEW

ASSEMBLY.

PROJECT 6B
MS-10-21

NOTICE CLOSE TOLERANCE- GRINDING- HOLE CENTER-DISTANCE
SPACER LENGTH-ASSEMBLY

PROJECT 10 (4TH QUARTER)

STUDENT DRAWS HIS OWN PRINT- MAKES PARTS TO SPECIFICATION AND
ASSEMBLES PARTS-SHOULD BE NO REVIEW AT THIS POINT.

MACHINE SHOP - UNIT 2 - BLUEPRINT READING

MS-2-1 INTRODUCTION TO BLUEPRINT READING

When you finish this learning package, you will be able to answer questions about blueprints and about the title block and notes on blueprints.

MS-2-2 ONE, TWO, AND THREE VIEW DRAWINGS

When you finish this learning package, you will be able to identify the different views of objects as shown by isometric drawings of the object.

MS-2-3 ALPHABET OF LINES

When you finish this learning package, you will be able to identify the different types of lines used in blueprints.

MS-2-4 SECTIONS

When you finish this learning package, you will be able to identify the following sections: full, half, offset, broken out, revolved, and removed.

MS-2-5 SCALE DRAWING

When you finish this learning package, you will be able to answer (basic) questions about (interpreting the) scale (of a) drawing.

MS-2-6 FINISH MARKS

When you finish this learning package, you will be able to identify and explain the finish marks on blueprints.

MS-2-7 FREEHAND SKETCHING

When you finish this learning package, you will be able to make freehand sketches of cylindrical, rectangular, and irregularly shaped work pieces.

MACHINE SHOP - UNIT 3 - MEASURING

MS-3-1 THE MACHINIST'S SCALE

When you finish this learning package, you will be able to use the machinist's scale to measure the length and width of a piece of stock. Your measurements must be within $\pm 1/64$ of an inch of specifications.

MS-3-2 CENTER HEAD OF THE COMBINATION SET

When you finish this learning package, you will be able to locate and mark the center on both ends of a round bar of any size from $\frac{1}{4}$ " to 6" using the center head of the combination set. Your marks must be within $\pm 1/32$ of an inch of specifications.

MS-3-3 THE SQUARE HEAD OF THE COMBINATION SET

When you finish this learning package, you will be able to use the square head to scribe straight lines and angles to within $\pm 1/32$ of an inch of specification.

MS-3-4 DIVIDERS

When you finish this learning package, you will be able to use the machinist's scale and dividers to transfer the dimensions of a drawing to a workpiece. Your transferred measurements must be within $\pm 1/64$ of an inch of specifications.

MS-3-5 HERMAPHRODITE CALIPERS

When you have finished this learning package, you will be able to use the hermaphrodite caliper to: a- scribe parallel lines on a workpiece, and b- locate and mark the center of a round workpiece. Your work must be within $\pm 1/64$ of an inch of specifications.

MS-3-6 OUTSIDE CALIPERS

When you finish this learning package, you will be able to use the outside caliper and the machinist's scale to measure the outside diameter of round workpieces to within $\pm 1/64$ " of specifications.

MS-3-7 BEVEL PROTRACTOR

When you finish this learning package, you will be able to use the bevel protractor of the combination set to lay out, on a workpiece, the various angles called for on a set of specifications to within $\pm 1/2^\circ$.

MS-3-8 OUTSIDE MICROMETER

When you finish this learning package, you will be able to use the outside micrometer to measure: the outside diameter of round stock, the thickness of flat stock, and the length of flat stock.

MS-3-9 INSIDE CALIPERS

When you finish this learning package, you will be able to use the inside calipers and the outside micrometer to measure the inside diameters of tubular stock to within $\pm .002$ " of specifications.

MS-3-10 TELESCOPING GAGE

When you finish this learning package, you will be able to use the telescoping gage and the outside micrometer to measure internal dimensions to within $\pm .001$ " of specifications

MACHINE SHOP - UNIT 3 CONTINUED - MEASURING

MS-3-11 INSIDE MICROMETER

When you finish this learning package, you will be able to assemble and use the inside micrometer to measure inside diameters of tubular stock to within $\pm .001$ " of specifications.

MS-3-12 DEPTH MICROMETER

When you finish this learning package, you will be able to assemble, adjust, and use the depth micrometer to measure the depth of holes and slots to within $\pm .001$ " of specifications.

MS-3-13 SCREW PITCH GAGE

When you finish this learning package, you will be able to use the screw pitch gage to measure the number of threads per inch on any given screw or bolt.

MS-3-13A SCREW THREAD MICROMETER

When you finish this learning package, you will be able to use the screw thread micrometer to measure the pitch diameter of screw threads to within $\pm .001$ " of specifications.

MS-3-14 VERNIER CALIPER

When you get finished with this learning package, you will be able to use the vernier caliper to measure the outside and inside diameters of round stock and the depths of holes and slots to within $\pm .001$ " of specifications.

MS-3-15 SURFACE GAGE

When you finish this learning package, you will be able to use the surface gage to measure and scribe lines on vertical surfaces to within $\pm .010$ " of specifications.

MS-3-16 VERNIER HEIGHT GAGE

When you finish this learning package, you will be able to use the vernier height gage to make comparison checks to within $\pm .001$ " of specifications.

MS-3-17 OPTICAL COMPARATORS

When you have finished this learning package, you will be able to answer questions about optical comparators and how they work.

MS-3-18 GAGE BLOCKS AND DIAL INDICATORS

When you finish this learning package, you will be able to use gage blocks to verify the accuracy of a dial indicator to within $\pm .0001$ ".

MS-3-19 DIAL INDICATOR

When you finish this learning package, you will be able to use the dial indicator to check the concentricity (roundness) of round stock to within $\pm .001$ ".

MS-3-20 DIAL INDICATOR - VISE ALIGNMENT

When you finish this learning package, you will be able to use the dial indicator to align a vise on a milling machine to within $\pm .001$ " of specifications.

MACHINE SHOP - UNIT 3 CONTINUED - MEASURING

MS-3-21 RADIUS GAGE

When you finish this learning package, you will be able to use a radius gage to measure convex and concave radii of parts.

MS-3-22 PLANNER GAGE

When you finish this learning package, you will be able to adjust the planner gage to a given height.

MS-3-23 UNIVERSAL BEVEL PROTRACTOR

When you finish this learning package, you will be able to use the universal vernier level protractor to lay out a given angle, with an accuracy of $\pm 0^{\circ}5'$.

MS-3-24 SINE BAR

When you finish this learning package, you will be able to use a sine bar to measure and set up various angles with an accuracy of $\pm 0^{\circ}5'$.

MS-3-25 SNAP GAGES

When you finish this learning package, you will be able to use snap gages to measure lengths, diameters, and thicknesses of parts.

MS-3-26 GEAR TOOTH VERNIER CALIPER

When you finish this learning package, you will be able to use a gear tooth vernier caliper to measure the addendum and the chordal thickness of any gear tooth.

MACHINE SHOP - UNIT 4 - LAYOUT

MS-4-1 INTRODUCTION TO LAYOUT TOOLS AND ACCESSORIES

When you finish this learning package, you will be able to identify basic layout tools and answer questions about their use.

MS-4-2 USING LAYOUT TOOLS: PART 1

When you finish this learning package, you will be able to layout fluid, scriber, dividers, trestles, hermaphrodite calipers, and prick punch to do layout work to specifications.

MS-4-3 USING LAYOUT TOOLS: PART 2

When you finish this learning package, you will be able to use the vernier height gage, magnifying glass, angle plate, toolmaker's square, c-clamps, parallel clamps, 1-2-3 step blocks, precision square, gage blocks, and sine bar to do layout work to specifications.

MS-4-4 USING LAYOUT TOOLS: PART 3

When you finish this learning package, you will be able to use the combination set, vernier protractor, and protractor depth gage to do inspection and layout work to specifications.

MS-4-5 USING LAYOUT TOOLS: PART 5

When you finish this learning package, you will be able to use the surface gage, dial indicator, plaver gage, center punch, and hammer to do layout work to specifications.

MS-4-6 LAYING OUT A T-SLOT CLEANER

When you finish this learning package, you will be able to layout a T-slot cleaner to specifications.

MS-4-7 LAYING OUT A DRILL AND TAP BLOCK

When you finish this learning package, you will be able to lay out a series of six holes on a drill and tap block.

MACHINE SHOP - UNIT 5 - BENCH WORK

MS-5-1 INTRODUCTION TO PLANE TOOLS

When you finish this learning package, you will be able to identify basic bench tools.

MS-5-2 THE BENCH VISE

When you finish this learning package, you will be able to name the parts of a bench vise and do clamping operations on the vise according to specifications.

MS-5-3 FILES AND FILING

When you finish this learning package, you will be able to identify basic files used in machining and file work pieces accurately to specifications.

MS-5-4 HAND HACK SAWS

When you finish this learning package, you will be able to identify and properly use hand hack saws to cut metals.

MS-5-5 TAPS AND DIES

When you finish this learning package, you will be able to identify and properly use taps and dies to cut threads on work pieces to specifications.

MS-5-6 HAND REAMING

When you finish this learning package, you will be able to use hand reamers properly to ream holes in metals to specified sizes.

MS-5-7 HAMMERS, SCREW DRIVERS, CHISELS, PLIERS, AND WRENCHES

When you finish this learning package, you will be able to identify and properly use hammers, screw drivers, chisels, pliers, and wrenches.

MACHINE SHOP - UNIT 6 - FLASH AND PEDIMENT GRINDING

MS-6-1 GRINDING WHEELS

When you finish this learning package, you will be able to use reference charts to select proper grinding wheels. You will be able to install the wheels on a grinder, adjust the wheels, and adjust the tool rest.

