

# Educational (1908) Department.

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[Despatch Abstract.]

College of Engineering, Madras

Sanctioning the introduction from July 1908  
of ~~the~~ Separate Courses of instruction for the Civil and  
Mechanical Engineer classes of the — and approving  
the Syllabuses and the revised Scheme of marks for the  
two classes.



# BACK PAPERS.

| G.O. | No. | Department. | Date. | G.O. | No. | Department. | Date. |
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|      |     |             |       |      |     |             |       |

# FURTHER PAPERS.

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|      |     |             |       |      |     |             |       |

## Government of Madras.

### EDUCATIONAL DEPARTMENT.

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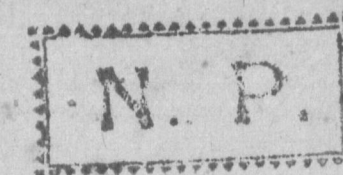
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} 1908.

Enclosures

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G.O., No. 342, 7th May 1908.



### College of Engineering, Madras.

Sanctioning the introduction from July 1908 of separate courses of instruction for the Civil and Mechanical Engineer classes of the — and approving the syllabuses and the revised scheme of marks for the two classes.



## GOVERNMENT OF MADRAS.

## EDUCATIONAL DEPARTMENT.

READ—the following papers :—

## I

## G.O., No. 159, Educational, dated 20th March 1907.

ABSTRACT.—Approving the revised rules submitted by the Director of Public Instruction relating to the constitution and working of the College of Engineering and ordering their publication in the *Fort St. George Gazette*.

## II

Letter—from the Hon'ble Mr. A. G. BOURNE, D.Sc., F.R.S., Director of Public Instruction, Madras.

To—the Secretary to Government, Educational Department.

Dated—the 28th March 1908.

No.—Ref. on C. 1414.

In G.O., No. 159, Educational, dated 20th March 1907, sanctioning the revised rules for the College of Engineering, the introduction of the revised courses of instruction for the Engineer class was allowed to lie over pending the construction and equipment of the new workshops and laboratories. The present Principal, College of Engineering, while being in complete agreement with Colonel Love in thinking that adequate laboratory equipment is essential for efficient instruction in accordance with the revised syllabuses, is, on further consideration, now of opinion that it is undesirable to suspend all attempts at improvement by continuing along the lines of the old syllabuses which he says are much out of date and suggests that the principle of bifurcation should be introduced for the new Engineer class joining in July next and that courses in accordance with the revised syllabuses be introduced as far as possible, considering the limited amount of laboratory work that can be undertaken at present. He further says that it is not possible to specify exactly how far this can be done but that there will be no danger of confusion in connection with the examination, now that members of the college staff act as advisory members of the Board of Examiners.

I have the honour to recommend that the proposal may be approved and that the accompanying syllabuses and the scheme of marks submitted by the Principal be sanctioned and introduced from July next. The Principal has proposed two minor modifications in the allotment of marks, viz., to increase the number of marks for physical exercises from 100 to 500, in proportion to the marks assigned for the subject for the Upper and Lower subordinate classes, and to increase the number of marks assigned for Chemistry from 100 to 300, the same as for Geology and Physics, in view of the importance of the subject to an Engineer and of the time it will be necessary to devote to both theory and laboratory work which will probably be more than in the case of either Physics or Geology.

On receipt of orders on these proposals, I shall submit for the sanction of Government a draft of the alterations that will be rendered necessary in the rules of the college.

## ENCLOSURE.

## SYLLABUSES.

## ENGINEER CLASSES.

## BRANCH I.

## I.—PURE AND APPLIED MATHEMATICS.

*Pure Mathematics.*

*Algebra*.—Binomial theorem. Exponential theorem. Logarithms. Summation of series. Solution of equations by graphs. Approximate solutions of equations by Horner's method.

*Geometry*.—Simple problems on the straight line, circle, parabola, ellipse, and hyperbola by analytical or pure geometry.

*Mensuration*.—Plane and solid.

*Plane Trigonometry*.—Practical use of logarithms. Adaptation of formulæ to logarithmic computation. Solution of triangles. Calculation of areas. Heights and distances. Circular and hyperbolic functions and the use of their expansions.

*Differential Calculus*.—Fundamental notions, with special applications to geometrical and mechanical problems. Theorems of Taylor and Maclaurin. Maxima and minima of one variable. Tracing of well-known curves from their cartesian and polar equations. Curvature, envelopes, evolutes and involutes. Change of the variable. Simple cases of partial differentiation.

*Integral Calculus*.—Integration of standard forms. Calculation of curve lengths and areas. Volumes and surfaces of solids of revolution. Formulæ of reduction. Integral as the limit of a sum. Double and triple integrals as applied to mass centres and moments of inertia. Planimeters. Elementary standard forms of differential equations.

*Applied Mathematics.*

*Kinematics*.—Displacement in one plane. Translation and rotation. The instantaneous centre. Composition and resolution of displacements, velocities and accelerations. Circular motion and simple harmonic motion.

Rotation of a rigid body in two dimensions.

*Kinetics*.—Equations of motion deduced from Newton's laws of motion. Conservation of momentum, work and energy. Motion under gravity, including projectiles. Kinetics of simple harmonic motion in a straight line or curve. Pendulums, simple and compound. Impact. Moment of inertia and radius of gyration.

*Hydrostatics*.—Transmission of fluid pressure. Thrusts due to fluid pressure on a plane area. Centre of pressure. Thrusts due to pressure of a fluid on bodies wholly or partially immersed. Principle of Archimedes. Conditions of equilibrium of floating bodies. Metacentre. Determination of specific gravities of solids and liquids. Hydrometers. The general phenomena of capillary elevation and depression.

Machines for raising water. The principles underlying the action of the suction pump, force pump, centrifugal pump, and jet pump. The syphon. The hydraulic press.

