

Government of Madras.

EDUCATIONAL DEPARTMENT.

Recd.

Regd.

} 1913.

Enclosures

Spare copies

G.O. No. 517, 4th June 1913.

College of Engineering

Approving the modifications in the syllabuses of the various classes of the —, Madras, and the revised distribution of marks proposed by the Director of Public Instruction.

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THE HON'BLE JAYOLABUCH

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

Read—the following paper:—

Letter—from the Hon'ble Sir ALFRED BOURNE, D.Sc., F.R.S., K.C.I.E., Director of Public Instruction.
To—the Secretary to Government, Educational Department.
Dated—Madras, the 8th April 1913.
No.—Ref. on Cir. 1879.

I have the honour to submit in duplicate proposals of the Principal, College of Engineering, for the distribution of marks consequent on the rearrangement of the college classes, and also the modifications necessary to bring the syllabuses up to date. The proposals have been approved by the Board of Visitors and I beg to recommend them for sanction and to state with reference to paragraph 2 of my letter R.C. No. 3734, dated 17th October 1912, that the proportion of marks awarded in the College Examination for practical work is smaller, in the rules as now proposed to be revised, than formerly.

2. I beg to add that the proposed modifications in the syllabuses involve no radical changes.

ENCLOSURES.

PROPOSED DISTRIBUTION OF MARKS.

ENGINEER CLASS.

First and second years.

	First year.		Second year.	
	Practical work.	Examination.	Practical work.	Examination.
BRANCH I.				
Mathematics—				
Pure	..	150	..	100
Applied	..	..	..	150
Science—				
Physics	50	50	50	50
Chemistry	50	50	50	50
Total ..		350		450
BRANCH II.				
Elementary applied mechanics	..	..	50	50
Drawing—				
Geometrical	50	100	50	100
Machine	..	25	50	50
Building	..	25	50	50
Freehand and model	..	50	..	..
Surveying—				
Chain, compass and plane table and simple levelling	100	..	100	..
Workshop	50	..	50	..
Physical exercises	..	..	50	..
Total ..		550		650
Grand Total ..				2,000

ENGINEER CLASS.

CIVIL.

Third and fourth years.

	Third year.		Fourth year.	
	Practical work.	Examination.	Practical work.	Examination.
BRANCH I.				
Mathematics—				
Pure	..	150	..	..
Applied	..	150	..	..
Geology	100	100	..	..
Total ..		500		Nil.
BRANCH II.				
Applied mechanics	100	100	100	100
Construction	50	150	50	150
Hydraulic engineering	50	150	50	150
Drawing	150	150	250	250
Surveying	200	..	200	100
Engineering laboratory	200	..	400	..
Workshop	100	..	100	..
Physical exercises	100	..	100	..
Total ..		1,500		2,000
Grand Total ..				4,000

ENGINEER CLASS.

MECHANICAL.

Third and fourth years.

	Third year.		Fourth year.	
	Practical work.	Examination.	Practical work.	Examination.
BRANCH I.				
Mathematics—				
Pure	..	150	..	..
Applied	..	150	..	..
Total ..		800		
BRANCH II.				
Applied mechanics	100	100	100	100
Mechanical engineering	50	250	50	250
Drawing	150	150	250	250
Engineering laboratory	200	..	400	..
Electrical engineering	50	150	50	150
Electrical engineering laboratory	150	..	150	..
Workshop	200	..	200	..
Physical exercises	100	..	100	..
Total ..		1,950		2,050
Grand Total ..				4,000