MS-6-2 TRUING WHEELS

When you finish this learning package, you will be able to true and dress a grinding wheel for normal grinding operations.

MS-6-3 GRINDING A RADIUS

When you finish this learning package, you will be able to grind a $\frac{1}{4}$ " radius to fit a $\frac{1}{4}$ " gage.

MACHINE SHOP - UNIT 7 - DRILL PRESSES

MS-7-1 INTRODUCTION TO DRILL PRESSES

When you finish this learning package, you will be able to name each control on a upright drill press and tell what each control does.

MS-7-2 SETUPS FOR DRILLING

When you finish this learning package, you will be able to use the proper holing devices to set up for the following drilling tasks: round stock, flat stock, sheet metal, irregular shapes.

MS-7-3 DRILL PRESS CUTTING TOOLS

When you finish this learning package, you will be able to identify cutting tools used in a drill press and tell what each one does.

MS-7-4 ADAPTERS AND SLEEVES

When you finish this learning package, you will be able to use sleeves and/or chucks to change the holding capacity of a drill press spindle.

MS-7-5 DRILLING HOLES

When you finish this learning package, you will be able to choose correct feeds and speeds for drilling holes in steel and aluminum. Accuracy will be $\pm 1/32"$.

MS-7-6 DEPTH DRILLING

When you finish this learning package, you will be able to use the drill press depth stops to drill holes to a specified depth, with an accuracy of $\pm 1/16"$.

MS-7-7 COUNTERBORING, COUNTERSINKING, AND SPOT FACING

When you finish this learning package, you will be able to use the proper tool to counter sink, counterbore, and spot face drilled holes to a tolerance of $\pm 1/32"$.

MS-7-8 ANGULAR HOLES

When you finish this learning package, you will be able to make table adjustments and use proper holding devices to drill angular holes in metal, to an accuracy of $\pm 1/32"$.

MS-7-9 RADIAL DRILL PRESS

When you finish this package, you will be able to answer questions about the parts and controls of a radial drill press and tell what each does.

MS-7-10 REAMING

When you finish this learning package, you will be able to use a straight or taper shank reamer to ream holes to a specified size, with an accuracy of $\pm 1/64"$.

MS-7-11 MACHINE TAPPING

When you finish this learning package, you will be able to use the proper tap drill size, tap, and tapping attachment to drill tap holes as shown on drawings, with an accuracy of $\pm 1/32"$.

MACHINE SHOP - UNIT 7 CONTINUED - DRILL PRESS

MS-7-12 PARTS OF A TWIST DRILL

When you finish this learning package, you will be able to name the parts of a twist drill and tell the purpose of each.

MS-7-13 TWIST DRILL SIZES

When you finish this learning package, you will be able to use charts and drill gages to select the proper size drill for a given application.

MS-7-14 TRANSFERRING HOLES

When you finish this learning package, you will be able to transfer holes from one piece of work to another by spotting with a twist drill, using a transfer punch, and using transfer screws.

MACHINE SHOP - UNIT 8 - DRILL GRINDING

MS-8-1 FREEHAND DRILL SHARPENING

When you finish this learning package, you will be able to use the bench or pedestal grinder to sharpen a dull twist drill. Using a drill bit gage as a guide, you will be able to: keep the point angle to within $\pm \frac{1}{2}^\circ$ and keep the point centered to within $\pm 1/64$ " drill lip length.

MS-8-2 MACHINE DRILL SHARPENING

When you finish this learning package, you will be able to set up and operate a machine drill grinder to sharpen a two-lip twist drill and a three or four-lip core drill.

MACHINE SHOP - UNIT 9 - POWER SAWS

MS-9-1 POWER SAWS: PARTS AND CONTROLS

When you finish this learning package, you will be able to name the main parts and controls of the horizontal band saw, the vertical band saw, and the power hack saw.

MS-9-2 CHOOSING POWER SAW BLADES

When you finish this learning package, you will be able to choose the correct power saw blade for a given application.

MS-9-3 FREQUENT SAWING PROBLEMS

When you finish this learning package, you will be able to answer questions about diagnosing and correcting problems often met when using the power hacksaw, vertical band saw, and horizontal band saw.

MS-9-4 SETTING BLADE SPEEDS

When you finish this learning package, you will be able to use charts or a job dial selector to choose the proper speed of a band saw blade for a given job.

MS-9-5 SETTING UP POWER SAW CONTROLS

When you finish this learning package, you will be able to set up the operational controls of a power hack saw and a power band saw for a sawing operation.

MS-9-6 MOUNTING BAND SAW BLADES AND CUTTING STOCK

When you finish this learning package, you will be able to select, mount guides, and install blades on the vertical band saw, and cut stock with a vertical band saw to an accuracy of $\pm 1/16$ ".

MS-9-7 WELDING BAND SAW BLADES

When you finish this learning package, you will be able to use the bulk blade provided and the welding attachment on the vertical band saw to weld band saw blades. You will weld blades to specified lengths for particular saws and to the thickness required by the blade thickness gage on the vertical band saw.

MS-9-8 VERTICAL BAND SAW: CUTTING CIRCLES, CONTOURS, AND STRAIGHT LINES

When you finish this learning package, you will be able to use the vertical band saw to cut contours, circles, and straight lines with an accuracy of $\pm 1/16$ ".

MS-9-9 FRICTION SAWING

When you finish this learning package, you will be able to set up a vertical band saw for friction sawing of thin sheet metal.

MS-9-10 BAND FILING

When you finish this learning package, you will be able to select and set up a band file for a band filing job.

MACHINE SHOP - UNIT 9 CONTINUED - POWER SAWS

MS-9-11 HORIZONTAL BAND SAW: STRAIGHT AND ANGLE CUTS

When you finish this learning package, you will be able to use the horizontal band saw to cut stock, with an accuracy of $\pm 1/16''$ and to make angular cuts with an accuracy of $\pm 1^\circ$.

MS-9-12 FINISHING A T-SLOT CLEANER

When you finish this learning package, you will be able to finish a T-slot cleaner to blueprint specifications.

MS-9-13 FINISHING A DRILL AND TAP BLOCK

When you finish this learning package, you will be able to finish a drill and tap block to blueprint specifications.

MACHINE SHOP - UNIT 10 - ENGINE LATHE

MS-10-1 LATHE PARTS AND CONTROLS

When you finish this learning package, you will be able to point out the main parts and controls of an engine lathe.

MS-10-2 CUTTING SPEEDS AND FEEDS

When you finish this learning package, you will be able to choose proper feeds and speeds used to machine different kinds of metals on the lathe.

MS-10-3 INSTALLING CHUCKS

When you finish this learning package, you will be able to install all of the chucks used on a lathe.

MS-10-4 TOOL BIT GRINDING

When you finish this learning package, you will be able to: identify and sketch basic lathe tools, grind a general purpose tool bit for use on the engine lathe.

MS-10-5 FOUR-JAW CHUCK TRUING

When you finish this learning package, you will be able to true a piece of round stock in a 4-jaw chuck.

MS-10-6 FACING TO LENGTH

When you finish this learning package, you will be able to machine a workpiece to a given length using a facing tool on an engine lathe with an accuracy of $\pm .001$ ".

MS-10-7 COLLET ASSEMBLY AND CENTER DRILLING

When you have finished this learning package, you will be able to: set up a collet assembly on a lathe, center drill a workpiece on the lathe.

MS-10-8 GRADUATED MICROMETER COLLAR: ROUGH AND FINISH TURNING

When you finish this learning package, you will be able to use a graduated micrometer collar to turn a workpiece to a specified diameter, with an accuracy of $\pm .001$ ".

MS-10-9 NECKING

When you finish this learning package, you will be able to do a necking operation on an engine lathe.

MS-10-10 MOUNTING WORK BETWEEN CENTERS

When you finish this learning package, you will be able to mount a workpiece between centers properly.

MS-10-11 ALIGNING THE TAILSTOCK

When you finish this learning package, you will be able to adjust the lathe tailstock properly for turning a work between centers with an accuracy of $\pm .001$ ".

MACHINE SHOP - UNIT 10 CONTINUED - ENGINE LATHE

MS-10-12 DRILLING AND REAMING ON THE LATHE

When you finish this learning package, you will be able to drill and ream a workpiece on an engine lathe to a specified size.

MS-10-13 TURNING WORK ON A MANDREL

When you finish this learning package, you will be able to use a mandrel to turn a workpiece to a specified diameter.

MS-10-14 TURNING TO SQUARE AND FILLETED SHOULDERS

When you finish this learning package, you will be able to cut a square and a filleted shoulder properly.

MS-10-15 FILING AND POLISHING

When you finish this package, you will be able to file and polish a work piece on a lathe to a specified size.

MS-10-16 KNURLING

When you finish this learning package, you will be able to knurl a workpiece on a lathe.

MS-10-17 TAPER TURNING WITH A COMPOUND REST

When you finish this learning package, you will be able to turn a taper on a workpiece using the compound rest.

MS-10-17A CALCULATING TAPERS

When you finish this learning package, you will be able to: calculate proper compound rest angle settings for turning tapers using formulas and trigonometric tables and calculate taper per foot and taper per inch using formulas.

MS-10-18 TAPER TURNING AND TAPER ATTACHMENT

When you finish this learning package, you will be able to turn a taper using the taper attachment for the lathe.

MS-10-19 TAPER TURNING WITH OFFSET TAILSTOCK

When you finish this learning package, you will be able to cut a taper using the offset tailstock method.