## II.—SCIENCE.

*Chemistry.*

*Theory*.—1. Physical and chemical change. Constitution of matter. Simple and compound substances. Chemical action. Chemical nomenclature and symbols. The Atomic theory. Equivalent, atomic and molecular weights. Specific and atomic heats. Calculation of weights and volumes of substances involved in chemical reactions. General properties of gases. Liquefaction. Diffusion. Solution. Dissociation. Electrolysis.

2. The chemistry of the following non-metallic elements and their more important compounds:—Hydrogen, Oxygen, Nitrogen, Chlorine, Bromine, Iodine, Fluorine, Sulphur, Phosphorous, Arsenic, Boron, Carbon and Silicon.

3. Chemical and physical characteristics of metals as illustrated by:—Sodium, Calcium, Iron, Zinc, Lead, Mercury, Copper, Silver and Gold.

*Laboratory Course*—

1. Preparation and examination of some of the more common gases, etc.—

*Elements*:—H, O, (air) N, S, Cl, Br, I.

*Compounds*:—HF, HCl, H<sub>2</sub>S, NH<sub>3</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, CO<sub>2</sub>, CO, HNO<sub>3</sub>, NO, NO<sub>2</sub>, N<sub>2</sub>O, SO<sub>2</sub>, SO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, KClO.



## 2. Qualitative Analysis—Simple mixtures of the following metals and acids:—

Bases in the form of metal, oxide, sulphide, haloid or oxysalt:—

Na, K,  $\text{NH}_4$ , Mg, Ba, Sr, Ca, Zn, Mn, Ni, Co, Fe, Al, Cr, Hg, Pb, Bi, Cu, Cd, As, Sb, Sn, Ag.

Recognition of different valencies of Mn, Fe, Cr, Hg, As, Sn.

Acids:— $\text{CO}_3$ ,  $\text{SO}_4$ ,  $\text{SO}_3$ ,  $\text{NO}_3$ ,  $\text{NO}_2$ ,  $\text{CrO}_4$ , Cl,  $\text{ClO}_3$ , S, Br, I, F,  $\text{PO}_4$ ,  $\text{AsO}_4$ ,  $\text{BO}_3$ ,  $\text{SiO}_2$ .

Distinction in easy cases between normal and acid salt, e.g., carbonate and bicarbonate, etc.

[NOTE.—Careful attention must be paid to the preliminary examinations of the substance by dry tests.]

## 3. Quantitative Analysis—

(1) *Gravimetric*:—Estimation of Cu and water in pure crystals of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .

Separation and estimation of proportions of Ag and Cu in a silver coin.

Estimation of silicon in a specimen of glass.

Estimation of Ca and  $\text{CO}_2$  in calc spar or any other impure carbonate.

(2) *Volumetric*:—Preparation of standard solutions of permanganate, alkali and acid, and easy applications of these solutions to analysis, e.g., Estimation of iron by titration with ferrous ammon-sulphate, etc.

## Physics.

*Heat*.—Temperature. The construction and use of instruments for measuring temperature. The expansion of solids, liquids and gases with change of temperature. Heat as quantity and the methods of calorimetry. Change of state. Latent heat: the laws of evaporation; boiling. The conduction of heat. Phenomena attending convection in fluids. Radiation, and the laws of cooling. The nature of heat, determination of the dynamical equivalent of heat. The laws of thermodynamics with simple applications.

*Light*.—The propagation of light: rays and pencils; photometry. The laws of reflection and refraction of rays of light: the sextant; passage of a ray through a prism. The direct reflection and refraction of small pencils at plane and spherical surfaces: passage through a lens. Formation of images. The telescope and microscope. The compound nature of white light: formation of a pure spectrum: the achromatic lens.

*Electricity and magnetism*.—1. Magnets, magnetic bodies. The magnetic field; lines of force. Forces and couples on magnets in the magnetic field. The earth's magnetic field. The phenomena of magnetic induction; the magnetic properties of iron and steel: hysteresis.

2. Electrification, conductors and insulators, the electrostatic field, and electrostatic induction. Charge, potential, and capacity of condensers: discharge, current: energy of charged condensers.

3. The more common cells for producing currents. The magnetic field of current galvanometers. The source of energy for maintaining it. Electromotive force. Ohm's law, resistance and its measurement; Wheatstone's bridge. The heating effects of currents, fuses, incandescent lamps. Elementary phenomena of electrolysis. The Clark cell and the potentiometer system of measuring E.M.F., current, etc.

4. Potential energy of circuit carrying current placed in magnetic field and derivation of forces and couples on circuit. Application to moving coil instruments (ammeters, voltmeters, etc.).

5. Electromagnetic induction: Maxwell's law. The variable and steady period of current in a circuit. Simple dynamo machines for producing continuous and alternating currents: induction coil.

## Geology.

(For Civil Branch only.)

*Object of Geology*.—Its relation to other sciences.

*The Earth*.—Envelopes: liquid and gaseous. The solid globe: the outer crust and interior or nucleus. Distribution of temperature and pressure in the crust.

*Petrography*.—Classification of rocks according to their character, origin and age. Rock-forming minerals. Determination of rocks. Megascopic examination. Tests in the field. Fracture. Specific gravity. Mechanical analysis. Chemical analysis. Treatment with acid, blowpipe tests, etc. Microscopic analysis. Preparation of slides of rocks and minerals. Microscopic characters of minerals, such as—quartz, orthoclase, plagioclase, augite, hornblende, etc. Microscopic characters and essential constituents of rocks more commonly met with such as—limestone, gneiss, micaceous and chloritic schists: granite: syenite, trachyte, pumice: sand and gravel, sandstones, conglomerates, breccias, slate, clay: laterites: peat, lignite, coal.

*Dynamical Geology*.—Volcanoes and volcanic action. Geographical and geological distribution of volcanoes. Earthquakes. Secular upheaval and depression. Geological functions of air, water and ice: chemical and mechanical action: denudation and deposition: river valleys with special reference to Indian rivers. Geological functions of plants and animals.