	First year.		Second year.	
	Practical work.	Examination	Practical work.	Examination.
UPPER SUBORDINATE CLASS.				
<i>Branch I.—Mathematics.</i>				
(1) Algebra (100), (2) Geometry (100), (3) Plane trigonometry (100)	..	300	..	..
<i>Branch II.—Engineering.</i>				
(1) Drawing—Machine drawing (100)	50	50	..	..
Building drawing and estimating (300)	50	50	100	100
(2) Applied mechanics	..	50	50	100
(3) Construction	..	50	50	150
(4) Hydraulic Engineering	50	100	..	50
(5) Mechanical Engineering	75	..	100	..
(6) Surveying—Levelling (100), theodolite surveying (100) ..	100	..	50	..
Workshop practice	50	..	..	..
Physical exercises	..	..	..	..
Total	375	650	475	600
Grand Total	2,000			
LOWER SUBORDINATE CLASS.				
(1) Drawing—Machine drawing (100), building drawing and estimating (300)	200	200	..	..
(2) Applied mechanics	..	100	..	..
(3) Construction	..	100	..	..
(4) Surveying—Levelling (100), theodolite surveying (100) ..	150	50	..	..
Workshop practice	100	..	..	..
Physical exercises	100	..	..	..
Total	550	450	..	..
Grand Total	1,000			
PROBATIONARY SUBORDINATE CLASS.				
<i>Branch I.—Mathematics.</i>				
Arithmetic	..	50	..	50
Mensuration	..	50	..	50
Elements of plane trigonometry	..	50	..	50
<i>Branch II.—Engineering.</i>				
(1) Drawing—Freehand and model	50	50	..	..
Geometrical	50	100	50	100
Machine	..	..	50	50
Building	..	50	..	100
(2) Elementary applied mechanics	..	..	..	50
(3) Construction	..	..	100	..
(4) Surveying—Chain, compass, plane table and levelling ..	100	..	50	..
Workshop practice	50	..	..	..
Physical exercises	..	..	..	..
Total	300	350	350	500
Grand Total	1,600			

SYLLABUSES.

ENGINEER CLASSES.

BRANCH I.

I.—PURE AND APPLIED MATHEMATICS.

PURE MATHEMATICS.

Algebra.—Binomial theorem. Elementary tests of convergence and divergence of series. Exponential and logarithmic series. 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. Elements of solid geometry.

Mensuration.—Plane and solid.

Plane Trigonometry.—Practical use of logarithms. Adaptation of formulae 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 functions 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. Formulae 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.

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.

Statics.—Equilibrium of forces in a plane: couples; mass centres.

Hydrostatics.—Transmission of fluid pressure. Thrusts due to fluid pressure on a plane area. Centres 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.

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. Negascopic 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. Lanes of reference: axes, parameters, indices, symbols. Symmetry. The six crystallographic forms characterized 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.

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, Phosphorus, 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, H₂S, NH₃, CH₄, C₂H₂, CO₂, CO, HNO₃, NO, NO₂, N₂O, SO₂, SO₃, H₂SO₄, KClO.

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

Bases in the form of metal, oxide, sulphide, haloid or oxy-salt:—

Na, K, NH₄, 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:—O₂, SO₂, SO₃, NO₂, NO, CrO₃, Cl, ClO₃, S, Br, I, F, PO₃, AsO₃, BO₃, SiO₂.

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 CuSO₄·5H₂O.

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 CO₂ 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 ammoniumsulphate, etc.

Technical Analysis.—Physical and Chemical tests of oils, coal and water with the view of their suitability for use for Engineering purposes.

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 Polarisation.

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 Clerk 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.

BRANCH II.

ENGINEERING.

DRAWING.

1ST 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. Loci.

(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. Iso-metric projection. Elements of Perspective.

(c) *Graphics.*—Arithmetic. Determination of O.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 drawings accurately to scale and to make drawings 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 Syllabus.]

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. Complex stress: Applications of the theory of stress and strain.
- (b) Mechanical properties of the materials of construction
- (c) Testing of materials.

2. Applications of Statics 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: Continuous Beam.
- (d) Strength of Struts and Columns.
- (e) 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 mechanisms.
- (b) constrained motion. Translation and rotation, instantaneous centres and centroids.
- (c) Virtual motion in mechanism. Velocity and acceleration diagrams.
- (d) Altered mechanisms. Expansion of elements. Reduction of chains.
- (e) Higher pairing involving plane motion. Spur wheel trains, cam trains, etc.
- (f) Mechanisms containing non-rigid links. Belt-gearing, chain and rope gearing, etc.
- (g) Ordinary chains involving screw and spheric motion: worm gearing, universal joint, etc.

5. Applications of Statics and Kinetics—

- (a) Friction of rest and motion. Friction of lubricated surfaces. Friction in mechanism and efficiency of machines.
- (b) Inertia forces in mechanism: balancing: gyrostatic action.
- (c) Effort and resistance: steadiness: crank effort: governors: and fly wheels.

CONSTRUCTION.

1. Building Materials—Stones of S. 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) Re-inforced concrete structures*.

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. Hydrostatics.—Physical properties of water, and general theorems relating to pressure on surfaces and to floating bodies.