MS-10-20 EXTERNAL THREADING WITH THREADING DIE AND HOLDER

When you finish this learning package, you will be able to use the engine lathe to cut threads on a workpiece with a threading die and holder.

MS-10-21 TURNING ON THE LATHE

When you finish this learning package, you will be able to cut an internal thread with the lathe by using a tap and holder.

MS-10-22 THREADING ON THE LATHE: EXTERNAL THREAD CHASING

When you finish this learning package, you will be able to: cut threads on a workpiece by using the lathe thread cutting mechanisms and chase external threads using a lathe.

MACHINE SHOP - UNIT 10 CONTINUED - ENGINE LATHE

MS-10-23 BORING BAR

When you finish this learning package, you will be able to bore a hole to size on a lathe.

MS-10-24 INTERNAL THREADING

When you finish this learning package, you will be able to cut internal threads using the thread chasing mechanism.

MS-10-25 STEADY REST

When you finish this learning package, you will be able to set up and machine a long workpiece using a steady rest.

MS-10-26 FOLLOW REST

When you finish this learning package, you will be able to set up and machine a workpiece using the follow rest.

MS-10-27 FORM TURNING

When you finish this learning package, you will be able to turn a radius on the lathe by hand.

MACHINE SHOP - UNIT 11 - MILLING : INTRODUCTION

MS-11-1 KINDS OF MILLING MACHINES

When you finish this learning package, you will be able to point out and name six different kinds of milling machines and briefly describe their uses.

MS-11-2 LUBRICATION AND PREVENTIVE MAINTENANCE

When you finish this learning package, you will be able to lubricate and perform preventive maintenance on milling machines.

MS-11-3 SPEEDS AND FEEDS

When you finish this learning package, you will be able to figure speeds and feeds on a milling machine for given cutters and work materials.

MS-11-4 CUTTING FLUIDS AND OILS

When you finish this learning package, you will be able to identify, mix, and apply cutting fluids and oils in milling machine operations.

MS-11-5 ACCESSORIES AND ATTACHMENTS

When you finish this learning package, you will be able to point out and name several milling machine attachments and tell what is used for.

MS-11-6 INDEXING HEADS AND DIRECT INDEXING

When you finish this learning package, you will be able to: point out and name the five basic parts of an indexing head, describe the use of each part, and set an indexing head up for direct indexing.

MS-11-7 SIMPLE INDEXING

When you finish this learning package, you will be able to change an index plate and set up an indexing head for simple indexing.

MS-11-8 ANGULAR INDEXING

When you finish this learning package, you will be able to: set up an indexing head for angular indexing and use the proper formulas to figure angular indexing settings.

MS-11-9 PREPARING THE HEAD FOR INDEXING

When you finish this learning package, you will be able to prepare an indexing head along with the footstock (tailstock).

MS-11-10 INDEXING: ALIGNMENT OF CENTERS

When you finish this learning package, you will be able to align the centers of an indexing head and tailstock with an aligning bar and dial indicator.

MS-11-11 VISE AND TABLE ALIGNMENT

When you finish this learning package, you will be able to: align a milling machine vise with a square, a dial indicator, and the marks on the vise base and align the table of a milling machine with the column face.

MS-11-12 ROTARY TABLE AND SLOTTING ATTACHMENT

When you finish this learning package, you will be able to identify and briefly describe the uses of the rotary table and slotting attachment.

MACHINE SHOP - UNIT 12 - MILLING MACHINES: VERTICAL AND HORIZONTAL
SECTION A - VERTICAL MILLING MACHINES

MS-12A-1 SOUTH BEND RAM TURRET: PARTS AND CONTROLS

When you finish this learning package, you will be able to name the parts and controls of a South Bend Ram Turret vertical milling machine and describe what each control does.

MS-12A-2 CINCINNATI NO. 3: PARTS AND CONTROLS

When you finish this learning package, you will be able to point out and name the parts and controls of the Cincinnati No. 3 vertical milling machine and describe what each control does.

MS-12A-3 MODEL "J" BRIDGEPORT: PARTS AND CONTROLS

When you finish this learning package, you will be able to point out and name the parts and controls of the Model "J" Bridgeport vertical head milling machine and describe what each control does.

MS-12A-4 MODEL "J" BRIDGEPORT: VERTICAL HEAD ALIGNMENT

When you finish this learning package, you will be able to align the head of a Model "J" Bridgeport vertical head milling machine.

MS-12A-5 MODEL "2J" BRIDGEPORT: PARTS AND CONTROLS

When you finish this learning package, you will be able to point out and name the parts and controls of the Model "2J" Bridgeport vertical head milling machine and describe what each control does.

MS-12A-6 CINCINNATI MODEL "D" TOOLMASTER: PARTS AND CONTROLS

When you finish this learning package, you will be able to point out and name the parts and controls of the Cincinnati Model "D" Toolmaster vertical milling machine and describe what each control does.

MS-12A-7 VAN NORMAN MODEL 13: PARTS AND CONTROLS

When you finish this learning package, you will be able to point out and name the parts and controls of the Van Norman Model 13 milling machine and describe what each control does.

MS-12A-8 VERTICAL MILLING MACHINE CUTTERS

When you finish this learning package, you will be able to point out and name cutters used in vertical milling operations and describe their uses.

MS-12A-9 MOUNTING CUTTERS AND CUTTING A KEYSEAT

When you finish this learning package, you will be able to mount vertical milling machine cutters properly and cut a keyseat, using a 4-flute end mill.

MS-12A-10 VERTICAL MILLING SETUPS AND OPERATIONS

When you finish this learning package, you will be able to identify and make setups on a vertical milling machine.

MACHINE SHOP - UNIT 13 - SHAPER

MS-13-1 SHAPER: PARTS AND LUBRICATION

When you finish with this learning package, you will be able to name the main parts of a shaper and lubricate a shaper to manufacturer's specifications.

MS-13-2 SHAPER CONTROLS

When you finish this learning package, you will be able to name the operating controls of the shaper and tell what each does.

MS-13-3 CUTTING TOOLS

When you finish this learning package, you will be able to name common cutting tools used on the shaper and describe and tell the purpose of the angles ground on each tool.

MS-13-4 VISE ALIGNMENT: SHAPER SAFETY

When you finish this learning package, you will be able to level and align a shaper vise using a dial indicator and a precision square or parallel, and state important safety rules about the shaper swivel head and vertical tool head.

MS-13-5 MACHINING A FLAT, HORIZONTAL SURFACE

When you finish this learning package, you will be able to set up and machine a flat, horizontal surface on a shaper.

MS-13-6 SETUPS FOR VERTICAL AND ANGULAR CUTS

When you finish this learning package, you will be able to set up a shaper and machine vertical and angular cuts on a workpiece to given specifications.

MS-13-7 FEEDS AND SPEEDS

When you finish this learning package, you will be able to figure proper feeds and speeds for different shaper operations, using formulas and charts and set a shaper for a given cutting speed, number of strokes per minute, and feed per stroke.

MACHINE SHOP - UNIT 12 - MILLING MACHINES: VERTICAL AND HORIZONTAL
SECTION B - HORIZONTAL MILLING MACHINES

MS-12B-1 CINCINNATI UNIVERSAL NO. 2: PARTS AND CONTROLS

When you finish this learning package, you will be able to name and point out the parts and controls on the above milling machine and describe what each control does.

MS-12B-2 HORIZONTAL MILLING MACHINE CUTTERS

When you finish this learning package, you will be able to point out and name cutters used in horizontal milling operations and describe their uses.

MS-12B-3 MOUNTING HORIZONTAL MILLING CUTTERS

When you finish this learning package, you will be able to mount horizontal milling machine cutters properly.

MS-12B-4 HORIZONTAL MILLING SETUPS AND OPERATIONS

When you finish this learning package, you will be able to identify and make setups on a horizontal milling machine.

MS-12B-5 INSTALLING A VERTICAL HEAD ATTACHMENT

When you finish this learning package, you will be able to install, lubricate, and operate a vertical head milling attachment.

MS-12B-6 CUTTING A SPUR GEAR

When you finish this learning package, you will be able to set up a horizontal column and knee type milling machine for cutting a spur gear and cut a spur gear according to blueprint specifications.

MS-12B-7 CUTTING A RACK GEAR

When you finish this learning package, you will be able to set up a horizontal column and knee type milling machine for cutting a rack gear and cut a rack gear according to blueprint specifications.

MS-12B-8 CUTTING A HELICAL GEAR

When you finish this learning package, you will be able to set up a horizontal column and knee type milling machine for cutting a helical gear and cut a helical gear according to blueprint specifications.

MACHINE SHOP - UNIT 14 - SURFACE GRINDING

MS-14-1 SURFACE GRINDER PARTS AND CONTROLS

When you finish this learning package, you will be able to name the main parts and controls of a surface grinder.

MS-14-2 SELECTING AND CHANGING GRINDING WHEELS

When you finish this learning package, you will be able to select and change grinding wheels on a surface grinder to meet requirements of the material to be ground.

MS-14-3 MOUNTING AND DRESSING GRINDING WHEELS

When you finish this learning package, you will be able to select, test, mount, and dress the proper grinding wheel for a given job by using the diamond tip dresser to true the wheel in relation to the magnetic chuck.

MS-14-4 MAGNETIC CHUCKS

When you finish this learning package, you will be able to position and secure a workpiece on the magnetic chuck of the surface grinder and align the workpiece surface so that it is parallel to the face of the grinding wheel, using a dial indicator to get an accuracy of ± 0.001 ".

MS-14-5 GRINDING A WORKPIECE

When you finish this learning package, you will be able to make a finish drawing and grind two parallel bars to the specifications of that drawing with an accuracy of ± 0.0005 ".