*Structural Geology*.—Bedding. Surface marks. Concretions. Relative persistence of strata. Overlap. Groups of strata. Joints. Inclination of rocks: dip, outcrop and strike. Curvature: monocline, syncline, anticline. Nature and origin of faults. Igneous rocks: phase of eruptivity: bosses, sheets, veins and dykes, necks. Interbedded phase of eruptivity: lavas and tuffs. Metamorphism. Ore deposits. Unconformability.

*Stratigraphical Geology*.—Scope of historical geology. Fossils: their mode of petrification and uses. Classification of animals and plants. The leading stratigraphical laws. General outline of the stratigraphy of Southern India. The geological formations: their rock divisions: characteristic fossils and economic products.

## Mineralogy.

### Crystallography—

*Physical*.—Cleavage. Fracture. Hardness. Optical and magnetic properties of minerals.

*Geometrical*.—Relation of physical properties to geometrical form: arrangement of molecules. Crystalline form: faces. Planes of reference: axes, parameters, indices, symbols. Symmetry. The six crystallographic forms characterised with reference to planes of symmetry. Simple forms and combinations.

*Descriptive*.—Detailed descriptions of the more common minerals.

*Practical*.—Application of above and blowpipe analysis to the identification of minerals.

## BRANCH II.

## ENGINEERING.

### Drawing.

#### FIRST YEAR (Civil and Mechanical).

#### Free-hand and model drawing.

*Geometrical drawing*—(a) *Practical Plane Geometry*.—Elementary problems dealing with Lines, Triangles, Quadrilaterals, Circles, Polygons. Methods of construction and problems relating thereto. Tangents. Inscribed and described figures. Proportional lines and angles. Areas of plane figures. Plane curves: Parabola, Ellipse and Hyperbola: Methods of drawing and chief properties. Cycloidal, spiral and other common curves.

(b) *Practical Solid Geometry and Projection*.—Lines, points and planes. Projection of simple solids. Regular solids. Sections of solids. Development of plane and curved surfaces. Tangent planes. Interpenetration of solids. Determination of shadows. Isometric projection. Elements of Perspective.

(c) *Graphics*.—Arithmetic. Determination of C.G. of Plane areas.

*Machine drawing*.—Ability to copy accurately to scale and supply additional views. Drawings of simple machine parts from sketches. Ability to supply and give some idea of the proportions of the more simple machine details, such as bolts, nuts, keys, cotters, etc.

*Building drawing*.—Ability to copy plans accurately to scale and to make plans from sketches.

*Masonry Details*.—Bond in brickwork. Gauged, relieving and inverted arches; Footings and ordinary foundations; Uncoursed and coursed Rubble, Ashlar, etc. Dressings, such as window sills, window and door jambs, etc.

*Timber Details*.—Joints; halving, lapping, notching, etc., also as applied to wall plates, floors, ceilings, etc. Floors. Doors. Windows. Partitions. Roof frames.

*Iron and Steel Details*.—Sections of cast and rolled beams and simple applications: Simple iron frames.

[NOTE.—Building and Machine Drawing for 2nd and 3rd years will be based on following Syllabuses.]

## Applied Mechanics.

(Civil and Mechanical.)

### 1. Stress, Strain and the Mechanical properties of materials used in engineering—

(a) Modulus of Elasticity: Elastic Limit, Ultimate Strength, Resilience: Strain beyond the Elastic Limit: Fatigue of metals. Applications of the theory of stress and strain.

(b) Mechanical properties of the materials of construction.

(c) The Testing of materials.



2. *Applications of Statistics to Structures*—

- (a) Definition of a structure: Simple and compound structures: Perfect, imperfect and redundant frames.
- (b) Principles of Graphic Statics: Applications to roofs, bridges and similar structures.
- (c) Beams: Bending Moment and Shearing Force: Load diagrams: Deflection: Stiffness: The Continuous Beam.
- (d) Strength of Struts and Columns.
- (e) The Arch rib and hanging Chains.
- (f) Theory of Torsion: Strength of shafting and other practical applications.
- (g) Shells and thick cylinders.

3. *Hydromechanics*—

- (a) Floating bodies: Stability of floating vessels.
- (b) General principles applicable to designs of dams, gates, etc.

(For Mechanical Branch only.)

4. *Kinematics and Pure Mechanism*—

- (a) Definition of a machine: Machine Elements and Pairs: Links, Chains and Mechanism.
- (b) Simple constrained motion. Translation and Rotation: Instantaneous centres: Centroides.
- (c) Virtual motion in Mechanism.
- (d) Linear and angular velocity: Speed: Diagrams of relative velocities for elementary mechanisms.
- (e) Mechanisms other than Linkwork:—Spur wheel trains, Cam trains, etc.: Altered mechanisms: Expansion of Elements: Reduction of Links: Parallel Motions: Chains containing non-rigid Links.
- (f) Dynamics of mechanism. Velocity and Acceleration: Linear velocity and acceleration diagrams: Force, Mass and Weight: Momentum and Impulse: Work and Energy.
- (g) Friction. Friction of rest and motion: Laws of dry friction: Friction of lubricated surfaces: Friction in mechanism and machines. Efficiency of a machine.

5. *Applications of Statics and Kinetics to Machinery*—(a) Inertia forces in the Steam engine and other mechanisms.

- (b) Effort and Resistance: Steadiness: Governors and Fly-wheels.

*Construction.*1. *Building Materials*—

- Stones of South India*.—Characteristics and preparation.
- Bricks and Tiles*.—Manufacture and uses.
- Lime, Cement, Mortar, Concrete and Plaster*.—Sources of supply, preparation, and working.
- Timber*.—Varieties used for building purposes; Seasoning; Preservation.
- Metals*.—Iron and Steel; Elementary description of metallurgical processes for production; Varieties and suitability for use. Other common metals, such as copper, zinc, lead, tin and alloys.

