1934

Mechanical Engineering: Prospectus of Courses Session 1934-35

City of Dublin Vocational Education Committee

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City of Dublin
Vocational Education Committee

Scoileanna ceard-öideachais
City of Dublin Technical Schools

Seirbhís
1934-35
1933

MECHANICAL ENGINEERING
PROSPECTUS OF COURSES

BOLTON STREET AND RINGSSEND
CALENDAR
SESSION 1934-35

1934.

Sept. 3, Monday. Whole-time Day Schools open for enrolment. Day Apprentice School resumes work.
" 10, Monday. Whole-time Day Schools commence work, and Part-time Day Classes open for enrolment.
" 17, Monday. Evening Classes open for enrolment, and Part-time Day Classes commence work.
" 24, Monday. Evening Classes commence work.
Nov. 1, Thursday. All Saints Day. Whole-time Day Schools, excepting Day Apprentice School, closed.

1935.

Jan. 2, Wednesday. All classes resume work after Christmas vacation.
" 3, Thursday. New Course Lectures, Materia Medica and Botany commence work.
" 6, Sunday. Feast of the Epiphany.
Mar. 2, Saturday. Land Surveying and Levelling Course begins.
" 2, Wednesday. Motor Car Driving Lessons begin.
" 17, Sunday. St. Patrick's Day
" 23, Saturday. Land Surveying Field work begins.
Apr. 16, Tuesday. Last meeting of classes before Easter vacation.
" 24, Wednesday. All classes resume work after Easter vacation.
May 3, Friday. Evening Classes close (excepting special classes).
June 4, Tuesday. New Course Lectures, Materia Medica and Botany commence work.
" 20, Thursday. Feast of Corpus Christi. Whole-time Day Schools, excepting Day Apprentice School, closed.
" 28, Friday. Whole-time Day Schools and Part-time Day Classes (excepting special classes and Day Apprentice School), closed for the Session.
July 19, Friday. Day Apprentice School closes. Schools close on all Bank Holidays not specified in above Calendar.

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VOCATIONAL EDUCATION COMMITTEE

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Mr. M. P. Rowan.

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Mr. M. P. Rowan.

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MASTER TAILORS.
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Mr. W. O'Connor.
Mr. W. Scott.
Mr. R. Boyd.

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GENERAL NOTICES

ENTRANCE EXAMINATIONS, FEES, REGULATIONS.

Entrance Examinations will be held at Technical Institutes, Bolton Street and Ringsend, every evening during the week commencing 17th September, and on such subsequent evenings as may be arranged. Students who produce satisfactory evidence of education may be exempted from examination. Introductory Courses are provided for those who fail to obtain sufficiently high marks in the examination.

Fees: per Session.

Courses in Mechanical Engineering and
Motor Car Engineering ...... 7/6 for Course.
Introductory Course ........ 2/6 for Course.
Additional Course subjects .... 2/6 each.
Single subjects ............. 7/6 each.

Technical students may take a class in Irish and in Physical Training for an additional fee of 2/6 per class.

Students who through obtaining employment are unable to continue in attendance at the Whole-time Day School Courses of the City of Dublin Vocational Education Committee will be admitted to approved Evening School Courses, without fees, up to the value of the Day School Fees paid.

The same concession may be extended to other students who have left the Day School Courses, if the reasons for their non-attendance at the Day School Classes are considered by the Principal to be adequate.

Applicants for admission to Courses or Classes must be at least fourteen years of age.
PROGRAMME and TIME TABLE
OF THE
Schools of Mechanical and Motor Car Engineering and Allied Trades
AT
Technical Institutes: Bolton Street and Ringsend
### COURSES AND TIME TABLES