MS-14-6 WHEEL DRESSING: CONVEX OR CONCAVE RADIUS

When you finish this learning package, you will be able to set up a radius dresser and dress a grinding wheel to a convex or concave radius.

MACHINE SHOP - UNIT 15 - TOOL POST GRINDING

MS-15-1 SETTING UP A TOOL POST GRINDER

When you finish this learning package, you will be able to set up a lathe and tool post grinder for a grinding operation.

MS-15-2 EXTERNAL TOOL POST GRINDING

When you finish this learning package, you will be able to grind a lathe center point properly to fit a center gage in 55 minutes.

MS-15-3 REAMER SHARPENING ON THE TOOL POST GRINDER

When you finish this learning package, you will be able to sharpen a machine reamer properly on a tool post grinder in 1½ hours.

MS-15-4 INTERNAL TOOL POST GRINDING

When you finish this learning package, you will be able to grind a drill bushing bore to blueprint specifications with a tool post grinder in one hour and twenty minutes.

ENGINEERING GRAPHICS TECHNOLOGY ARTICULATION

Greenville Technical College

GREENVILLE, SOUTH CAROLINA 29602

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ENGINEERING GRAPHICS TECHNOLOGY

ARTICULATION GRANT

GREENVILLE TECHNICAL COLLEGE

JUNE, 1976

OVERVIEW

In order for the graduates of the vocational high school drafting programs to enter the Engineering Graphics Technology program at Greenville Technical College at an advanced level, course objectives, an Employability Profile, and articulation procedures have been developed.

The concept sheets have been developed jointly by the instructors in the vocational high schools of Greenville County and the department head, division chairman and members of the Educational Development Team at Greenville Technical College. Their purpose is to help insure uniformity of objectives to be covered at either school or college.

The Student's Employability Profile shows the major mechanical drafting units plus a further breakdown of competencies that can be used by an instructor to keep a running account of a student's progress. The completed form supplied by the vocational school instructor will be used along with other data to help determine at what level the student may enter the Engineering Graphics Department at Greenville Technical College. The same form will be used at Greenville Technical College and the additional tasks and competencies will be checked as they are reached.

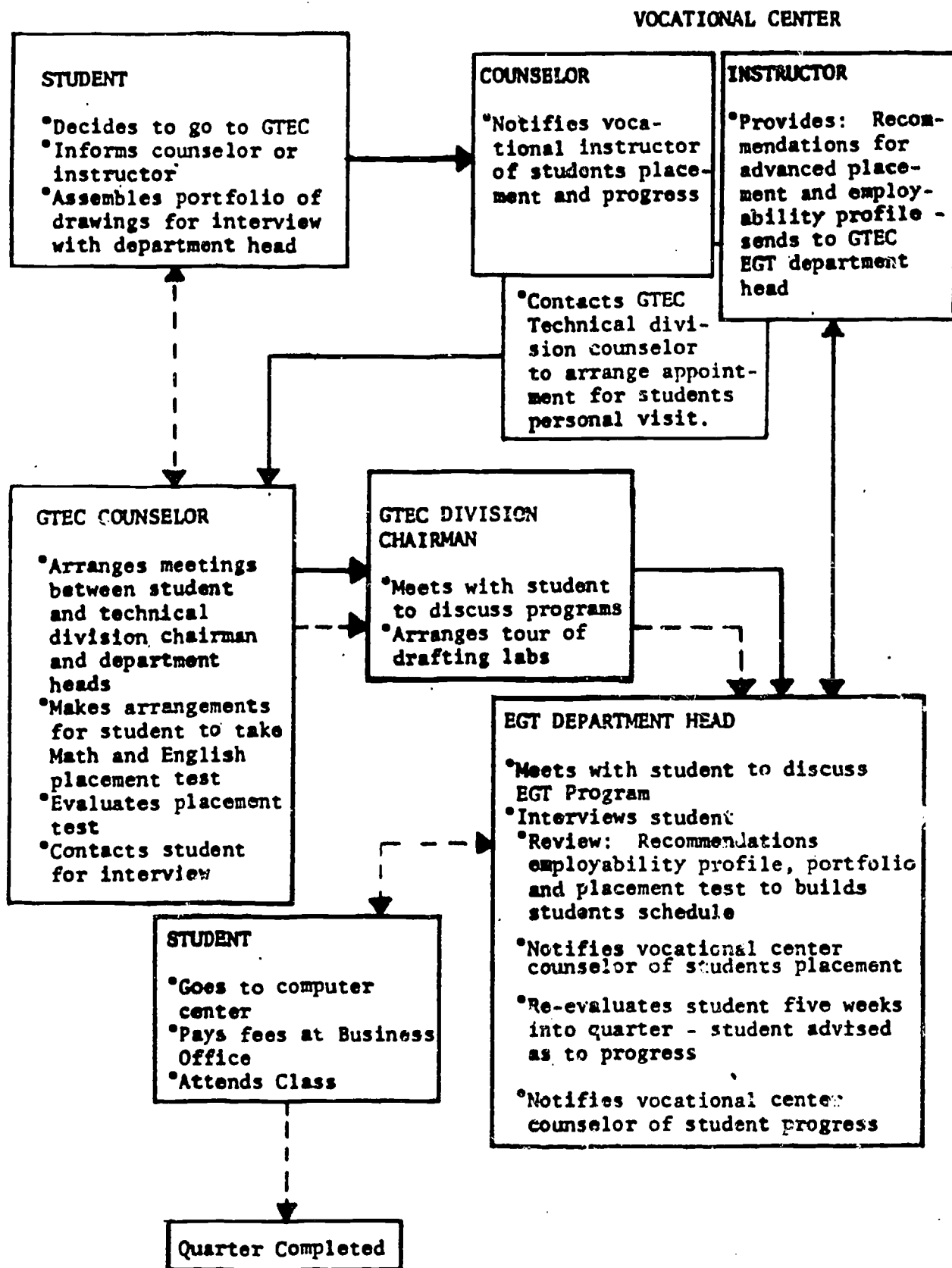
When the student leaves GTEC, the completed form may be used by an employer as a guide with reference to his technical skills accomplishments and also as an indication of his attitudes, behavior, and work habits.

The major units and competencies listed in the Employability Profile cover many specialized fields of drafting so that it is highly unlikely that any one student will cover them all even though he completes two years at a vocational school and two years at Greenville Technical College.

The following courses will be considered for exemption:

| <u>Course Title</u> | <u>Course Number</u> |
|-------------------------------------|----------------------|
| Engineering Graphics I | EGT 111 |
| Engineering Graphics II | EGT 121 |
| Engineering Graphics III | EGT 131 |
|
Related Drafting Courses | |
| Engineering Drawing I | EGT 112 |
| Engineering Drawing II | EGT 122 |

FLOW CHART OF ARTICULATION STUDENTS - EGT



ARTICULATION EVALUATION PROCEDURE

Students who graduate from any Greenville area vocational centers' drafting program may be permitted to exempt one, two, or three quarters of engineering graphics from the Engineering Graphics curriculum or one quarter of engineering drawing from the Architectural Engineering Technology curriculum at Greenville Technical College.

The following steps should be taken by vocational school students who plan to apply for exemption from engineering graphics or engineering drawing courses.

1. By the middle of your senior year ask your instructor or counselor to contact the Technical Division counselor at GTEC and set up an appointment for you to make a personal visit.
2. Arrangements will be made by the GTEC counselor for you to meet the Technical Division chairman, the department heads and to visit the drafting labs while classes are in session.
3. Your counselor can make arrangements for you to take the placement test administered by GTEC either at your school or at GTEC.
4. The GTEC technical division counselor will evaluate your test and contact you to arrange for an interview.
5. Providing that you have met the general entrance requirements you will need a recommendation from your instructor for advanced placement. (This will be sent directly to the department head).
6. You will need an Employability Profile. (This will be sent directly to the department head by your instructor).
7. You will need a portfolio of your drawings either originals or prints. (Bring this with you when you are called for an interview with the GTEC department head).

GREENVILLE TECHNICAL COLLEGE
 ENGINEERING GRAPHICS DEPT.
 P. O. BOX 5616 STA. "B"
 GREENVILLE, S. C. 29606
 TELEPHONE, 242-3170 EXT. 253