2. *Theory and design of structures in Wood, Iron, Steel, Masonry and Earth*—

- (a) *Masonry Structures*—Foundations; Buildings; Bridges; Retaining walls; Tunnels.
- (b) *Structures in Iron and Steel*—Roofs; Bridges; Gates and Shutters.
- (c) Ability to make intelligible dimensioned sketches of structures and simple machines.

3. *General Principles governing the Design of*—Railways, Roads, Harbours and other works.

[NOTE.—The above syllabus connotes Building drawing exercises, designs, and estimating.]

*Hydraulic Engineering.*

- 1. *Discharge from Orifices and Notches*—Volume of flow. Principle of continuity. Small orifices. Velocity of discharge. Co-efficients of velocity, contraction, and discharge. Adjutages. Short pipes. Large orifices. Rectangular notch and orifice. Triangular notch. Velocity of approach. Submerged and partly submerged orifices. Submerged notch.

2. *Practical cases of Discharge from Orifices and Notches*—Tank surplus weirs. Drowned weirs. Gauging weirs. Anicuts with clear overfall or drowned. Sluices; head, under, tank, weir, lock and irrigation. Bridge openings. Afflux. Modules.3. *Discharge under variable Heads*—Free discharge from prismatic vessels. Time of emptying or filling. Discharge during a given time. Canal locks. Discharge from irregular basins. Discharge from one prismatic vessel into another.4. *Flow of water in Pipes*—Fluid friction. Velocity in pipes. Virtual slopes. D'Arcy's co-efficients of friction. Velocity and discharge. Short pipes. Siphon sluice. Inclination of pipes. Branched mains. Pipes not running full. Minor losses of head. Jets.5. *Flow of water in Channels*—Open channels. Co-efficients. Channel section. Discharge. Trapezoidal section in earth. Practical data. Channels of minimum border. Channels for variable discharge. Variation of velocity in a cross section. Falls. Standing waves.6. *Rivers*—Estimation of discharge. Maximum flood discharge from catchment basins. Discharge formulae. Bends in rivers. Regime of rivers.7. *Storage and Distribution of Water*—Supply for irrigation, navigation or to a town. Rainfall. Supply from wells, rivers and reservoirs.8. *Pumps and Waterlifts*.9. *Masonry works in Irrigation Projects*.10. *Canals and Channels*—Irrigation canals in deltaic and non-deltaic country. Supply from rivers and tanks. Capacity of canal. Limiting velocities. Fall. Side slopes. Alignment. Disposal of cross drainage. Height of banks. Navigable canals.11. *Tanks*—Isolated rain-fed tanks. Tanks in groups. Tanks supplied by rivers or streams. Capacity. Irrigating duty. Loss of water by evaporation and absorption. Construction of earthen bunds. Puddle walls. Revetment of earthen bunds. Design and construction of surplus weirs. Tank sluices and their regulation. Repairs to bunds, and closing breaches.12. *Water-supply of Towns*.13. *Town Drainage and Sewage Disposal*.

[NOTE.—The above syllabus connotes Building drawing exercises, designs and estimating.]

*Surveying.*A. *Surveying*—Surveying with the chain, compass and plane table. Plotting surveys.B. *Levelling*—Levels: their adjustment and manipulation. Levelling. Contouring. Plotting.C. *Theodolite work*—Theodolites: their adjustment and manipulation. Traversing. Setting out straight lines and curves in the field. Triangulation and general survey work.D. *Topographical Drawing*—Conventional signs, map-drawing. Representation of ground. Sections on contoured plans. Location of road or railway on contoured plans, showing cuttings and embankments. Estimation of areas.

(Mechanical Engineering students will receive elementary instruction in surveying.)

[NOTE.—Third year students failing to qualify in survey field work will attend the following survey camp and will be re-examined at the termination of the camp. Students failing at this re-examination will receive no certificate.]

*Mechanical Engineering.*1. *General Machine Design*—Fastenings:—Bolts, nuts, keys and cotters: Rivetted joints and connections generally: Pipes and cylinders: Shafting and journals: Pedestals: Wall fixings, etc., Belt and rope gearing: Friction and spur gearing.2. *Boilers and Fuel*—(a) Coal, wood, gas and petroleum; Physical characteristics; Approximate chemical composition; Heat of combustion; Evaporative powers; Air of dilution.

(b) Draught: Natural, forced and induced; Chimney design.

(c) Boilers:—Ordinary forms of stationary; Locomotive, marine, water-tube and other types; Heating surface; Fire-grate area; Boiler efficiency; Feed pumps and injectors; Feed heaters: Mountings; Management and cleaning.

3. *Theory of Heat Engines*—(a) Thermodynamical Principles; Joule's Law; Carnot's Cycle; Perfect Heat Engine; Second Law; Laws of Gaseous expansion.

(b) Air Engines:—Stirling and other forms.

(c) Internal Combustion Engines:—Gas Engine, Oil Engine.

(d) Steam:—Thermodynamics of the generation, expansion and condensation of steam; Heat diagrams, etc.

(e) Steam Engines:—Early forms and modern developments; High speed Engines. Efficiencies of non-condensing, condensing, simple, compound and multiple expansion types; Steam jacketing; Superheating.



(f) Steam Turbines:—Parson, De Laval and other types.

(g) Engine Testing:—Consumption of steam and fuel, gas and oil; Brakes and Dynamometers; Indicators and Indicator diagrams.

4. *Engine Accessories and Details*—(a) Condensers, air pumps, circulating pumps, cooling tanks, etc.

(b) Cylinders, pistons, cross heads, guides, connecting rod, cranks, governors, fly-wheels, valves and valve gears, glands and pipes.

5. *Hydraulic Machinery*—(a) Pumps:—Bucket and Plunger; Piston forms; Valves; Air vessels and stand pipes; Efficiency of pumps.

(b) Water wheels:—Theory, design and efficiency; Undershot, overshot, breast and other forms.

(c) Turbines:—Theory, design and efficiency; Parallel, outward and inward flow; Governing.

(d) Miscellaneous:—The Centrifugal pump; Pulsometer; Rams; Air Lift Pumps, etc.