2. Motion of Water.—Stream line motion. Bernoulli's theorem. Simple flow in passages of varying dimensions. Fluid friction.

3. Orifices and notches.—Flow from small orifices. Mouth-pieces and large openings. Notches, weirs and alicuts. Submerged weirs and sluices. Bridge openings.

4. Flow in pipes.—Co-efficients, mean velocity and discharge. Losses of head along pipe lines, at bends, valves, etc. Branch mains, syphons and nozzles.

5. Flow in Channels.—Variation of velocity over cross section. Co-efficients, mean velocity and discharges. Limiting velocities. Sections of channels. Falls.

6. Rivers.—Estimation of discharge. Gauging. Discharge from catchment basins.

7. Storage and distribution.—Rainfall. Supply from wells, rivers and reservoirs, for irrigation, navigation and town consumption.

8. Irrigation works.—Masonry works in general description and methods of construction.

9. Canals and Channels.—Irrigation canals in deltaic and non-deltaic country. Supply from rivers and tanks. Capacity of canal. Limiting velocities. Alignment. Disposal of cross drainage. Height of banks. Navigable canals.

10. Tanks.—Isolated raised tanks. Tanks in groups. Tanks supplied by rivers or streams. Capacity. Irrigating duty. Loss of water by evaporation and absorption. Construction of earthen bunds. Design and construction of surplus weirs. Tank sluices and their regulation. Repairs to bunds, and closing breaches.

11. Water supply of towns.—General principles governing the design of works for water supply and distribution in towns, including filtration, storage regulation and waste detection.

12. Town Drainage and Sewage Disposal.—General principles governing the design of works for sewerage of towns and sewage disposal, including pumping stations, laying of sewer, flushing arrangements and treatment by bacteriological, chemical and other processes.

13. Mechanical appliances.—General description and methods of working of water-wheels, turbines, water lifts and pumps.

SURVEYING.

1. Ordinary surveying with chain, compass and plane-table.

2. Levels: adjustment and manipulation. Contouring.

3. Theodolites and other surveying instruments: adjustment and manipulation. Traversing, tachometry, triangulation and problems in Engineering geodesy and astronomy.

4. General operations of setting out and measuring engineering works.

MECHANICAL ENGINEERING.**(1) General Machine Design.**

Fastenings.—Bolts, nuts, keys and cotters: Riveted joints and connections generally: Pipes and cylinders: Shafting and journals: Pedestals: Wall fixings, etc.: Belt and rope gearing: Friction and spur gearing.

(2) Fuel, Gas Plants and Boilers.

(a) *Fuel.*—Coal, wood, petroleum, gas, petrol, alcohol, etc.: Physical characteristics: Approximate chemical composition: Heat of combustion.

(b) *Gas Plants.*—Gas producers, pressure and suction plants: Arrangement and working.

(c) *Boilers.*—Draught: natural, forced and induced. Ordinary forms of stationery; locomotive, marine, water-tube and other types; heating surface; fire-grate area; boiler efficiency; superheaters; feed water heaters; accessories and management.

(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, oil and petrol Engines. Types and working; features of cycles. Proportioning of mixtures; efficiencies.

(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) *Refrigerating Plant.*—Theory and general arrangement of the more common types.

(h) *Air Compressors.*—Theory of pneumatic working.

(i) *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) Carburettors and systems of ignition.

(c) Cylinders, pistons, cross heads, guides, connecting rods, 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, over-shot, 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; Gas pump, etc.

(e) *Hydraulic transmission of power;* Accumulators; Valves, Mains, Cranes, Lifts, 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 Candidates.)

(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 calibrating 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; Single and polyphase alternators; Synchronous and Induction motors; Methods of Testing; Characteristic curves.

(5) Electric Distribution and Power Supply.

Systems of Electric supply; Continuous current; Single and polyphase alternating systems; High and low tension. Transformers; Rotary Converters; Accumulators; Lamps; Mains, etc. Electric Traction. General principles of artificial illumination: Photometry.

UPPER SUBORDINATE CLASS.**BRANCH I.****MATHEMATICS.**

1. Algebra.—Factorisation. Simplification. Rules of indices. Easy problems leading to simple and quadratic equations. Determination of constants in equations of known form, such as $y = ax + b$, $y = ax^2 + bx + c$. Arithmetical progression; geometrical progression.