**Bolton Street**

<table>
<thead>
<tr>
<th>No. of Course</th>
<th>Subject</th>
<th>Day</th>
<th>Hour</th>
<th>Room</th>
<th>Teacher</th>
<th>No. of Syllables</th>
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<td>1B</td>
<td>Arithmetic</td>
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<td>English</td>
<td>Mon.</td>
<td>8.00-9.00</td>
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<td>3B</td>
<td>Practical Drawing</td>
<td>Thurs.</td>
<td>7.30-8.30</td>
<td>A 9</td>
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<td>4B</td>
<td>Practical Drawing(Metal Plate Work)</td>
<td>Tues.</td>
<td>7.30-9.30</td>
<td>D 2</td>
<td>J. Dooley</td>
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<td>5B</td>
<td>Machine Drawing-IA</td>
<td>Mon, Wed</td>
<td>7.30-8.30</td>
<td>A 5</td>
<td>W. J. Ash, B. E. Fee</td>
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<td>6B</td>
<td>Mathematics-I</td>
<td>Fri.</td>
<td>7.30-8.30</td>
<td>C 7</td>
<td>J. J. Hughes</td>
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<td>7B</td>
<td>Geometry or</td>
<td>Thurs.</td>
<td>7.30-8.30</td>
<td>B 1</td>
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<td>8B</td>
<td>Engineering Workshop-I</td>
<td>Tues., Thurs.</td>
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<td>D 7</td>
<td>J. Kelly, J. J. Redmond</td>
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<td><strong>SECOND YEAR</strong></td>
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<td>9B</td>
<td>Machine Drawing-II</td>
<td>Tues.</td>
<td>7.30-8.30</td>
<td>A 5</td>
<td>W. J. Ash, B. E. Fee</td>
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<td>10B</td>
<td>Mathematics II</td>
<td>Wed.</td>
<td>7.30-8.30</td>
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<td>Thurs.</td>
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<td>B 1</td>
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<td>12B</td>
<td>Machine Drawing-III</td>
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<td>7.30-8.30</td>
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<td>Applied Mechanics-I</td>
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<td>7.30-8.30</td>
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<td>Machine Construction-IV</td>
<td>Thurs.</td>
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<td>7.30-8.30</td>
<td>C 7</td>
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<td>C 8</td>
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<td>22B</td>
<td>Heat Engines-II</td>
<td>Wed.</td>
<td>7.30-8.30</td>
<td>A 8</td>
<td>P. Cormack</td>
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#### MECHANICAL ENGINEERING TRADES—ENGINEERING WORKSHOP PRACTICE

<table>
<thead>
<tr>
<th>No. of Course</th>
<th>Subject</th>
<th>Day</th>
<th>Hour</th>
<th>Room</th>
<th>Teacher</th>
<th>No. of Syllables</th>
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<td>23B</td>
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<td>Thurs.</td>
<td>7.30-9.30</td>
<td>D 7</td>
<td>J. Kelly, J. J. Redmond</td>
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<td>25B</td>
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<td>7.30-9.30</td>
<td>B 29</td>
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<td>Mathematics-I</td>
<td>Fri.</td>
<td>7.30-9.30</td>
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<td>7.30-9.30</td>
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#### FOURTH YEAR

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<td>32B</td>
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<td>Thurs.</td>
<td>7.30-9.30</td>
<td>B 27</td>
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#### PATTERNMAKING

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<th>No. of Course</th>
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<tr>
<td>35B</td>
<td>Patternmaking-I</td>
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<td>D 4</td>
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<td>36B</td>
<td>Workshop Drawing and Calculations</td>
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#### THIRD YEAR

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#### FOUNDRY WORK

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<td>Wed.</td>
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<td>Brassfinishing, Practical</td>
<td>Mon, Fri.</td>
<td>7.30-9.30</td>
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#### BOILERMAKING

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<th>Room</th>
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<tr>
<td>48B</td>
<td>Boilermaking, Lectures and Drawing</td>
<td>Mon.</td>
<td>7.30-9.30</td>
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<tr>
<td>50B</td>
<td>Smithwork, Practical</td>
<td>Wed.</td>
<td>7.30-9.30</td>
<td>D 9</td>
<td>W. J. Ash</td>
<td>34</td>
</tr>
<tr>
<td>51B</td>
<td>Machine Drawing-I</td>
<td>Mon.</td>
<td>7.30-9.30</td>
<td>A 5</td>
<td>H. C. FiteGerald</td>
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#### ART IRONWORK

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<th>No. of Course</th>
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<tr>
<td>52B</td>
<td>Art Ironwork, Practical-I</td>
<td>Mon.</td>
<td>7.30-9.30</td>
<td>D 9</td>
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#### METAL PLATE WORK

<table>
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<tr>
<th>No. of Course</th>
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<tr>
<td>53B</td>
<td>Metal Plate Work, Lecture and Drawing-I</td>
<td>Mon.</td>
<td>7.30-9.30</td>
<td>D 2</td>
<td>J. Dooley</td>
<td>35</td>
</tr>
<tr>
<td>54B</td>
<td>Metal Plate Work, Practical-I</td>
<td>Mon.</td>
<td>7.30-10.00</td>
<td>D 2</td>
<td>J. Dooley, T. J. Ryan</td>
<td>36</td>
</tr>
</tbody>
</table>
### Oxy-Acetylene Welding

**41B** Oxy-Acetylene Welding, Practical  | Fri.  | 7.30-9.30 | D 2 | T. J. Ryan | 29

**MOTOR CAR ENGINEERING— COURSE FOR MOTOR CAR DRIVERS.**

**42B** Motor Car Engineering  | Mon.  | 7.30-9.30 | B 15 | A. O'M. Burke | 41

### MOTOR CAR ENGINEERING COURSE.

**FIRST YEAR, A**

**43A** Motor Car Engineering—I  | Tues. | 7.30-8.30 | A 6 | W. D. Horgan | 53
Motor Car Electricity—I  | Tues. | 8.35-9.35 | A 6 | W. D. Horgan | 53
Science—I  | Wed.  | 7.30-9.30 | A 6 | J. J. Hughes | 58
Motor Workshop Practice—I  | Thurs. | 7.30-9.30 | A 6 | A. O'M. Burke | 47
Machine Drawing—I  | Mon.  | 7.30-9.30 | A 5 | W. J. Ash | 4