(e) Hydraulic transmission of power; Accumulators; Valves, Mains, etc.

6. *Machine Tools and Mechanical Manipulation*—(a) Cutting of Metals; Tool Steels; Shape and preparation of tools; Lubrication of tools; Speed of cutting and power required.

(b) Surface Plates; Callipers and gauges.

(c) Lathes; Early forms and modern developments; Turret and other lathes adapted for special purposes; Screw cutting; Tools and chucks.

(d) Screw Machines; Boring and turning mills; Milling machines; Planing machines; Shaping machines; Slotting machines; Drilling machines; Sawing machines; Gear cutting machines; Grinding and other miscellaneous machines.

(e) Methods of driving and general arrangement of machine tools: Shafting; Electrically driven machines.

[*NOTE*.—Stress will be laid on the ability to make intelligible dimensioned sketches. The above syllabus connotes all Machine Drawing and Design.]

### Electrical Engineering.

(For Mechanical Engineering Students).

1. *Fundamental Laws, Units and Standards.*

2. *Electrical Measuring instruments and Testing Processes*—Measurement of Current, Potential Difference, Resistance and Power; Galvanometers, Ammeters and Voltmeters; The Potentiometer and other Standard Instruments. Testing and Checking Electrical Instruments. Electric Meters.

3. *Magnetism and Electro-magnetism considered in relation to Electrical Energy*—Magnetisation of iron: Practical determination of magnetic qualities of iron and steel: Electro-magnetic Induction.

4. *Design and Construction of Dynamos*—Series, Shunt and Compound Machines; Simple and polyphase alternators; Methods of Testing; Characteristic curves.

5. *Electric Distribution and Power Supply*—Systems of Electric supply; Continuous current: Simple and polyphase alternating systems; High and low tension. Transformers; Rotary Converters; Accumulators; Lamps; Mains, etc. Electric Traction. General principles of artificial Illumination; Photometry.

### MARK DISTRIBUTION.

#### (1) General Distribution.

#### CIVIL ENGINEER CLASS.

| Branch I.                        |           | Branch II.            | Physical Exercises.                |
|----------------------------------|-----------|-----------------------|------------------------------------|
| MATHEMATICS (1st and 2nd YEARS.) |           | SCIENCE.              | ENGINEERING.                       |
| Pure and Applied.                | 900       | Chemistry .. 1st year | 300 (100)                          |
|                                  |           | Physics .. „          | 300 (100)                          |
|                                  |           | Geology .. 2nd year   | 300 (100)                          |
| Total ..                         |           | 1,800                 | (300)                              |
| 1st year.                        |           | 2nd and 3rd years.    |                                    |
| Geometrical drawing ..           | 300 (100) | Surveying.            | Applied                            |
| Free-hand and Model drawing ..   | 100 (100) | Level .. 300 (200)    | Mechanics .. 1,000 (200)           |
| Building drawing ..              | 200 (100) | Theodolite. 400 (200) | Construction .. 1,000 (200)        |
| Machine drawing ..               | 200 (100) |                       | Hydraulic Engineering. 1,000 (200) |
| Surveying ..                     | 300 (200) |                       | Drawing .. 1,000 (500)             |
| Total ..                         |           | 700                   | (400)                              |
| Total ..                         |           | 1,100                 | (600)                              |
|                                  |           | Total ..              |                                    |
|                                  |           | 4,000                 |                                    |
|                                  |           | (1,100)               |                                    |
|                                  |           | Grand total ..        |                                    |
|                                  |           | 8,700                 |                                    |
|                                  |           | (3,500).              |                                    |

*N.B.*—The bracketed marks show those allotted by the College while the total is shown unbracketed.

#### MECHANICAL ENGINEER CLASS.

| Branch I.                        |           | Branch II.                        | Physical Exercises. |
|----------------------------------|-----------|-----------------------------------|---------------------|
| MATHEMATICS (1st and 2nd YEARS.) |           | SCIENCE (1st YEAR).               | ENGINEERING.        |
| Pure and Applied.                | 900       | Chemistry ..                      | 300 (100)           |
|                                  |           | Physics ..                        | 300 (100)           |
| Total ..                         |           | 1,500                             | (200)               |
| (1st year.)                      |           | 2nd and 3rd years.                |                     |
| Geometrical drawing ..           | 300 (100) | Applied Mechanics ..              | 1,000 (200)         |
| Model and Free-hand drawing ..   | 100 (100) | Mechanical Engineering ..         | 1,500 (300)         |
| Building drawing ..              | 200 (100) | Mechanical Engineering drawing .. | 1,200 (800)         |
| Machine drawing ..               | 200 (100) | Engineering Laboratory.           | 400 (200)           |
| Surveying ..                     | 300 (200) |                                   |                     |
| Total ..                         |           | 1,100                             | (600)               |
|                                  |           | Total ..                          |                     |
|                                  |           | 4,100                             |                     |
|                                  |           | (1,500)                           |                     |
|                                  |           | Grand total ..                    |                     |
|                                  |           | 9,000                             |                     |
|                                  |           | (3,800).                          |                     |

*N.B.*—The bracketed marks show those allotted by the College while the total is shown unbracketed.