Co-ordinates of a point in a plane. Plotting observations on section paper. Probable intermediate values. Plotting of simple functions, such as $y = mx$, $y = mx + n$, $ay = x^2$, $y = \frac{a^2}{x}$, $y = (x - a)(x - b)$, $y = (x - a)(x - b)(x - c)$. Use of section paper for obtaining maximum and minimum values and roots of equations.

[NOTE.—The co-efficients in equations like $y = ax^2 + bx + c$, etc., will be numerical. Discussion of the forms of graphs for different values of a , b , c , is not required.]

2. Geometry.—The inscribed, escribed and circumscribed circles of a triangle. To describe the following regular polygons: (1) on a given base, (2) in a given circle, (3) about a given circle;—(a) square, octagon; (b) hexagon, equilateral triangle, dodecagon; (c) decagon, pentagon, quindecagon. The in- and circum-scribed circles of regular figures. Area of a parallelogram = base $\times$ altitude; area of triangle = $\frac{1}{2}$ base $\times$ altitude. Deduce Euclid VI, 1 and corollary. Euclid VI, 2, 9 to 13, 3, A. To describe a triangle equiangular to a given triangle (1) on a given base, (2) in a given circle, (3) about a given circle. Euclid VI, 4, B, C, D, 8, 24. Ratio of two triangles or parallelograms having one angle of the one equal to one angle of the other. Similar triangles are to one another as the squares on the homologous sides or lines. Ratios of similar figures and solids. Euclid VI, 5, 6, 26. Explanation of the enunciation of VI, 33 and illustrations.

[NOTE.—The geometrical analogues of the propositions in Algebra relating to four quantities in proportion will be assumed.]

3. Plane Trigonometry.—Functions of compound angles. Easy identities and equations. Relations between the sides and angles of a triangle. Solution of triangles. Applications to heights and distances.

BRANCH II.

ENGINEERING.

1. DRAWING.

(1) **Free-hand** and (2) **Model Drawing**.—Ornamental outlines. Application of elementary perspective to model drawing of simple objects.

(3) **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.

(4) *Practical Solid Geometry and Projection*.—Lines, Points and Planes: Projection of Simple Solids. The Regular Solids: Sections of Solids: Development of Plane and Curved Surfaces: Tangent Planes. Interpenetration of Solids. Determination of Shadows. Isometric Projection. Elements of Perspective.

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

Building Drawing.—See note to syllabuses on Construction and Hydraulic Engineering.

[NOTE.—Machine Drawing, Building Drawing and Hydraulic Engineering Drawing and Estimating.—Special teaching in these subjects will be given during the course of lectures in which Mechanical Engineering, Construction and Hydraulic Engineering are respectively taught. Marks will be allotted by the College for the drawing work done by students during these courses. A paper will also be set in each of the above three branches of drawing.]

2. APPLIED MECHANICS.

(1) Mechanical Properties of Engineering Materials; Stress and Strain; Modulus of Elasticity; Elastic Limit; Ultimate Strength; Factor of Safety and Working Stress.

(2) Statics and applications to Structures; Coplanar Forces; Parallelogram, Triangle and Polygon of Forces; Applications by graphical methods to simple frames with Pin joints, such as Cranes, etc. Wind Pressure on Roofs.

(3) Elementary Study of Beams; Bending Moment and Shearing Force; Sections in iron, steel and wood.

(4) Struts and Columns; formulae of Gordon and Euler.

(5) Simple Shear and Torsion; Strength of Shafts.

(6) Elementary application of theory in design of small Bridges and Arches generally, Retaining walls and Dams.

(7) Principle of Work; Potential and Kinetic Energy; Centrifugal force.

3. CONSTRUCTION.

Materials.

(1) **Stone**.—Varieties met with in Southern India. Quarrying. Blasting with powder and dynamite. Dressing. Average strength and weight of stone.

(2) **Bricks and Tiles**.—Brick earth. Tempering. Hand and machine moulding. Drying. Burning in clamps and kilns. Hoffman's kiln. Coloured bricks and tiles. Pressed bricks. Roofing, flooring and drain tiles. Fire bricks. Average strength and weight of brick. Characteristics of good bricks and tiles.