EMPLOYABILITY PROFILE

Occupation: Drafting

SKILLS PROFICIENCY RATING

NAME _____

 Last First

ADDRESS _____ PHONE _____

TOWN, STATE, ZIP _____

EVALUATOR _____ TITLE _____ DATE _____

- RATING LEVELS:
- | | |
|-----------------------------|-----------------|
| 1. Instruction Not Received | 3. Satisfactory |
| 2. Needs More Instruction | 4. Outstanding |

| | 1 | 2 | 3 | 4 |
|--|---|---|---|---|
| BASIC TECHNIQUES | | | | |
| Use & care of instruments & materials | | | | |
| Alphabet of lines | | | | |
| Lettering | | | | |
| Use of scales | | | | |
| GEOMETRIC CONSTRUCTIONS | | | | |
| Basic constructions | | | | |
| Basic applications | | | | |
| MULTIVIEW DRAWINGS | | | | |
| Orthographic projection | | | | |
| Major views | | | | |
| Selection of scales, sheet size, views | | | | |
| DIMENSIONING | | | | |
| Methods | | | | |
| Rules | | | | |
| PRECISION DIMENSIONING | | | | |
| Standard fits and limits | | | | |
| Tolerances | | | | |
| Surface finishes | | | | |
| SPECIAL VIEWS | | | | |
| Full and half section, other sections | | | | |
| Primary and double auxiliary views | | | | |

| | 1 | 2 | 3 | 4 |
|---------------------------------------|---|---|---|---|
| FASTENERS | | | | |
| Specification and representation | | | | |
| Kinds and classifications of threads | | | | |
| Springs | | | | |
| | | | | |
| WELDING | | | | |
| Standards and symbols | | | | |
| Application | | | | |
| | | | | |
| PRODUCTION DRAWING | | | | |
| Assembly and detail | | | | |
| Layout and design | | | | |
| Bills of Materials, standard notes | | | | |
| Revisions and related forms | | | | |
| Detailed assembly | | | | |
| | | | | |
| DETAILED DRAWING - SPECIALIZED | | | | |
| Casting and pattern | | | | |
| Machine | | | | |
| Stamping | | | | |
| Welding | | | | |
| Exploded view | | | | |
| | | | | |
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| Oblique Projection | | | | |
| Perspective | | | | |
| | | | | |
| TECHNIQUES IN INK | | | | |
| Line work | | | | |
| Lettering | | | | |
| | | | | |
| SKETCHING REPRODUCTION | | | | |
| Prints | | | | |
| Sepia | | | | |
| Other | | | | |
| | | | | |
| RELATED INFORMATION | | | | |
| Time cards and clock | | | | |
| Time sheets | | | | |
| Drawing no. and part no. system | | | | |
| | | | | |
| REFERENCES | | | | |
| Machinery's Handbook | | | | |
| Architectural Handbook | | | | |
| Industrial catalogs | | | | |
| | | | | |
| | | | | |

| | 1 | 2 | 3 | 3 |
|--|---|---|---|---|
| BASIC MATH INCLUDING METRIC SYSTEM | | | | |
| Fractions and decimals | | | | |
| Volumes and areas | | | | |
| Weights | | | | |
| Basic slide rule | | | | |
| | | | | |
| SPECIAL PROJECTS (LIVE WORK) | | | | |
| Mechanical | | | | |
| Electrical | | | | |
| Construction | | | | |
| Architectural | | | | |
| Graphs & charts | | | | |
| | | | | |
| GEARS AND CAMS | | | | |
| Nomenclature and profiles | | | | |
| Introduction to formulae ratios | | | | |
| Bearings | | | | |
| | | | | |
| OTHER DRAFTING AREAS | | | | |
| Architectural | | | | |
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| Plumbing, heating and air conditioning | | | | |
| Electrical and electronic | | | | |
| Map and topographical | | | | |
| | | | | |
| PRECISION DIMENSIONING | | | | |
| Positional and form tolerances (true position) | | | | |
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| | | | | |
| APPLYING FOR A JOB | | | | |
| Appearance | | | | |
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| What not to do | | | | |
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| Interview Know-How | | | | |
| COMMENTS | | | | |

ATTITUDES, BEHAVIOR, AND WORK TRAITS

EVALUATION: Please draw circle around numbers that are most appropriate.

RELATIONSHIP WITH OTHERS

1. Unable to determine at this time
2. Has difficulty with others
3. Gets along satisfactorily
4. Exceptionally well accepted

COOPERATION

1. Unable to determine at this time
2. Generally not cooperative
3. Generally cooperative
4. Exceptionally cooperative

COURTESY

1. Unable to determine at this time
2. Poor attitudes, needs improvement
3. Generally courteous
4. Exceptionally courteous and considerate

DEPENDABILITY

1. Unable to determine at this time
2. Needs constant follow-up
3. Generally accepts responsibility
4. Exceptionally reliable

INITIATIVE

1. Unable to determine at this time
2. Never initiates action
3. Seldom needs prodding
4. Exceptionally good "self starter"

JUDGMENT

1. Unable to determine at this time
2. Often uses poor judgment
3. Usually makes the right decision
4. Above average in making decisions

SELF CONTROL

1. Unable to determine at this time
2. Tends to be excitable
3. Well balanced
4. Exceptionally well balanced

CONCENTRATION

1. Unable to apply self to job at hand
2. Concentration fluctuates
3. Satisfactory concentration level
4. Highly satisfactory

ADAPTABILITY TO NEW JOB TASKS

1. Cannot adjust to new assignment
2. Has difficulty adjusting
3. Adjusts adequately
4. Adjusts well to new assignments

MOTIVATION IN OCCUPATIONAL AREA

1. Unable to determine at this time
2. Lacks motivation
3. Average interest and application
4. Highly motivated

ADAPTABILITY

1. Unable to determine at this time
2. Has difficulty in adapting
3. Usually accepts change
4. Self reliant, imaginative

DEXTERITY REQUIREMENTS FOR THE OCCUPATION

1. Unable to determine at this time
2. Prognosis for success is poor
3. Is well suited. Shows potential
4. Highly suited to needs of occupation

CRAFTSMANSHIP AND SKILLS

1. Unable to determine at this time
2. Substandard work
3. Average performance
4. High standards of performance

EFFICIENCY AND PRODUCTION

1. Unable to determine at this time
2. Often wastes time and effort
3. Makes effort to work effectively
4. A steady and productive worker

SAFETY

1. Unable to determine at this time
2. Lacks genuine concern for safety
3. Satisfactory practice of safety
4. High regard for safety requirements

WRITTEN PERFORMANCE

1. Unable to determine at this time
2. Work is selfom good
3. Work is generally good
4. Work is consistently good

TOLERANCE

1. Cannot tolerate many obstacles
2. Has difficulty with obstacles
3. Generally sticks to job
4. Sticks to job in face of obstacles

CONSISTENCY OF WORK BEHAVIOR

1. Very unstable work behavior
2. Generally more erratic than not
3. Showed moderately steady work behavior
4. Showed steady work behavior

TUITION SCHOLARSHIP

Greenville Technical College is proud to offer tuition scholarships in each of the Articulation Grant programs: Machine Tool Technology, Industrial Electricity, and Engineering Graphics Technology. These scholarships were suggested at an Articulation Grant Advisory Committee meeting and hardily approved by the Greenville Technical College administration. It is hoped their inception will stimulate interest in continuing quality education and training in these fields.

T Donaldson, Enoree, and Foothills Vocational Centers will each select their most outstanding and/or worthy student in their drafting, electricity, and machine shop programs. Wade Hampton High School will select a student from their electricity program. The three scholarship students from each center will receive one quarter of tuition free study at Greenville Technical College. After their first quarter, each student may receive an extension for another quarter based upon review and approval by his or her instructors and department head.

After the selection of the students by their instructors, the director or principal of each school should send a copy of all the names to the heads of the Industrial and Technical Divisions Mr. J.D. Warren and Mr. Les Caraway. This is necessary to insure the tuition waiver be available when the student begins.

GUIDANCE INFORMATION FORM

This form was designed to supply feedback to guidance counselors, instructors, and administrators. It will be sent by the Greenville Technical College department involved to the vocational center each time there is a horizontal line of asterisks. The information on the form will supply data to evaluate our effectiveness and suggest continuation or change in our procedures.

+ + * +

IT IS EXTREMELY IMPORTANT THAT THE STUDENT OR HIS/HER PARENT IF THE STUDENT IS UNDER 18 SIGNS THE PERMISSION BLANK ON THE SIDE OF THE FORM. IT WOULD BE ILLEGAL TO DISEMINATE THIS INFORMATION FROM GREENVILLE TECHNICAL COLLEGE WITHOUT THE PROPER SIGNATURE.

ENGINEERING GRAPHICS
 ARTICULATION STUDENT'S PROGRESS

Your student, _____, from _____
 Vocational Center has exempted EGT _____, _____, _____, and may
 (conditionally, unconditionally) enroll in EGT _____ (quarter _____).

This placement was based on
 _____ portfolio
 _____ employability profile filled out by _____
 _____ vocational instructor's recommendation

Date of evaluation _____

The student at mid-term has been re-evaluated and is
 _____ progressing satisfactorily
 _____ moved back to level of competence (may be able to finish
 quarter's work, may have to take Incomplete)

Student's signature _____ Instructor's signature _____
 Date _____

The student at the end of the first quarter of work
 _____ successfully completed EGT _____ (grade _____) on _____ (date).
 _____ received an incomplete
 _____ dropped out before the end of the quarter
 because of _____

Student's status at the end of the first year of work - _____

I GIVE MY PERMISSION FOR THE INFORMATION ON THIS SHEET TO BE RELEASED TO GREENVILLE COUNTY SCHOOL SYSTEM.
 SIGNATURE OF PARENT IF UNDER 18
 LEGAL SIGNATURE
 DATE



ARTICULATED DRAFTING UNITS

FIRST QUARTER

1. Instrument Drawing (One View)
2. Lettering
3. Geometric Construction
4. Sketching and Shape Description
5. Dimensioning
6. Reproduction and Control of Drawing
7. Multiview Projection

SECOND QUARTER

8. Section Views
9. Auxiliary Views
10. Revolutions
11. Screw Threads and Fasteners
12. Isometric Drawings
13. Oblique Drawings
14. Intersections and Developments

THIRD QUARTER

15. Shop Processes
16. Working Drawings

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|---|--|---|
| <p>1.0 Instrument Drawing (One View)</p> <p>1.1 Demonstrate the use of drafting instruments</p> <p>1.2 Do the assigned one view drafting problems</p> <p>1.3 Letter the necessary notes on the drawing and in the title block</p> <p>2.0 Lettering</p> <p>2.1 Perform legible lettering exercises (letters, numbers, fractions symbols)</p> <p>2.2 Perform lettering exercises of words, sentences, and paragraphs.</p> | <p>Given a drafting assignment to do on the drafting board where instruments and other basic drafting equipment is necessary</p> <p>Drawings will be drawn to scale using the proper pencils on the assigned sheet size and title block layout. Drawing will be centered on the sheet.</p> <p>Use the proper pencil to get dark, sharp lettering</p> <p>Drafting standards and handout examples will be followed. Proper number of strokes and direction of stroke must be used.</p> | <p>To the instructors' satisfaction</p> <p>ANSI Standards will be used to the instructors' satisfaction</p> <p>It must be dark enough to make a good readable reproduction</p> <p>Lettering must be easy to read, reproducible and not more than a 5 variation away from verticle. Spacing between letters must have equal area within a 5% variation. Spacing between sentences must be uniform using two letter heights as the optimum.</p> |