(2) *Distribution during the course.*

## CIVIL ENGINEER CLASS.

| Subject.                                            | Allotted by<br>Board of<br>Examiners for<br>Examinations. | Allotted by<br>College staff for<br>practical work. | Total. |          |
|-----------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------|--------|----------|
|                                                     |                                                           |                                                     | Board. | College. |
| FIRST YEAR.                                         |                                                           |                                                     |        |          |
| BRANCH I.—MATHEMATICS AND SCIENCE.                  |                                                           |                                                     |        |          |
| 1. Mathematics—Pure .. .. .                         | 200                                                       | ..                                                  | ..     | ..       |
| Applied .. .. .                                     | 200                                                       | ..                                                  | ..     | ..       |
| 2. Science—Chemistry .. .. .                        | 200                                                       | 100                                                 | ..     | ..       |
| Physics .. .. .                                     | 200                                                       | 100                                                 | 800    | 200      |
| BRANCH II.—ENGINEERING.                             |                                                           |                                                     |        |          |
| 1. Drawing—Geometrical .. .. .                      | 200                                                       | 100                                                 | ..     | ..       |
| Free-hand and Model .. .. .                         | ..                                                        | 100                                                 | ..     | ..       |
| Building .. .. .                                    | 100                                                       | 100                                                 | ..     | ..       |
| Machine .. .. .                                     | 100                                                       | 100                                                 | ..     | ..       |
| 2. Surveying—Chain, Compass and Plane Table .. .. . | 100                                                       | 200                                                 | 500    | 600      |
| Physical Exercises .. .. .                          | ..                                                        | 150                                                 | ..     | 150      |
|                                                     | ..                                                        | ..                                                  | 1,300  | 950      |
| Total for 1st year .. .. .                          | ..                                                        | ..                                                  | 2,250  |          |
| SECOND YEAR.                                        |                                                           |                                                     |        |          |
| BRANCH I.—MATHEMATICS AND SCIENCE.                  |                                                           |                                                     |        |          |
| 1. Mathematics—Pure .. .. .                         | 250                                                       | ..                                                  | ..     | ..       |
| Applied .. .. .                                     | 250                                                       | ..                                                  | ..     | ..       |
| 2. Science—Geology .. .. .                          | 200                                                       | 100                                                 | 700    | 100      |
| BRANCH II.—ENGINEERING.                             |                                                           |                                                     |        |          |
| 1. Applied Mechanics .. .. .                        | 400                                                       | 100                                                 | ..     | ..       |
| 2. Construction .. .. .                             | 200                                                       | 100                                                 | ..     | ..       |
| 3. Drawing .. .. .                                  | 100                                                       | 250                                                 | ..     | ..       |
| 4. Surveying—Level .. .. .                          | 100                                                       | 200                                                 | 800    | 650      |
| Physical Exercises .. .. .                          | ..                                                        | 150                                                 | ..     | 150      |
|                                                     | ..                                                        | ..                                                  | 1,500  | 900      |
| Total for 2nd year .. .. .                          | ..                                                        | ..                                                  | 2,400  |          |
| THIRD YEAR.                                         |                                                           |                                                     |        |          |
| BRANCH II.—ENGINEERING.                             |                                                           |                                                     |        |          |
| 1. Applied Mechanics .. .. .                        | 400                                                       | 100                                                 | ..     | ..       |
| 2. Construction .. .. .                             | 600                                                       | 100                                                 | ..     | ..       |
| 3. Hydraulic Engineering .. .. .                    | 800                                                       | 200                                                 | ..     | ..       |
| 4. Drawing .. .. .                                  | 400                                                       | 200                                                 | ..     | ..       |
| 5. Surveying—Theodolite .. .. .                     | 200                                                       | 200                                                 | ..     | ..       |
| 6. Engineering Laboratory .. .. .                   | ..                                                        | 400                                                 | ..     | ..       |
| 7. Workshops .. .. .                                | ..                                                        | 200                                                 | 2,400  | 1,450    |
| Physical Exercises .. .. .                          | ..                                                        | 200                                                 | ..     | 200      |
|                                                     | ..                                                        | ..                                                  | 2,400  | 1,650    |
| Total for 3rd year .. .. .                          | ..                                                        | ..                                                  | 4,050  |          |

## ABSTRACT.

| Year.          | Board. | College. | Total. |
|----------------|--------|----------|--------|
| First .. .. .  | 1,300  | 950      | 2,250  |
| Second .. .. . | 1,500  | 900      | 2,400  |
| Third .. .. .  | 2,400  | 1,650    | 4,050  |
| Total .. .. .  | 5,200  | 3,500    | 8,700  |