(3) **Lime, Cement, Mortar, Concrete, Plaster**.—Sources and properties of lime. Burning in intermittent and running kilns. Slaking. Mortar mixing. Fat and Hydraulic limes. Portland cement manufactured in England and in Madras. Hydraulic mortar. Surki. Concrete. Practical tests for limes and cements. Strength of mortars and concretes. Plaster and plastering. Pointing. White and colour washing.

(4) **Timber**.—Growth. Felling. Seasoning, natural and artificial. Conversion. Preservation of timber. Varieties of timber used in Southern India—teak, sal, erol, karamarido, padowka, vengay, bentek, aynee, red and white cedar, rose-wood, castorina, mango, palmyra, cocconut, bamboo. Strength and weight of timber. Characteristics of good timber.

(5) **Metals**.—Iron ores. Smelting. Grey and white pig iron. Castings. Pipes and columns of cast-iron. Chilled castings. Strength of cast-iron. Brief description of the manufacture of wrought-iron.

Forms of wrought-iron. Galvanized and corrugated iron. Tests and strength of wrought-iron. Rivets and bolts. Punching and drilling holes. Riveting. Outting plates and bars. Welding. Steel, hard and mild. The Bessemer process. Strength of steel. Copper. Zinc. Lead. Tin. Alloys. Soldering metals.

(6) **Paints and Varnishes**.—Ingredients of paint. Litharge. Turpentine. Linseed oil. Mixing paint. Painting old and new work. Wood oil. Coal tar. Distemper. Varnish. Papering. Putty. Glazing.

Design.

(1) **Masonry**.—Coursed and uncoursed rubble. Block in course. Ashlar. String courses. Copings. Bricklaying. English and Flemish bonds. Bond at angles of walls, in footings with offsets, between main and cross walls, at door and window openings and in circular pillars. Foundations and footings. Plinth. Damp proof course. Thickness of main and cross walls. Wall plates. Wood bricks and plugs. Openings for timber beams, for doors and windows. Corbelling. Flat, segmental, pointed and relieving brick arches. Inverts. Centres for small arches. Bond in brick and stone arches. Small oblique arches. Enclosure walls. Buttresses and counterforts. Retaining and breast walls. Scaffolding.

(2) **Foundations**.—Excavation. Masonry and concrete foundations. Unequal settlement. Pressure on soil under foundations. Foundations in rock, good and bad soils. Piles. Cofferdams and caissons. Well foundations. Brick and iron wells. Mode of sinking wells. Patent excavators for well sinking. Setting out buildings from working plans.

(3) **Carpentry**.—Mortice and tenon joint. Fishing and scarfing. Iron straps and bolts. Roof and bridge frames, nature of stress in the different members. Detail of joints. Frames of timber and iron combined. Trussed beams. Timber floors. Stairs, designing and setting out. Doors and windows. Centerings for arches. Striking centres.

(4) **Roofs and Floors**.—Terrace-roofs and floors on joists, beams and joists, or iron girders and joists. Bengal terrace roofs. Fire-proof floors. Brick arched roofs. Pitched roofs. Couples. Trusses. Rafters, purlins and reapers. Roof coverings of thatch, tiles, slates and shingles. Ceilings. Floors of stone, brick, tiles concrete, timber and asphalt. Simple forms of iron roof. Use of tee, angle and channel iron in compression, and of rods and flat bars in tension. Joints and connections. Shoes, rivets, bolts. Iron and timber purlins. Brackets. Patent tiles, corrugated iron, lead and zinc roofing. Modes of attachment. Ventilators.

(5) **Bridges**.—Names of parts. Thickness of arch-ring, wing-walls, centerings. Setting out arches full size.

(6) **Roads**.—Road construction and maintenance.

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

4. HYDRAULIC ENGINEERING.

(1) **Hydrostatics**.—Hydrostatic laws. Pressure at a point and on a surface. Equal transmission of pressure. Atmospheric pressure. Siphon. Specific gravity. Flotation.

(2) **Discharge from Orifices and Notches**.—Small orifices. Velocity of discharge. Co-efficients of velocity, contraction and discharge. Rectangular orifice and notch. Triangular notch. Velocity of approach. Submerged and partly submerged orifices. Submerged notch.

(3) **Practical Cases**.—Tank weirs. Drowned weirs. Gauging weirs. Anicuts. Sluices: head, under, lock and tank. Modules.