**SECOND YEAR.**

**44A** Motor Car Engineering—I  | Wed.  | 7.30-8.30 | A 6 | W. D. Horgan | 58
Motor Car Electricity—I  | Wed.  | 8.35-9.35 | A 6 | W. D. Horgan | 58
Science—I  | Thurs. | 7.30-9.30 | A 6 | M. Niall | 58
Motor Workshop Practice—I  | Mon.  | 7.30-9.30 | A 6 | A. O'M. Burke | 47
Machine Drawing—I  | Mon.  | 7.30-9.30 | A 5 | W. J. Ash | 4

**THIRD YEAR, A**

**45A** Motor Car Engineering—I  | Mon.  | 7.30-9.30 | A 8 | P. O'Connell | 45B
Electricity—I  | Mon.  | 8.35-9.35 | C 8 | W. D. Pile | 55
Mechanics—I  | Mon.  | 7.30-9.30 | C 8 | A. McLoughlin | 61
Motor Workshop Practice—I  | Mon.  | 7.30-9.30 | D 8 | A. O'M. Burke | 49, 50
Machine Drawing—I, or Mechanics—I  | Mon.  | 7.30-9.30 | A 5 | W. J. Ash, B. E. For | 6
Mathematics—I  | Mon.  | 7.30-9.30 | B 1 | H. Doyle | 12

Students are recommended to add a class in Mathematics.

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**NO. OF COURSE**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Day</th>
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<tbody>
<tr>
<td>Mechanical Engineering I</td>
<td>Mon.</td>
<td>7.30-9.30</td>
<td>A 8</td>
<td>P. O'Connell</td>
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<tr>
<td>Electricity I</td>
<td>Mon.</td>
<td>8.35-9.35</td>
<td>C 8</td>
<td>W. D. Pile</td>
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<tr>
<td>Mechanics I</td>
<td>Mon.</td>
<td>7.30-9.30</td>
<td>C 8</td>
<td>A. McLoughlin</td>
</tr>
<tr>
<td>Motor Workshop Practice I</td>
<td>Mon.</td>
<td>7.30-9.30</td>
<td>A 6</td>
<td>W. D. Pile</td>
</tr>
<tr>
<td>Machine Drawing I, or Mechanics I</td>
<td>Mon.</td>
<td>7.30-9.30</td>
<td>A 5</td>
<td>W. J. Ash, B. E. For</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>Mon.</td>
<td>7.30-9.30</td>
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<td>H. Doyle</td>
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**MOTOR CAR DRIVING.**

(Strictly confined to Students in regular attendance at the Classes of either of the Motor Car Engineering Courses listed above.)

Fee, £2 0s. Od. for Course of Eight Lessons.

**FIRST YEAR.**

**46A** Motor Car Design—IV  | Fri.  | 7.30-9.30 | C 7 | W. D. Pile | 48
Applied Mechanics—II  | Mon.  | 7.30-9.30 | C 8 | A. McLoughlin | 18
Mathematics—III  | Thu.  | 7.30-9.30 | C 7 | H. C. Clifton | 14

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**GAS ENGINEERING.**

The Courses in Gas Engineering, Gas Supply, and Gas Fitting have been arranged in compliance with the requirements of the Institution of Gas Engineers for Students preparing for the Examinations prescribed by that Body.

**FIRST YEAR.**

**47K** Physics  | Mon.  | 7.30-10.00 | Kevin St. | P. O'Callaghan | 63
Inorganic Chemistry  | Tue., Wed. | 7.30-10.00 | Kevin St. | P. B. For | 63
Mathematics I  | Fri.  | 7.30-9.30 | C 7 | J. J. Hughes | 11

**GAS SUPPLY.**

**FIRST YEAR.**

**48K** Physics  | Mon.  | 7.30-10.00 | Kevin St. | P. O'Callaghan | 62
Inorganic Chemistry  | Tue., Wed. | 7.30-10.00 | Kevin St. | P. B. For | 63
Mathematics I  | Fri.  | 7.30-9.30 | C 7 | J. J. Hughes | 11

**GAS FITTING.**

**50A** Lectures and Calculations—I  | Thurs. | 7.30-9.30 | B 20 | R. B. Clark | 65
Gas Fitting Practical—I  | Mon.  | 7.30-9.30 | B 21 | J. Lenihan | 68
Gas Fitting Practical-II  | Mon.  | 7.30-9.30 | B 21 | J. Lenihan | 68