## MECHANICAL ENGINEER CLASS.

| Subject.                                            | Allotted by<br>Board of<br>Examiners for<br>Examinations. | Allotted by<br>College staff for<br>practical work. | Total. |          |
|-----------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------|--------|----------|
|                                                     |                                                           |                                                     | Board. | College. |
| FIRST YEAR.                                         |                                                           |                                                     |        |          |
| BRANCH I.—MATHEMATICS AND SCIENCE.                  |                                                           |                                                     |        |          |
| 1. Mathematics—Pure .. .. .                         | 200                                                       | ..                                                  | ..     | ..       |
| Applied .. .. .                                     | 200                                                       | ..                                                  | ..     | ..       |
| 2. Science—Chemistry .. .. .                        | 200                                                       | 100                                                 | ..     | ..       |
| Physics .. .. .                                     | 200                                                       | 100                                                 | 800    | 200      |
| BRANCH II.—ENGINEERING.                             |                                                           |                                                     |        |          |
| 1. Drawing—Geometrical .. .. .                      | 200                                                       | 100                                                 | ..     | ..       |
| Free-hand and Model .. .. .                         | ..                                                        | 100                                                 | ..     | ..       |
| Building .. .. .                                    | 100                                                       | 100                                                 | ..     | ..       |
| Machine .. .. .                                     | 100                                                       | 100                                                 | ..     | ..       |
| 2. Surveying—Chain, Compass and Plane Table .. .. . | 100                                                       | 200                                                 | 500    | 600      |
| Physical Exercises .. .. .                          | ..                                                        | 150                                                 | ..     | 150      |
| Total for 1st year .. .. .                          | ..                                                        | ..                                                  | 1,300  | 950      |
|                                                     |                                                           |                                                     | 2,250  |          |
| SECOND YEAR.                                        |                                                           |                                                     |        |          |
| BRANCH I.—MATHEMATICS.                              |                                                           |                                                     |        |          |
| 1. Mathematics—Pure .. .. .                         | 250                                                       | ..                                                  | ..     | ..       |
| Applied .. .. .                                     | 250                                                       | ..                                                  | 500    | ..       |
| BRANCH II.—ENGINEERING.                             |                                                           |                                                     |        |          |
| 1. Applied Mechanics .. .. .                        | 400                                                       | 100                                                 | ..     | ..       |
| 2. Mechanical Engineering .. .. .                   | 400                                                       | 100                                                 | ..     | ..       |
| 3. Drawing .. .. .                                  | ..                                                        | 400                                                 | ..     | ..       |
| 4. Engineering Laboratory .. .. .                   | ..                                                        | 100                                                 | ..     | ..       |
| 5. Electrical Engineering .. .. .                   | 200                                                       | 100                                                 | ..     | ..       |
| 6. Do. Laboratory .. .. .                           | ..                                                        | 200                                                 | ..     | ..       |
| 7. Workshops .. .. .                                | ..                                                        | 200                                                 | 1,000  | 1,200    |
| Physical Exercises .. .. .                          | ..                                                        | 150                                                 | ..     | 150      |
| Total for 2nd year .. .. .                          | ..                                                        | ..                                                  | 1,500  | 1,350    |
|                                                     |                                                           |                                                     | 2,850  |          |
| THIRD YEAR.                                         |                                                           |                                                     |        |          |
| BRANCH II.—ENGINEERING.                             |                                                           |                                                     |        |          |
| 1. Applied Mechanics .. .. .                        | 400                                                       | 100                                                 | ..     | ..       |
| 2. Mechanical Engineering .. .. .                   | 800                                                       | 200                                                 | ..     | ..       |
| 3. Drawing .. .. .                                  | 400                                                       | 400                                                 | ..     | ..       |
| 4. Engineering Laboratory .. .. .                   | 200                                                       | 100                                                 | ..     | ..       |
| 5. Electrical Engineering .. .. .                   | 500                                                       | 100                                                 | ..     | ..       |
| 6. Do. Laboratory .. .. .                           | 100                                                       | 200                                                 | ..     | ..       |
| 7. Workshops .. .. .                                | ..                                                        | 200                                                 | 2,400  | 1,300    |
| Physical Exercises .. .. .                          | ..                                                        | 200                                                 | ..     | 200      |
| Total for 3rd year .. .. .                          | ..                                                        | ..                                                  | 2,400  | 1,500    |
|                                                     |                                                           |                                                     | 3,900  |          |

## ABSTRACT.

| Year.          | Board. | College. | Total. |
|----------------|--------|----------|--------|
| First .. .. .  | 1,300  | 950      | 2,250  |
| Second .. .. . | 1,500  | 1,300    | 2,850  |
| Third .. .. .  | 2,400  | 1,500    | 3,900  |
| Total .. .. .  | 5,200  | 3,800    | 9,000  |



**Order—No. 342, Educational, dated 7th May 1908.**

The Government sanction the introduction from July next of the separate courses of instruction for the Civil and Mechanical Engineer classes recommended by the Committee appointed to advise on the extension and reorganization of the College of Engineering. The Government also approve the syllabuses and the revised scheme of marks for the two classes submitted by the Principal.

(True Extract.)

C. A. SOUTER,  
Ag. Secretary to Government.

To the Director of Public Instruction.  
" Public Works Department.  
Editors' Table.

## EDUCATIONAL DEPARTMENT.

NOTES CONNECTED WITH G.O., No. 342, EDUCATIONAL, DATED  
7TH MAY 1908.

[SUBJECT.—*Introduction of separate courses of instruction for the Civil and Mechanical Engineer classes of the College of Engineering.*]

*Previous papers.*

|                              |                           |
|------------------------------|---------------------------|
| G. O., No. 723, Educational, | dated 12th December 1904. |
| " " 655                      | " " 3rd October 1905.     |
| " " 657                      | " " 10th " 1906.          |
| " " 159                      | " " 20th March 1907.      |

*From the Director of Public Instruction, dated 28th March 1908, No. 1414.*

The Committee appointed in G.O., No. 723, Educational, dated 12th December 1904, to consider the reorganization of the College of Engineering recommended, in paragraph 8 of their report, printed with G.O., No. 655, Educational, dated 3rd October 1905, the adoption of five rules as incidental to the college reorganization. Of these, rule 3 ran:—

"The theoretical course of the Civil and Mechanical Engineer students will be one and the same during the first year, but from the end of this period the further instruction of the two classes of students will be on different lines, in other words, the bifurcation of the Civil and Mechanical course will take place at the end of the first year."

The Government accepted the rule—*vide* paragraph 6 of G.O., No. 655, Educational, dated 3rd October 1905, page 27.

2. In paragraph 13 of G.O., No. 657, Educational, dated 10th October 1906, passing final orders on the question of reorganization of the college, the Director of Public Instruction was requested to submit proposals for the introduction of the scheme of reorganization as finally approved.

3. In submitting proposals for the introduction of the scheme of reorganization, Colonel Love, the then Principal of the College, stated—

"I consider that the whole scheme may be introduced immediately, with the exception of that portion which provides for separate courses of instruction for the Civil and Mechanical Engineer classes. This portion must in my opinion stand over until new workshops and laboratories have been erected and equipped. In the meantime the existing course of instruction for the Engineer class should be retained."

4. Colonel Love also submitted draft revised rules of the college on this basis and the Government approved them. The note prefixed to rule 11 of these rules says that "a revised course for the Engineer class will be published later and that for the present, pending the construction of new laboratories and workshops, the course will be as follows:—"

5. The Director of Public Instruction now requests that sanction may be accorded to the introduction of separate courses of instruction for the Civil and Mechanical Engineer classes from July next. Dr. Bourne states that the present Principal of the College, Mr. James, while being in complete agreement with Colonel



Love in thinking that adequate laboratory equipment is essential for efficient instruction in accordance with the revised syllabuses, is, on further consideration, of opinion that it is undesirable to suspend all attempts at improvement by continuing along the lines of the old syllabuses, which "are much out of date," and he suggests that the principle of bifurcation should be introduced for the new Engineer class joining in July next.