27-2/77

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|--|--|--|
| <p>3.0 Geometric Construction</p> <p>3.1 Bisect lines, angles and construct figures.</p> <p>3.2 Draw regular polygons.</p> <p>3.3 Draw tangents to arcs, lines and circles.</p> <p>3.4 Make drawings that show the above techniques applied.</p> | <p>Use drafting instruments as required to do the problems on the handout sheet or as assigned by instructor.</p> <p>Same as above.</p> <p>Same as above.</p> <p>Complete one view drawings with points of tangency indicated.</p> | <p>Bisected lines must measure within a tolerance of 1/64". Angles must be within 1/2 constructed figures must be to instructors' satisfaction.</p> <p>To instructors' satisfaction.</p> <p>Arcs and lines must be tangents to the instructors' satisfaction.</p> <p>To instructors' satisfaction.</p> |

BT-NHS



| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|--|--|--|
| <p>4.0 Sketching and Shape Description</p> <p>4.1 Illustrate the six principle views used in describing the shape of an object graphically.</p> <p>4.2 Illustrate the three principles dimensions.</p> <p>4.3 Convert an isometric picture drawing on grid paper to three view sketches on grid paper.</p> <p>4.4 Sketch 3 views of assigned objects on grid paper.</p> <p>4.5 Add missing lines to complete the shape description of objects.</p> | <p>On paper using drafting instruments</p> <p>Make 3 view drawings and label on each view length, width and/or depth as appropriate.</p> <p>Use the problems assigned in the text and do them on the grid paper provided.</p> <p>Problems assigned in text shows 2 views on grid paper, the third one is to be added.</p> <p>3 view problems are given with missing lines.</p> | <p>100%</p> <p>100%</p> <p>All three views must be shown to scale in their proper positions.</p> <p>The 2 views as shown plus the 3rd view must be shown in its proper position to scale with all necessary lines.</p> <p>All lines must be added before assignment is complete.</p> |

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|---|--|---|
| <p>5.0 Dimensioning</p> <p>5.1 Demonstrate an understanding of how and where shape dimensions are placed on a drawing.</p> <p>5.2 Demonstrate an understanding of how and where size dimensions are placed on a drawing.</p> <p>5.3 Demonstrate ability to completely define a part by selecting the views necessary to completely and correctly dimension it.</p> <p>6.0 Reproduction and Control of Drawing</p> <p>6.1 Demonstrate an understanding of a drawing identification system.</p> <p>6.2 Demonstrate the ability to make a diazo print from a tracing.</p> <p>6.3 Demonstrate an understanding of the preparation and use of brown-line drawings.</p> | <p>Problems will be given which show undimensioned views of a part. The student will measure the shape and place the dimensions on the view.</p> <p>Same as above, except that some additional information may be partially given i.e., thread class.</p> <p>Both textbook problems and layout drawings will be used. The student must prepare the drawings and dimension them using drafting instruments.</p> <p>He will provide drawing and/or part number identification for a set of detail and assy drawings (See Para 5.2 & 5.3).</p> <p>Given a tracing, he will properly and safely operate a diazo print machine.</p> <p>He will prepare a brownline of a tracing using similar technique as 6.2 above.</p> | <p>To the satisfaction of the instructor.</p> <p>The same as above.</p> <p>To the satisfaction of the instructor: ANSI Y14 will serve as a standard for dimensioning practices. (Emphasis will be placed on linework, lettering, proper placement of dimensions, and choice of optimum method of dimensioning.)</p> <p>Drawing numbers must be chosen so as to avoid duplication, to the satisfaction of the instructor.</p> <p>To instructor's satisfaction using both vellum and polyester base drawings</p> <p>Ditto</p> |

27-1275



| CONCEPT / PERFORMANCE | CONDITIONS | CRITERIA |
|--|--|--|
| 7.0 Multiview Projections | | |
| 7.1 Make 3 view sketches. | To be made on 8 1/2 X 11 cross section paper from Isometric Sketching Problems on handouts or the ones in the textbook. | All three principal views must be in their proper positions and sketching must be to the instructors' satisfaction |
| 7.2 Do the assigned Missing View Problems. | Given: 2 orthographic views to copy on cross section paper and the third view. | Same as above. |
| 7.3 Do the assigned Missing Line Problems. | Given: 3 orthographic views with lines missing--Lines to be sketched in. May be either on a handout sheet or problems in the textbook. | All lines must be shown. |

27-1175

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|---|---|---|
| <p>8.0 Section Views</p> <p>8.1 Demonstrate a proficiency in the correct terminology relating to section views.</p> <p>8.2 Make section drawings of cylindrical shaped objects.</p> <p>8.3 Make section drawings of irregular shaped objects.</p> <p>8.4 Make section drawings showing revolved sections and broken-out sections.</p> | <p>Written</p> <p>Apply good standard sectioning principles to simple cylindrical shaped objects. Drawings will consist of one circular view and a full or half section as assigned by instructor.</p> <p>Same conditions as above.</p> <p>Problems will be assigned from textbook or handouts.</p> | <p>Pass as a written test.</p> <p>Problems will be drawn until they show clearly to the instructor's satisfaction that the principles of sectioning are being applied in a neat and orderly manner.</p> <p>Problems will be assigned until they are done to instructor's satisfaction.</p> <p>To instructor's satisfaction.</p> |

27-12/75

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|---|--|---|
| <p>9.0 Auxiliary Views</p> <p>9.1 Demonstrate a proficiency in the use of correct terminology relating to auxiliary views.</p> <p>9.2 Construct primary auxiliary view of objects with symmetrical planes</p> <p>9.3 Construct auxiliary view of objects that have asymmetrical planes.</p> <p>9.4 Construct auxiliary views of objects with curved surfaces.</p> | <p>Written</p> <p>Problems showing orthographic views of objects will be given from which the auxiliary view will be drawn.</p> <p>Textbook problems or handout sheets will be provided.</p> <p>Problems to be assigned.</p> | <p>Make a passing grade on a written test</p> <p>To the instructor's satisfaction.</p> <p>To the instructor's satisfaction.</p> <p>Same as above.</p> |

ST-11/78

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|---------------------|---|---|
| 10.0 | Revolutions | |
| 10.1 | Construct a three view drawing of an object with a revolution of the given front view about an axis perpendicular to the frontal plane. | 100% correct projection methods I.01 accuracy answers line quality. |
| 10.2 | Same as above except revolve the right view about an axis perpendicular to profile plane. | " |
| 10.3 | Same as above with top view revolved about axis perpendicular to horizontal plane. | " |
| 10.4 | Successive revolution | " |
| 10.5 | Revolve a point about a normal axis. | 1. To I.01 accuracy
2. Answers, line quality
3. And example |
| 10.6 | Revolve a point about an inclined axis. | " |
| 10.7 | Revolve a point about an oblique axis. | " |
| 10.8 | Revolve a line about as normal, inclined or oblique axis. | 1. To I.01 accuracy
2. To answer standard of line.
3. By example
4. Using revolution & auxiliary view methods as required. |

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|--|---|---|
| <p>11.0 Screw Threads & Fasteners</p> <p>11.1 Demonstrate knowledge concerning terminology used with screws, bolts, nuts, threads, and fasteners.</p> <p>11.2 Make drawings that show simplified, Schematic and detailed threads complete with notes and dimensions.</p> <p>11.3 Make drawings that show square head and hex head bolts and nuts assembled. Complete with notes, and dimensions.</p> | <p>Written</p> <p>Problems as assigned by instructor.</p> <p>Problems assigned by instructor.</p> | <p>Make a passing grade on a written and/or performance test.</p> <p>To instructor's satisfaction.</p> <p>To instructor's satisfaction.</p> |

20-11/18

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|--|--|---|
| 12.0 Isometric Drawing | | |
| 12.1 Draw an isometric drawing of a cube. | Given cube size and instruction to use principles of isometric construction. | To instructor line quality and accuracy standards ansi lines and <u>+ .01</u> accuracy to isometric form. |
| 12.2 Draw ellipse in face of cube using template. | Given cube size and circle size. | " |
| 12.3 Draw ellipse in each face of cube using approximate four-center ellipse method. | Given cube size and circle size. | " |
| 12.4 Draw an isometric view of object that has inclined planes and angles. | Given object in 3-view, oblique or physically. | " |
| 12.5 Draw an isometric of an object that has an irregular curved surface. | Given object, 3-view drawing or pictorial. | " |
| 12.6 Draw and dimension completely an isometric view of an object having angles and circles. | Given object or pictorial of object. | " |