**SECOND YEAR.**

**51A** Lectures and Calculations—II  | Mon.  | 7.30-9.30 | B 20 | R. B. Clark | 66
Gas Fitting Practical—II  | Fri.  | 7.30-9.30 | B 21 | J. Lenihan | 69

**THIRD YEAR.**

**52A** Lectures and Calculations—III  | Mon.  | 7.30-9.30 | B 20 | R. B. Clark | 67
Gas Fitting Practical—III  | Mon.  | 7.30-9.30 | B 21 | J. Lenihan | 70
Machine Drawing I  | Mon.  | 7.30-9.30 | A 5 | W. J. Ash | 4

**IRISH.**

Irish—IA  | Mon.  | 7.30-9.30 | C 2 | D. S. MacEoin | 71
Irish—IB  | Mon.  | 7.30-9.30 | C 2 | D. S. MacEoin | 71
TECHNICAL SCHOOL
RINGSEND

MARTIN Keady, A.R.C.Sc.I., B.Sc. (Eng.), Lond.—Principal.

TEACHING STAFF

The Principal.

S. O. Evans.


I. Lambert, B.Sc. (Hons.), H.Dip.Ed.

B. Devlin, B.E., A.R.C.Sc.I.

P. J. O'Hagan.

J. R. Evans.

A. McNeil Shaw.

J. Coleman.

D. Flynn.
## SYLLABUSES

### SUBJECTS.

1—**English.**

Grammar, parts of speech, punctuation. Reading exercises from technical publications, dictation, letter and essay writing, notetaking. Lectures on simple machines.

2—**Workshop Arithmetic.**

Signs and symbols, factors, greatest common measure, least common multiple, fractions, decimals. Percentages, ratio and proportion, units of length, area, volume and weight. Simple mensuration.

3—**Practical Drawing.**

Use of instruments, lettering, simple geometrical exercises, orthographic projection. Freehand sketches of models and machine parts. Scale drawings of nuts, bolts, screw threads, bearings, brackets, couplings and other simple machine details.

4—**Machine Drawing, I.**

Use of drawing instruments and materials, precision exercises, orthographic projection. Use of sketch book, dimensioned freehand sketches of simple parts. Scale drawings of brackets, bearings, couplings, bolts, nuts, screws, simple engine details, valves and cocks. Explanation of features of importance in machine and engine parts, and of operations involved in their manufacture.

5—**Machine Drawing, II.**

6—MACHINE DRAWING, III.


7—MACHINE CONSTRUCTION, IV.

Advanced exercises in Machine Drawing, also problems involved in the design of the simpler details of machines and steam engines.


8—MACHINE DESIGN, V.


9—PRACTICAL GEOMETRY.

Use of instruments, setting out of angles, proportional parts; scales. Exercises on straight lines and curves. Construction of plane figures, areas of figures, and reduction of areas to equal squares, properties of the triangle and parallelogram; application to link work. Construction of angles; circular measure and trigonometrical functions of angles. Proportions, construction and use of scales. Location of points by rectangular co-ordinates, problems on lines and circles, construction of circles from specified data, tangents, angles in segment. The ellipse; cycloidal and involute curves. Triangles, polygons and curved figures. Vectors and vector quantities, problems on uniplanar forces. Projections and methods of defining positions of points and lines in space, horizontal and vertical traces. Views of solids in various positions, alterations of ground line, inclined and vertical planes. Elevations, plans and sections of prisms, pyramids, cylinders, and cone. Interpenetrations and developments.

11—PRACTICAL MATHEMATICS, I.

Arithmetic: Simple and compound rules, calculations of prices and costs, fractions, decimals, contracted methods, percentages, ratio and proportion, square root. Mensuration: Square, rectangle, triangle and circle, areas, volumes; applications of geometry to problems. Algebra: Symbols, the four simple rules, simple equations, evaluation and transformation of formulae, factors. Elementary graphs.

12—PRACTICAL MATHEMATICS, II.

13—Practical Mathematics, III.

Simultaneous and quadratic equations, graphical solution of equations of degree higher than the second; maximum and minimum values of quadratic and cubic expressions, logarithmic solution of equations. Applications of Simpson's trapezoidal rules. Work done by a variable force or expanding gas. General solution of triangles, formulae for sine, cosine and tangent of sum or difference of two angles, formulae for sum or difference of sines or cosines of two angles; application of the formulae for compound angles to problems on valve displacement, etc. Formulae for the functions of $3A$ and $2A$ in terms of $A$. Linear graph law and the reduction thereto of other laws, graphs of the form $y=\alpha x^n$. Trigonometrical and logarithmic functions. Slope of a curve at a point and its interpretation, rate of increase, velocity and acceleration, area of a curve and its interpretation, area of $y=\sin^2x$ and $y=\sin x$. The "root mean square" value of the ordinate.