6. The Director of Public Instruction also recommends that the syllabuses and the scheme of marks submitted by the Principal, Mr. James, be sanctioned and introduced from July next. The syllabuses are almost the same as those drawn up by the College Reorganization Committee, appearing on pages 9 to 14 of G.O., No. 655, Educational, dated 3rd October 1905; but in the scheme of marks Mr. James proposes two minor modifications, namely—

*Vide* page 5 of G.O., No. 657, Educational, dated 3rd October 1907.

(1) to increase the number of marks for Physical Exercises from 100 to 500 in proportion to the marks assigned for the subject for the Upper and Lower Subordinate classes, and

(2) to increase the number of marks assigned for Chemistry from 100 to 300 in view of the importance of the subject to an Engineer and of the amount of time it will be necessary to devote to it.

7. It is for consideration whether the proposal of the Director of Public Instruction to introduce the bifurcation of the Civil and Mechanical Engineer classes from July next may be sanctioned and whether the syllabuses and the scheme of marks for the two classes submitted by the Principal may be approved.

T.K.—10-4-08.

The sanction of Government is requested—

(1) to the introduction from July next of the revised courses of instruction for the Civil and Mechanical Engineer classes, which were recommended by the Committee on the Reorganization of the College; and

(2) to the increase in the number of marks assigned for Physical Exercises from 100 to 500 and for Chemistry from 100 to 300.

2. *Revised courses of instruction.*—Please see paragraph 27 of the notes with G.O., No. 159, Educational, dated 20th March 1907. Colonel Love expressed the opinion that "it will not be possible to adopt the new courses sanctioned in G.O., No. 655, Educational, dated 3rd

"October 1905, for the Engineer class until the new laboratories and workshops have been provided." Mr. James, the present Principal, however, considers that the introduction of the revised courses should not be indefinitely postponed and that they may be introduced from July next. A Committee has been appointed to consider the question of adopting the site of the Agricultural College at Saidapet for the new College of Engineering and it will be some time before the college, with the new laboratory and workshops, is constructed. In the meantime, it is for consideration whether, as suggested by Mr. James and the Director of Public Instruction, the revised courses may be introduced from July next.

Yes.

C. A. SOUTER—19-4-08.

*Increase in the number of marks.*—According to the scheme of marks proposed by the Committee and approved by Government in G.O., No. 655, Educational, dated 3rd October 1905, the maximum number of marks assigned for the Civil Engineering and Mechanical Engineering sections for Physical Exercises and Chemistry is 100 in each case. The proposal now is to raise this to 500 in the case of Physical Exercises and to 300 in the case of Chemistry. The proposed alteration seems to be unobjectionable.

K. RANGASWAMI AIYANGAR—12-4-08.

C. A. SOUTER—19-4-08.

The proposals of the Principal, Mr. James, which are accepted by the Director of Public Instruction, may be approved, unless Public Works Department see any objection.

H. D. TAYLOR—21-4-08.

*To the Public Works Department.*

PUBLIC WORKS DEPARTMENT.

Secretary for orders. The advantage of increasing marks for Chemistry appears doubtful.

P. HAWKINS—24-4-08.

I accept the proposals.

F. J. WILSON—24-4-08.

*Educational Department.*

EDUCATIONAL DEPARTMENT.

H. D. TAYLOR—30-4-08.

Approved.

M. H[ANMICK]—4-5-08.

G. [STOKES]—5-5-08.

Draft please.

H. D. TAYLOR—6-5-08.

A draft is submitted for approval.

T.K.—6-5-08.

K. RANGASWAMI AIYANGAR—6-5-08.

Issue.

C. A. SOUTER—7-5-08.

[G.O., No. 342, Educational, dated 7th May 1908.]



EDUCATIONAL DEPARTMENT.

Received.....190 , Registered.....30/3/1908.

Subject.

Submitting proposals for the bifurcation of the Engineer class  
in the College of Engineering, Madras.

ENCLOSURES.

No. 17

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Station Madras, Dated the 28<sup>th</sup> March 1908.

From (Name) The Hon'ble Mr. A.G. Bourne, D.Sc., F.R.S.,

(Designation) Director of Public Instruction,

Madras

To the Secretary to the Government of Madras,  
Educational Department.

Sir,

In G.O. No. 159 Educational dated 20th March 1907  
sanctioning the revised rules for the College of Engineering,  
the introduction of the revised courses of instruction for the  
Engineer class was allowed to lie over pending the construction  
and equipment of the new workshops and laboratories. The  
present Principal, College of Engineering, while being in  
complete agreement with Colonel Love in thinking that adequate  
laboratory equipment is essential for efficient instruction in  
accordance with the revised syllabuses is, on further considera-  
tion, now of opinion that it is undesirable to suspend all  
attempts at improvement by continuing along the lines of the  
old syllabuses which he says are much out of date and suggests  
that the principle of bifurcation should be introduced for the  
new Engineer class joining in July next and that courses in  
accordance with the revised syllabuses be introduced as far as



20P

C. No. 793, From the D.P. 9.

, No. 414, dated 28-3- 1908.

190

190

No. 342, dated 7-5-1908

P. S.

7. 5. 08

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8-MAY 1908

94

The Govt. sanction the introduction from July next of the separate courses of instruction for the Civil and Mechanical Engineer classes recommended by the Committee appointed to advise on the extension and reorganization of the College of Eng. and <sup>The Govt also</sup> approve of the syllabuses and the <sup>revised</sup> scheme of marks for the two classes submitted by the Principal.

77.

Cal  
7.5.8.

To The S.P.I. in his final Depo 12/6/5  
P.W.D.-C



*Edinburgh*

The Govt. committee the introduction  
from July 1st of the separate  
courses of instruction for the Civil  
and Mechanical Engineering classes  
recommended by the Committee  
appointed to advise on the extension  
and reorganization of the College  
of Eng. and Survey of the  
Institution and the various forms  
for the classes submitted by  
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