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|---|--|---|
| 13.0 Oblique Drawing | | |
| 13.1 Draw an oblique view of a cube using oblique pictorial method. | Given size of cube and angle of sight, percent of depth protection and viewing direction (cabinet, cavalier, etc.) | Ansi line quality $\pm .01$ accuracy to oblique form. |
| 13.2 Draw oblique view of object having angles and inclined surfaces. | Given object, 3-view of object or pictorial of object. | " |
| 13.3 Draw oblique view of object having circular planes or features. | " | " |
| 14.0 Intersection and Developments | | |
| 14.1 Construct prisms and cylinders by parallel line development. | Assigned problems to be done on the drafting board using standard drafting techniques. | To the instructors' satisfaction |
| 14.2 Construct pyramids and cones by radial line developments. | Assigned problems to be done on the drafting board using standard drafting techniques. | When cut out and folded or rolled they must form into the intended shape. |
| 14.3 Construct transition pieces by triangulation. | Same as above. | Pieces must join together to form the intended shape when cut out, rolled, folded and stuck together. |

| CONCEPT/PERFORMANCE | CONDITIONS | CRITERIA |
|---|---|--|
| <p>15.0 Shop Processes</p> <p>15.1 Make working drawings of machine parts</p> <p>15.2 Make working drawings of fabricated parts</p> <p>15.3 Take a test on terminology relating to shop processes</p> | <p>Parts are to be machined from castings. Correct terminology must be shown in the notes and specifications.</p> <p>Parts are to be shown assembled by welding.</p> <p>Written test to cover terms, notes, machine tools, manufacturing processes, dimensioning, techniques and applications, etc.</p> | <p>To the instructors' satisfaction</p> <p>To the instructors' satisfaction</p> <p>85%</p> |

| CONCEPT / PERFORMANCE | CONDITIONS | CRITERIA |
|--|---|--|
| <p>16. Working Drawings</p> <p>16.1 Demonstrates an understanding of a detail part drawing</p> <p>16.2 Demonstrate an understanding of assembly drawings and the relationship that detail and assembly drawings have to each other.</p> <p>16.3 Advanced student work: Demonstrate an understanding of the responsibilities of a layout draftsman.</p> | <p>The student will prepare part drawings from problems assigned by the instructor.</p> <p>Problems will be given in either of two formats:</p> <ul style="list-style-type: none"> a) Exploded pictorial drawings with dimensions and materials noted b) Cross sectioned assembly layout drawings with design parameters defined. <p>The advanced students will be appointed as job leaders and will be assigned one or more detail draftsmen. The job captain will prepare a layout of a more complicated device from a problem assigned by the instructor. When the layout is complete, he will assign detail drawings to the draftsmen and supervise their work.</p> | <p>Each drawing must include all information necessary to properly fabricate the parts to the satisfaction of the instructor.</p> <p>The student must determine which part require detail part drawings, and the must prepare these drawings as noted above. He then must prepare all necessary sub-assembly and assembly drawings which will include a listing of parts in family-tree order.</p> <p>The layout will be completed to the satisfaction of the instructor, and will include a sequenced assembly procedure. The responsibility for handing in a complete drawing package will be on the job leader. (The job leader will check all detail and assembly drawings for completeness and correctness.</p> |

27-10/75

INDUSTRIAL ELECTRICITY ARTICULATION

Greenville Technical College

GREENVILLE, SOUTH CAROLINA • 29606

The work upon which this publication is based was performed pursuant to Grant G00-75-00453 with the U. S. Office of Education, Department of Health, Education, and Welfare.

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GREENVILLE TECHNICAL COLLEGE - ARTICULATION GRANT

INDUSTRIAL ELECTRICITY

MAY, 1976

OVERVIEW

The vocational school graduate will have the opportunity to exempt some of the Industrial Electricity courses at Greenville Technical College that are repetitious of his vocational school studies. The student may exempt a course after attaining an acceptable proficiency level on the appropriate placement test. Each placement test may be taken once a quarter with a limit of one retake during another quarter.

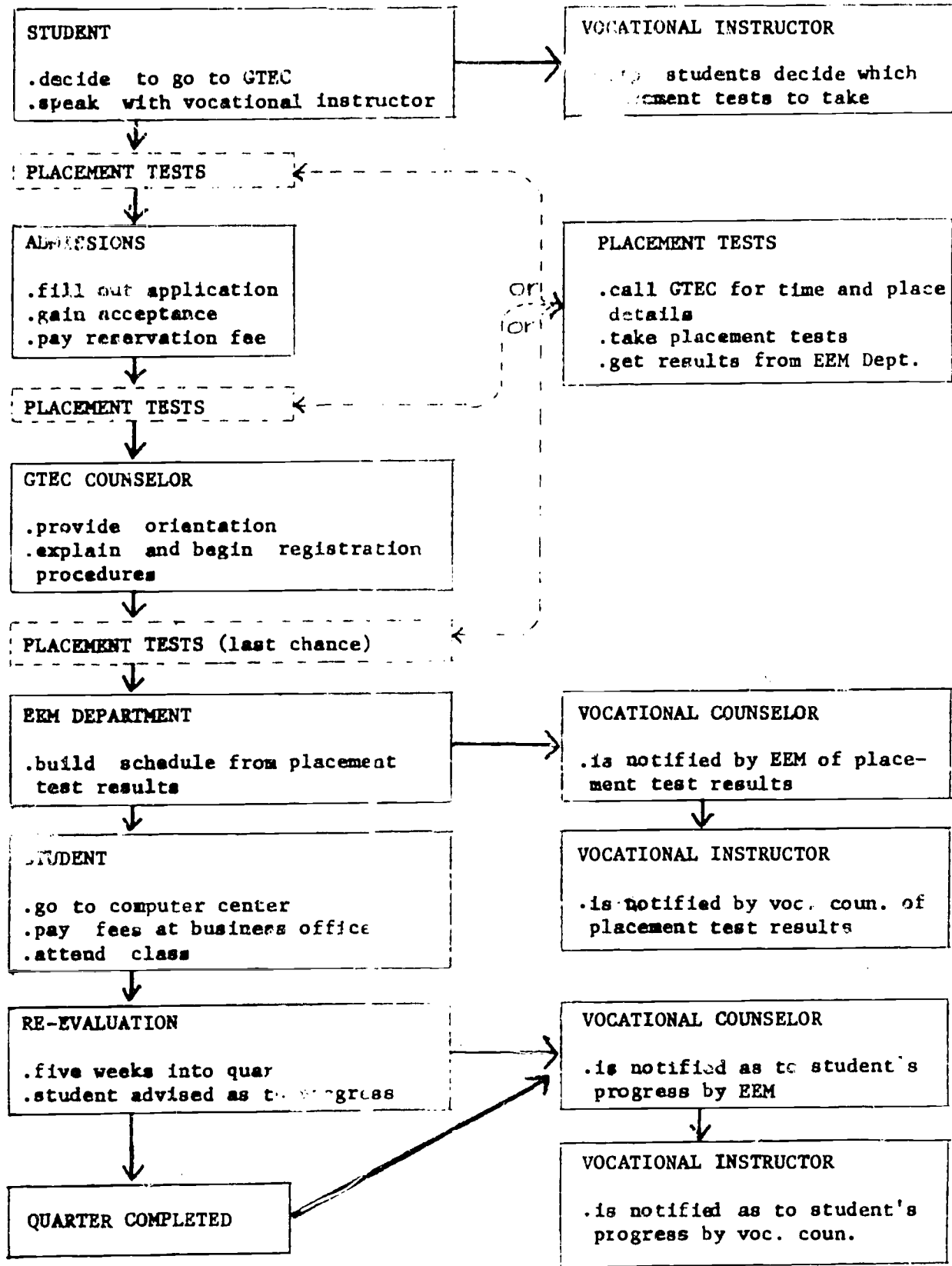
The course objectives that are covered in each placement test will be given to each vocational electricity instructor. They are also available for inspection at GTEC's Industrial Electricity department.

The placement tests for exemptions will begin during the regular registration days just before fall quarter. They will continue to be offered during each pre-registration time in a testing center at Greenville Technical College. Mr. J.D. Warren, Industrial Division Chairman, of the Industrial Electricity department may be contacted for details.

Specifically, the following courses will be considered for exemption upon completion of the placement test:

| <u>Course Title</u> | <u>Course Number</u> |
|--|----------------------|
| Applied Electricity | EEM 101 |
| Residential Electricity-Codes and Ordinances-A | EEM 345 |
| Residential Electricity-Codes and Ordinances-B | EEM 346 |
| DC Electricity | EEM 113 |
| AC Electricity | EEM 123 |
| AC Machines and Devices | EEM 127 |
| Electrical Control Circuits | EEM 136 |
| Electrical Math I | MAT 115 |
| Electrical Math II | MAT 126 |

PROPOSED FLOW CHART OF ARTICULATION STUDENTS - EEM



TUITION SCHOLARSHIP

Greenville Technical College is proud to offer tuition scholarships in each of the Articulation Grant programs: Machine Tool Technology, Industrial Electricity, and Engineering Graphics Technology. These scholarships were suggested at an Articulation Grant Advisory Committee meeting and hardily approved by the Greenville Technical College administration. It is hoped their inception will stimulate interest in continuing quality education and training in these fields.

The Donaldson, Enoree, and Foothills Vocational Centers will each select their most outstanding and/or worthy student in their drafting, electricity, and machine shop programs. Wade Hampton High School will select a student from their electricity program. The three scholarship students from each center will receive one quarter of tuition free study at Greenville Technical College. After their first quarter, each student may receive an extension for another quarter based upon review and approval by his or her instructors and department head.

After the selection of the students by their instructors, the director or principal of each school should send a copy of all the names to the heads of the Industrial and Technical Divisions, Mr. J.D. Warren and Mr. Les Caraway. This is necessary to insure the tuition waiver be available when the student begins.

PLACEMENT TESTS

Course objectives for each course offering a placement test are in this booklet and on file in the Industrial Electricity department at Greenville Technical College. Each vocational instructor may review these objectives and advise his students as to which placement tests would be most appropriate to take.