14—Practical Mathematics, IV.

Binominal expansions and approximations. Exponential and logarithmic theorems. Calculations of logarithms to the exponential base and their transformation to a decimal or other base. Tabular study of the rate of increase and graphical study of the slope of curve of simple functions of a varying quantity, i.e., powers, trigonometrical, logarithmic and exponential functions. Differentials of such simple functions; of their sum, difference of product, and the function of a function. Successive differentiation and determination of the maximum and minimum values of a function. Integration as a process of summation, and as the inverse of differentiation. Further study of curves: conics, cycloids, trochoids, catenary. Discussion of the properties of curves from their cartesian equations. Simple harmonic motion.

15—Practical Mathematics, V.


16—Workshop Mechanics and Calculations.


17—Applied Mechanics, I.

Force measured by its straining action; stretching of wires and springs. Stress, strain, elasticity. Moments of forces, couples, centres of gravity. Work, energy, power; diagrams of work, horse power. Friction. Simple machines, velocity ratio and efficiency. Composition, resolution and equilibrium of forces. Velocity and acceleration. Elementary hydrostatics.

18—Applied Mechanics, II.


19—Applied Mechanics, III.

Further treatment of testing of materials; alloy steels, heat treatment; fatigue of metals. Principal stresses. Strength and deflection of beams, distribution of shear stress. Strength and stiffness of

20—HEAT ENGINES, I.

The steam engine cylinder, steam distribution, mean effective pressure, calculation of indicated, and of brake horse power. Problems on the simple slide valve. Work done per cubic foot of steam. Effects of superheating. Steam boilers; heat transmission, heating surface; boiler types. Mechanical stokers, economisers, feed-water heaters, feed pumps and injectors, superheaters; boiler efficiency. Boiler valves, mountings and fittings. Fuels, calorific value, air supply per pound of fuel, products of combustion. Transmission of heat from furnace to water, evaporation, air supply to furnace, natural and forced draught.

21—HEAT ENGINES AND POWER PLANTS, II.


22—ENGINEERING WORKSHOP, I.


All work will be done to drawings prepared in connection with the classes in Machine Construction and Design. Patterns and castings made in the Institute will be utilised as far as possible.

23—ENGINEERING WORKSHOP, II.


24—ENGINEERING WORKSHOP, III.


25—ENGINEERING WORKSHOP, IV.

Advanced work on Syllabus of earlier years, involving the complete turning, machine, fitting and assembly of machine and engine details requiring a high degree of accuracy and finish. The application and use of modern high-grade measuring instruments and gauges. Fine grinding operations on hardened surfaces. Production of spur and ratchet wheels; tapered work; cottered connections, screw jacks and other workshop accessories.

26—PATTERNMAKING, I.

Selection, qualities and application of timbers and other materials used. Use of patternmaking tools and appliances, the contraction rule. Operation of wood-turning lathe. Construction of simple patterns of flanges, brackets, bearings, brasses and crocks. Corebox making; use of core prints.

27—PATTERNMAKING, II.

Patterns of more advanced type; built-up patterns, pedestals, wall brackets, hangers, toothed wheels, pulleys, clutches, pipe bends, valves, cocks, pistons. Use of strickles and loam board.
28—Patternmaking, III.

Cylinders and connections for engines and pumps, hydraulic details. Patterns of complex nature, involving coring of passages, chambers and recesses. Patterns for ornamental castings in iron, brass and bronze.

29—Foundry Work.


30—Workshop Drawing and Calculations.

Orthographic projection. Simple exercises in drawing as applied to patternmaking and foundry work. Interpretation of prints and drawings of castings. Elementary calculations required for foundry work.

31—Brass Finishing.

Bench and lathe operations involved in finishing and assembly of cocks, valves, lubricators, injectors, gauges, steam whistles. Turning of screwed spindles and of balls. Preparation of small switches and other simple electrical fittings. Ecclesiastical and ornamental brasswork requiring a high degree of finish. Chasing, knurling, spinning, brazing, polishing and lacquering operations.

32—Boilermaking, Drawing.


33—Boilermaking, Practical.

Marking out, cutting and bending to required shape and dimensions of cylindrical and coned riveted bodies. Preparation of plates for boiler-construction, levelling, squaring, cutting and drilling. Simple riveted joints, caulking and fullering. Riveted tank work, watertight joints, corner connections, stiffening and staying. Boiler smithwork, heating of angle and channel bars in the fire, bending to required shape and size, welding and finishing. Flanging of boiler end plates. Oxy-acetylene processes applied to boilermakers' work.

34—Smithwork.


35—Metal Plate Work, Drawing and Theory, I.

Lectures: Fuels used in metal plate work. Metals: characteristics and applications of tinplate, zinc, copper and iron. Solders and brazing materials. Galvanising, tinning and re-tinning processes. Calculations of dimensions, capacities and weights of vessels of various designs.