(4) **Discharge under Variable Head**.—Free discharge from prismatic vessels. Time of emptying or filling locks. Discharge from one prismatic vessel into another.

(5) **Flow in Pipes**.—Fluid friction. Velocity in pipes. Virtual slope. Discharge. Inclination of pipes. Pipes not running full.

(6) **Flow in Channels**.—Sections for channels. Co-efficients. Discharge of channels. Practical data. Channels of minimum border. Falls.

(7) **Rivers**.—Cross sections. Measurement of velocity and discharge. Flood discharge from catchment basins. Bends. Regime of rivers.

(8) **Storage and Distribution**.—Irrigation, navigation and town supply. Rainfall. Supply from wells, rivers and reservoirs.

(9) **Masonry Works in Irrigation Projects**.

(10) **Canals and Channels**.—Irrigation in deltas and elsewhere. Supply from rivers. Storage in tanks. Capacity of channel. Limiting velocity. Surface fall. Side slopes. Alignment. Cross drainage. Navigation canals.

(11) **Tanks.**—Isolated rain-fed tanks. Tanks in groups. Tanks supplied from rivers or streams. Catchment and capacity of a tank. Irrigating duty of water. Tank bunds, puddle walls, revetment. Surplus weirs. Tank sluices. Closing breaches.

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

5. MECHANICAL ENGINEERING.

(1) **Transmission of Motion and Power.**—Shafts, couplings, clutches, pedestals and wall fixings. Belts, ropes and pulleys. Torsion dynamic transmission. Toothed gearing, spur and bevel-wheels, rack and pinion, worm gearing. Cams. Examples of uses of above in ordinary machines.

(2) **Boilers.**—General description and management of Cornish, Lancashire, vertical, locomotive, flash and water-tube boilers. Feedheaters, economizers, superheaters and other accessories and mountings.

(3) **Steam and other Heat Engines.**—Description and method of working of stationary and locomotive engines. Steam turbines. Gas and oil engines. Engine accessories and details:—condensers, air and circulating pumps, cylinders, pistons, slide valves, governors, fly wheels, etc.

(4) **Hydraulic Machinery.**—General description of ordinary forms of force and centrifugal pumps, pulsometer and rams. Water wheels, parallel, outward and inward flow turbines. Presses and riveters. Hydraulic transmission of power, accumulators, valves, etc.

(5) **Machine Tools and Mechanical Manipulation.**—Cutting of metals. Surface plates, callipers and gauges. Arrangement of drilling, shaping, planing, slotting and milling machines. Lathes, turning and boring mills. Punching and shearing machines.

[NOTE.—The above syllabus connotes all Machine drawing and design.]

6. SURVEYING.

(1) **Chain, Compass and Plane Table.**—Ordinary surveying with chain, compass and plane table. Inaccessible points, obstructed lines, use of optical square and cross staff.

(2) **Level.**—Manipulation and adjustment of levels. Levelling. Contouring. Cross sections. Use of Abney's level, dionometer and ghaunt tracer. Setting out gradients for railways, canals and sewers.

(3) **Theodolite.**—Use and adjustment of theodolites. Simple triangulation and traversing. Gale's system. Setting out straight lines and curves in the field. Heights and distances, including curvature and simple refraction. Simple stadia measurements.

(4) **Topographical Drawing.**—Conventional signs, map drawing. Representation of ground by contours. Sections on contoured plans. Location of dams, roads and railways on contoured plans showing cuttings and embankments estimation of areas and volumes.

LOWER SUBORDINATE CLASS.

ENGINEERING.

1. DRAWING.

(1) **Free-hand** and (2) **Model Drawing.**—Ornamental outlines. Application of elementary perspective to model drawing of simple objects.

(3) **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.

(3) **Practical Solid Geometry and Projection.**—Lines, points and planes. Projection of simple solids. The regular solids. Sections of solids. Development of plane and curved surfaces. Tangent planes and solids. Interpenetration of solids. Determination of Shadows: Isometric projection. Elements of Perspective.

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

(5) **Building Drawing.**—The work will be based on the following syllabuses.

[NOTE.—**Machine Drawing, Building Drawing and Hydraulic Engineering, Drawing and Estimating.**—Special teaching in these subjects will be given during the course of lectures in which Mechanical Engineering, Construction and Hydraulic Engineering are respectively taught. Marks will be allotted by the College for the drawing work done by students during these courses. A paper will also be set in each of the above three branches of drawing.]