The placement tests will be offered at Greenville Technical College during the registration days immediately preceding each quarter. They will begin just before fall quarter, 1976, and be offered each quarter thereafter.

It is the student's responsibility to find out the location of the testing center and schedule him/herself so that all the desired placement tests may be taken in the time the center is open. The Industrial Electricity department and Mr. J.D. Warren, Industrial Division Chairman, may be called for details. It is planned that the guidance counselors at TEC will also know specific details.

Tentative schedules for registration (and therefore the placement tests) for the next year are as follows:

Fall, 1976 - Sept. 1,2,3

Winter, 1976 - Nov. 29,30

Spring, 1977 - March 1,2

Summer, 1977 - May 24,25

It is hoped that through the urging of the vocational instructors that each vocational student will take full advantage of these placement tests.

GUIDANCE INFORMATION FORM

This form was designed to supply feedback to guidance counselors, instructors, and administrators. It will be sent by the Greenville Technical College department involved to the vocational center each time there is a horizontal line of asterisks. The information on the form will supply data to evaluate our effectiveness and suggest continuation or change in our procedures.

IT IS EXTREMELY IMPORTANT THAT THE STUDENT OR HIS/HER PARENT IF THE STUDENT IS UNDER 18 SIGNS THE PERMISSION BLANK ON THE SIDE OF THE FORM. IT WOULD BE ILLEGAL TO DISEMINATE THIS INFORMATION FROM GREENVILLE TECHNICAL COLLEGE WITHOUT THE PROPER SIGNATURE.

INDUSTRIAL ELECTRICITY
ARTICULATION STUDENT'S PROGRESS

Your student, _____, from _____

Vocational Center has exempted the following courses:

EEM _____, MAT _____

The student will be enrolling in the following EEM courses next quarter: _____, MAT course: _____

This placement was based on
_____ placement test score(s)
_____ vocational instructor's recommendation
_____ interview requested by _____ and conducted by _____

The student
_____ readily accepted placement
_____ requested a lower placement, outcome _____
_____ requested a higher placement, outcome _____

Date exemption(s) granted _____

The student at mid-term has been re-evaluated and is
_____ progressing satisfactorily
_____ not progressing satisfactorily

Student's signature _____ Instructor's signature _____
Date _____

The student at the end of the first quarter of work
_____ successfully completed the following courses in EEM / MAT
EEM _____ (grade _____) EEM _____ (grade _____)
EEM _____ (grade _____) EEM _____ (grade _____)
MAT _____ (grade _____)
_____ received an incomplete
_____ dropped out before the end of the quarter

Student's status at the end of the first year of work - _____

I GIVE MY PERMISSION FOR THE INFORMATION ON THIS PAGE TO BE SENT BACK TO THE GREENVILLE COUNTY PUBLIC SCHOOL SYSTEM.

DATE _____ LEGAL SIGNATURE _____ PARENT'S SIGNATURE IF UNDER 18 _____



CONCEPT / PERFORMANCE

(Sometimes) Covered or Not Covered?

SC, C, or NC

When is it covered? 1-1, 1-2, 2-1, 2-2

Concept 1.0 Special Purpose Outlets

- 1.1 Given a blueprint, recognize special-purpose outlet designations.
- 1.2 Given nameplate reading, or specs, or equipment, calculate the load to be connected to a special outlet and use configuration chart for selection of outlet.
- 1.3 Illustrate the proper grounding connections when using armored cable and nonmetallic-sheathed cable.
- 1.4 Illustrate the proper connections to insure grounding continuity between a grounded outlet box and the grounding circuit of the receptacle.

Concept 2.0 Special Purpose Outlets for a Water Pump and Heater

- 2.1 List the basic requirements for a motor to be used on deep-well jet pump.
- 2.2 Given the rating of a motor, calculate the conductor size and over-current protection required for the pump circuit.
- 2.3 List the basic steps in various water heating methods which can be used.
- 2.4 Describe the operation of the water heating system, including the functions of the tank, the heating elements, and the thermostats.
- 2.5 Illustrate the proper grounding connections for the water heater.

Concept 3.0 Special Purpose Outlets for Dryers and Over Garage Door Openers

- 3.1 Illustrate the proper wiring and grounding connections for large appliances based on the type of wiring method to be used.
- 3.2 List the requirements for using service entrance cable to connect large appliances.

CONCEPT / PERFORMANCE

(Sometimes) Covered or Not Covered

SC, C, or NC

When is it covered? 1-1, 1-2, 2-1, 2-2

3.3 Illustrate the proper connections involved in remote control switching such as in an overhead garage door opener based on manufacturer's installation recommendations.

3.4 Given Code tables, select the proper overcurrent protective device based on the amperage rating of the device.

Concept 4.0 Special Purpose Outlets for Kitchen Appliances

4.1 Interpret electrical plans and construction blueprints to determine any special installation requirements for electrical appliances.

4.2 Given NEC table 310/16-19 and notes and based on the ratings of appliances, select proper conductor sizes for wiring installation.

4.3 Illustrate how to ground all appliances properly regardless of the wiring method used.

4.4 Illustrate proper wiring of 7-heat control and 3-heat control for a dual element cooking unit-heating unit. (phasing out)

4.5 List the advantages of infinite over 7- and 3-heat control.

4.6 Illustrate the 3 options in the installation of various types of stove and oven units: group circuit, single circuit, and load center.

Concept 5.0 Telephone, Television, and Signal Systems

5.1 Describe the proper precautions to prevent line voltage interference with television signals.

5.2 Given specifications, describe the installation of outlet boxes, outlets, and provide cable or conduit to which the telephone installer will make final connections.

5.3 Define what is meant by signal circuit.

CONCEPT / PERFORMANCE

(Sometimes) Covered or Not Covered?
SC, C, or NC
When is it covered? 1-1, 1-2, 2-1, 2-2

5.4 Describe the operation of a two-tone chime and a four-tone chime with one or more extension chimes.

Concept 6.0 Heating Systems

6.1 List the advantages of electric heat.

6.2 Describe the several types of electric heating systems.

6.3 Describe the various thermostat control systems for electric heating units.

6.4 Describe the installation of electric heaters with appropriate temperature controls according to NEC requirements.

6.5 Interpret typical schematics provided by heating system control manufacturers.

6.6 Describe the functions of the control devices provided in a typical system.

6.7 Explain the principle of the thermopile and the thermocouple.

6.8 Compare and contrast the electrical requirements for the following heating systems: oil, gas fire - water gravity, gas fire - self-contained.

Concept 7.0 Service Entrances, Equipment, and Calculations

7.1 Define these terms: electrical service, overhead service, service drop, and underground service.

7.2 Describe the installation of a mast-type overhead service and an underground service.

7.3 Discuss the NEC requirements for disconnecting the electrical service by means of a main panel and load centers.

| CONCEPT / PERFORMANCE | (Sometimes) Covered or Not Covered?
C, SC, or NC
When is it covered? 1-1, 1-2, 2-1, 2-2 |
|--|---|
| 7.4 Differentiate between the various types of fuses and select the proper fuse for a particular installation. | |
| 7.5 Explain the operation of fuses and circuit breakers. | |
| 7.6 Explain the term, "interrupting capacity". | |
| 7.7 Determine available short-circuit current using a simple formula. | |
| 7.8 Determine the total calculated load of a residence using the methods in Article 220 of the NEC. | |
| 7.9 Calculate the size of the service entrance conductors, including the neutral conductor. | |
| Concept 8.0 Remote Control Systems for Lighting Control Circuits | |
| 8.1 Explain the operation of the various components of a low-voltage, remote control system for lighting circuits. | |
| 8.2 Interpret the wiring diagrams of various types of low-voltage, remote control circuits. | |
| 8.3 Describe the installation of a low-voltage, remote control system using the proper conductors, wiring, and components according to NEC requirements. | |

| CONCEPT / PERFORMANCE | (Sometimes) Covered or Not Covered?
C, SC, or NC
When Is It Covered? 1-1, 1-2, 2-1, 2-2 |
|--|---|
| 7.5 Define bandwidth and contrast it with voltage gain and explain their use in amplifiers and receivers. | |
| 7.6 Explain the effects of Q on bandwidth. | |
| 7.7 Tell how many series resonant circuits may be employed as filters. | |
| Concept 8.0 Parallel-Reactive Circuits | |
| 8.1 Explain the current and voltage relationships of series versus parallel circuits. | |
| 8.2 Calculate current, impedance, power, and power factor in a parallel RL circuit. | |
| 8.3 Analyze a parallel RL circuit by varying frequency, resistance, applied voltage, and inductance; prove the effects by mathematical calculations. | |
| 8.4 Calculate current, impedance, power, and power factor in a parallel RC circuit. | |
| 8.5 Calculate current, impedance, power, and power factor in an RLC circuit. | |
| 8.6 Analyze an ideal parallel LC circuit. | |
| 8.7 Define the conditions for parallel resonance. | |
| 8.8 Diagram current and impedance curves at the resonant frequency. | |
| 8.9 Define a tank circuit. | |
| 8.10 Analyze a practical tank circuit. | |
| 8.11 Analyze circuit behavior above and below the resonant frequency. | |

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| CONCEPT / PERFORMANCE | (Sometimes) Covered or Not Covered?
C, SC, or NC
When is it covered? 1-1, 1-2, 2-1, 2-2 |
|--|---|
| 8.12 Tell how parallel resonant circuits may be used as filters. | |
| 8.13 Define when the effective resistance of the coil in an RL circuit must be considered. | |
| 8.14 Calculate figure of merit, impedance, and current in a practical RL circuit. | |

DATE: _____
 BY: _____