Drawing: Geometrical problems involved in metal plate work; intersections and penetrations. Development of patterns for vessels and other objects of simple form such as:—Cylindrical pipes and branches, coned articles in two or more pieces, equal tapering bodies, baking pans; objects with combined flat and coned surfaces, tee pipes, bends in two or more pieces, V and Y pipes. Patterns for finials, simple mouldings, gutters and other roofwork details. Principal joints used in metal plate work practice.

36—Metal Plate Work, Practical, I.

Use of hand tools, cutting and bending appliances. Cutting, rolling, hammering, bending and flattening operations. Preparation of notches, allowances for lap, wiring and joining of seams and intersecting parts. Jointing, soldering, brazing, riveting and grooving

37—METAL PLATE WORK, DRAWING AND THEORY, II., III.

The subjects listed for the First Year will be dealt with in their advanced stages. The following will be the principal:—

Metals and alloys: their physical and chemical properties. Special uses of tinplate, galvanised and lead-coated iron. Fuels, solid and gaseous; their methods of application. Oxy-acetylene processes. Development of patterns of an advanced type involving triangulation methods. Development of complex patterns and mouldings, and of those required for articles to be welded, brazed, and specially treated.

38—METAL PLATE WORK, PRACTICAL, II., III.

In addition to advanced work on the Syllabus for the First Year, special attention will be given to the following:—Oxy-acetylene processes applied to the cutting and welding of sheet-metal objects; the choice and proper use of blowpipes, welding rods and fluxes. Oxy-acetylene methods in the treatment of sheet copper, aluminium, brass, and stainless steel. Sifbronze welding. Welding, bending and treatment of light panels. Preparation and repair of motor car wings, bonnets and radiators. Domes, finials, ships' ventilators. Lamps, vases, caskets and other ornamental work involving a high degree of finish. Flashings for domes, spires and special roof forms. Kettles, urns, boilerettes, mirrors and other domestic articles of importance.

39—OXY-ACETYLENE WELDING.

Low pressure acetylene generator: precautions to be observed in the preparation and use of the gas. Storage and preservation of calcium carbide. Dissolved acetylene; care of high pressure acetylene and oxygen cylinders, valves, gauges and other fittings. Choice and use of blow-pipes for various purposes. Cutting and welding processes.

Practical exercises in cutting and welding plates, angle and other sectional bars. Welding of framed structures of different designs. Oxy-acetylene methods applied to cast iron, aluminium alloys, brasses; bronzes and copper. Use of welding rods and fluxes for different metals.

40—WELDING SCIENCE.

Simple chemistry of the atmosphere; oxidation and combustion. Some of the simpler elements, in particular carbon, hydrogen, iron, copper, aluminium; oxidation of these elements.


Force and fluid pressure; elementary ideas of stress and strain.

Metallurgy:—Composition and properties of the principal ferrous metals; effects of carbon, manganese, silicon, sulphur, phosphorus, oxygen and nitrogen on the strength, hardness, ductility, plasticity and malleability of steels. The effect of metallic additions made for the improvement of physical or chemical properties.

Heat treatment of metals. Normalising, annealing, hardening, tempering and case hardening.


Types of electrodes and welding rods, and their compositions. Slags and Fluxes.

Expansion and contraction; stresses resulting therefrom in welds. Modes of testing welds, destructive and non-destructive.

Cast iron and alloy steels.
Composition and properties of the non-ferrous metals, principally copper, aluminium and some of their alloys.

Sketching and Drawing:—Freehand sketching, and drawing to scale of simple elements of machines and structures. The dimensioning and reading of drawings. Sketches showing assembling of elements and methods of holding them in place during welding.

41—Motor Car Engineering (Lecture).


42—Motor Car Engineering (Lecture).

Cylinder types, pistons, piston and oil rings, gudgeon pins, connecting rod and bearings. Crankshaft arrangements, main bearing adjustment. Valves and valve mechanisms, valve and ignition timing. More advanced construction of carburettors, their adjustment and operation. Engine temperatures, the cooling system, lubrication. Clutches, their construction, various types. Sliding gear and epicyclic change speed mechanisms, universal joints. Rear axles, arrangement and stresses. The suspension system. Front axle and construction in relation to steering, steering columns and mechanism. Various types of brakes.

43A—Motor Car Engineering.

Chassis arrangement, the internal combustion engine in its simplest form, construction of the power system, the Otto Cycle. Valves and valve operating mechanism, valve timing. Petrol feed systems; the carburettor; description of popular carburettors. Ignition systems. Simple lubricating systems. Cooling. Construction of common types of clutch; change speed mechanisms. The rear axle; chassis suspension. Brakes. Steering mechanisms and front axles.

43B.

Preparation of engine for starting, preparation of car for starting, car manoeuvring. Simple maintenance work, including chassis lubrication, brake adjustment, detachable wheel work and tyre manipulation. Exercises worked by students on the four stroke cycle, four stroke engine and exercises to make clear the principles of operation of clutch, gears, etc.

44A—Motor Car Engineering, 2nd Year.

Four and six cylinder engines, general description, construction and operation of the various forms of clutches and change speed gears in common use, the steering mechanism, brakes and braking, universal joints and transmission to road driving wheels, fuel and ignition systems, operation, maintenance and location of simple faults in the complete power unit, car manoeuvring.

44B.

General maintenance work such as outlined in car makers’ instruction books. Lubrication of complete chassis. Checking of units and parts for loose assemblies, rigging, etc. Study of the behaviour of the running engine under various conditions. Systematic location of simple engine faults.

45A—Motor Car Engineering, 3rd Year.

Systematic location of engine faults arising under the various headings, engine and chassis maintenance in detail including periodic attentions to fuel and ignition systems, locating and practical treatment of troubles arising in clutches, gears, steering and braking systems.

45B—Motor Car Engineering (Lecture), 3rd Year.

More advanced treatment of the subject matter of the Second Year of the Course.

46A—Motor Car Engineering, 4th Year.

The subject matter of the earlier Years of the Course will be dealt with in its higher stages, with particular reference to advanced maintenance work and the systematic location of the more obscure engine faults.

46B—Motor Car Design, 4th Year.

The application of the fundamental laws of mechanics and geometry to elementary problems in motor car design. Proportioned drawings and sketches of details of engine power and valve systems, clutches, gear boxes, rear axles and other important details. Calculations of gas and inertia pressures, crank pin bearing areas, frictional torque in clutches, dimensions of shafts, strength of gear teeth, bearing loads, brake leverages, etc.

47—Motor Workshop Practice, 1st Year.

Vicework and simple fitting work involving the use of hand and bench tools and including filing, chipping, marking out, use of tools for measuring and testing, drilling, reaming, scraping, tapping and screwing, punching, drifting, riveting, grinding, soldering, brazing, simple pipework in copper and the working of sheet metal by hand methods. Making of simple hand tools and appliances for use in the garage.

48—Motor Workshop Practice, 2nd Year.

More advanced bench and fitting work. Simple forging operations, including drawing out, bending, straightening and truing of bent and deformed parts. Simple exercises involving the use of the lathe and drilling machine. Pipework in copper and steel. Spring making and wire working. Annealing, hardening, tempering and case-hardening.

49—Motor Workshop and Garage Practice, 3rd Year.


50—Motor Workshop and Garage Practice, 4th Year.

Various practical forging, fitting, turning, drilling and other machine tools operations. Toolmaking; oxy-acetylene processes. Advanced engine fitting work including re-metalling bearings, aligning and bedding in crankshaft, lapping and grinding operations, scraping, taper and parallel reaming. Chassis frame and unit alignment and setting. Axle straightening. Spring setting.

51A—Garage Practice, 1st Year.

Use of spanners, pliers, screwdrivers, hand brace, files and other small tools. Use of bolts and nuts, removal of stubborn nuts and studs. Disassembly of units, examination and marking of parts. Common repair jobs will be demonstrated, including: decarbonising and valve grinding, brake re-lining, fitting piston rings, valve and ignition timing, fitting bearings, adjustment of ball and roller bearings.

51B.

Preparation of engine for starting. Preparation of car for starting. Car manoeuvring. Simple maintenance work including chassis lubrication, brake adjustment, detachable wheelwork and tyre manipulation. Exercises worked by students on the four stroke cycle (four cylinder engine). Exercises to make clear the principles of operation of clutch, gear, etc. Systematic location of the simpler engine faults.

52A—Garage Practice, 2nd Year.

More advanced exercises in disassembling and re-assembling. Adjustment of taper and roller bearings. Decarbonising. Truing, facing and re-seating valves. Adjustment of clutches. Valve and
ignition timing. Carburettor overhauls. Maintenance work on electrical equipment such as truing of points, brush races, fitting and bedding of brushes, skimming of commutators, etc.

52b.
General maintenance and servicing work. Lubrication of complete chassis. Checking of units and parts for loose assemblies, rigging, etc. Study of the behaviour of the running engine under various conditions. Systematic location of faults in the power unit arising under the various headings.

53—Motor Car Electricity, I.


54—Motor Car Electricity, II.


55—Motor Car Electricity, III.


Car starter types and circuits. The dynamotor.

56—Motor Car Electricity, IV.


57—Automobile Electrical Equipment, Testing and Repair.

Testing, repair, and adjustments of car electrical equipment, such as dynamos, starters, magnetos, ignition coils, “cut outs,” batteries, horns, general wiring, etc.


General Physics: British and metric units of length and mass. Density. Pressure of liquids and gases, atmospheric pressure, Boyle’s law, the Principle of Archimedes.
Heat: Temperature, expansion, thermometers, the units of quantity. Change of state, melting and boiling points, vapourisation, condensation. Conduction, convection, radiation.

Chemistry: Chemical change, the meaning of combustion, oxides, the air, brief study of oxygen, nitrogen, sulphuric acid and hydrogen.

59—Science II. (Motor Car Engineering).


Chemistry: Molecules and atoms, elements and compounds, chemical symbols, the atomic theory, atomic weights, quantitative notation, valency. Water, carbon, carbon dioxide; carbon monoxide; carbides; combustion; ignition point; flame; the Bunsen burner. Hydrochloric acid, zinc chloride. Lead, its oxide and sulphate, brief treatment of iron, aluminium, tin and zinc. The paraffin group.


61—Mechanics II. (Motor Car Engineering).


62—General Physics (Gas Engineering).


63—Inorganic Chemistry (Gas Engineering).

dioxide, sulphuretted hydrogen and carbon dioxide. Action of acids on metals; measurement of volumes and density of gases, and reduction of N.T.P. Alkalis; properties and reactions with acids, indicators, preparation and crystallisation of simple salts, simple determinations of equivalents. Recognition of chlorides, sulphates, sulphides, carbonates, nitrates and nitrites.

64—Art Ironwork.

Iron, its nature and properties, various kinds of iron used by art ironworkers; tools, their application and uses. Treatment and manipulation of wrought-iron; forging, welding, jumping, bending and embossing. Methods of joining ironwork, operations in art-smithing; riveting, intersecting, slitting, tenoning, shrinking on collars. Twisting scrolls and volutes.

65—Gas Fitting, Lectures and Calculations, I.


Simple calculations of areas and volumes; cubic contents of tanks, vessels, apartments, etc. Meter reading; units employed in gas measurements; elementary treatment of pressure gauges and recorders.

66—Gas Fitting Lectures, II.

Blown, screwed and flanged joints; testing and precautions against accidents. Meters; types, connections, reading of indices. Gauges; burners for lighting, heating and cooking appliances; burner governors. Description and fixing of domestic cookers, grills, gas fires, radiators, geysers, etc.

Physical properties of materials used for gas pipes and fittings; their reaction to stretching, compression, bending and twisting; effects of heat on materials.

Gauges; gauge pressures; pressure required for various gas appliances. Volumetric and pressure governors.

67—Gas Fitting Lectures III.

Internal gas pipes and fittings: joints, pipe laying, lighting fittings; testing for soundness; detection and correction of faults. Relation between loss of pressure, bore and length of pipe and capacity; other circumstances affecting pressure. More advanced treatment of meters, governors and gauges. Illumination; lighting schemes; burners; shades; reflectors and chimneys. Domestic cookers and heaters; water heating: principles of hot water circulation; appliances and fittings; thermostats. Principles of ventilation. Physical effects of heat: temperature, British Thermal Unit. Precautions to be observed in working with gas; method of dealing with gassing.

68—Gas Fitting, Practical, I.

Gas fitting tools, use, care and upkeep. Cutting and screwing iron, brass and copper tubing. Formation of parallel and taper screw threads; use of stocks, dies and taps. Drilling operations. Simple exercises in joint blowing, pipe fitting, bending and jointing.

69—Gas Fitting, Practical, II.

More advanced work on the Syllabus of the First Year and, in addition—

Examination and practical study of L.P. lighting burners and lamps; ventilation arrangements; gas and air controls. Burners and castings of small cooking stoves; oven ventilation; spacing of hot plate burners; small gas circulators, burners, waterways and flues. Domestic gas irons; radiators; flueless heaters; thermostatic control arrangements. Gas connections to lighting fittings, burners and gas fires; regulating devices. Pipe-work testing for soundness with gauge; fixing of small type meters. The use of U tubes for ascertaining pressures.

70—Gas Fitting, Practical, III.

Joint making in larger sized pipes; saddle joints; large screwed connections. Bending larger lead and iron pipes. Use of pressure gauge for locating stoppages. More advanced work on lighting fixtures, gas fires, radiators, cookers, geysers and hot water circulating arrangements, adjustment of thermostats. Practical study of recent improvements.
71—Irish.

Conversation lessons on simple matters such as the name, home or residence, salutations, the clock, days of the week, months and seasons, the weather, money, easy counting, colours, etc. Location of objects in the classroom and neighbourhood, parts of the body and clothing, giving and carrying out simple orders. With the conversational lessons the student will be familiarised with the use of *is* and *tá*, and of verbal nouns.

Memorising of simple songs, rhymes, stories, etc., so as to be able to repeat them with correct *bias*. Short stories and recitations.

Each student will keep a note-book to record the salutations phrases, etc., in correct Irish.