2. APPLIED MECHANICS.

(1) **Stress and Strain.**—Hooke's law. Modulus of elasticity. Elastic limit. Ultimate strength. Factor of safety and working stress.

(2) **Elementary Statics.**—Parallelogram, triangle, and polygon of forces. Easy graphical applications to ordinary frames. Wind pressure on roofs.

(3) **Elementary Study of Beams.**—Bending moment and shearing force. Sections in iron, steel and wood.

(4) **Simple Shear.**—Examples of applications in ordinary structures.

(5) **Design.**—Easy applications of theory and the use of empirical formulae in the design of small bridges, arches and retaining walls.

(6) **Principle of Work.**—Graphic representation. Simple applications to machines. Potential and kinetic energy.

3. CONSTRUCTION.

Materials.

(1) **Stone.**—Varieties met with in Southern India. Quarrying. Blasting with powder and dynamite. Dressing.

(2) **Bricks and Tiles.**—Brick earth, Tempering. Hand and machine moulding. Drying. Burning in clamps and kilns. Pressed bricks. Tiles. Strength and weight of brick. Characteristics of good tiles and bricks.

(3) **Lime, Cement, Mortar, Concrete, Plaster.**—Sources and properties of lime. Burning in intermittent and running kilns. Slaking. Mortar mixing. Fat and hydraulic limes. Portland cement. Hydraulic mortar. Surki. Concrete. Practical tests for limes and cements. Plaster, sources and plastering. Pointing. White and colour washing.

(4) **Timber.**—Seasoning, natural and artificial. Conversion. Preservation of timber. Varieties of timber used in Southern India. Strength and weight of timber. Characteristics of good timber.

(5) **Paints and Varnishes.**—Ingredients of paint, litharge, turpentine, linseed oil. Mixing paint. Painting old and new work. Wood oil. Coal-tar. Varnish. Putty. Glazing.

Design.

(1) **Masonry.**—Coursed and uncoursed rubble. Block in course. Ashlar. String courses. Copings. Bricklaying. English and Flemish bond. Bond at angles of walls, in footings with offsets, between main and cross walls, at door and window openings and in circular pillars. Foundations and footings. Plinth. Thickness of main and cross walls. Wall plates. Wood bricks and plugs. Openings for timber beams, for doors and windows. Corbelling. Flat, segmental, pointed and relieving brick arches. Centres for small arches. Bond in arches. Small oblique arches.

(2) **Foundations.**—Excavation. Masonry and concrete foundations. Unequal settlement. Foundations on rock, good and bad soils. Well foundations. Setting out buildings from working plans.

(3) **Carpentry.**—Mortise and tenon joint. Fishing and scarfing. Iron straps and bolts. Simple roof and bridge frames. Detail of joints. Frames of timber and iron combined. Doors and windows.

(4) **Roofs and Floors.**—Terrace roofs and floors on joists, beams and joists or iron girders and joists. Bengal terrace roof. Pitched roofs. Couples. Trusses. Buffers, purlins and rakers. Roof covering. Ceilings. Floors of stone, brick, tiles, concrete, timber and asphalt. Simple forms of iron roofs. Joints and connections. Iron and timber purlins. Ventilators.

(5) **Bridges.**—Names of parts. Thickness of arch ring. Wing walls. Centerings. Setting out arches full size.

(6) **Roads.**—Road construction and maintenance.

(7) **Tanks and Channels.**—Supply from wells, tanks and rivers. Discharge from catchment areas. Construction of tank bunds, escapes and irrigation sluices. Use of simple formulae for the discharge of escapes and

sluices. Discharge of channels. Permissible limits of fall and velocity in minor channels. Laying out and construction of channels. Regulation of supply from head sluices.

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

SURVEYING.

(1) **Chain, Compass and Plane Table.**—Ordinary surveying with chain, compass and plane table. Inaccessible points, obstructed lines. Use of optical square and cross staff.

(2) **Level.**—Manipulation and adjustment of levels. Levelling. Contouring. Cross sections. Use of Abney's level, clinometer and ghaat tracer.

(3) **Theodolite.**—Elementary use of adjustment of theodolites. Simple triangulation and traversing. Gale's system. Setting out straight lines, and curves in the field. Easy work in heights and distances.

(4) **Topographical Drawing.**—Conventional signs, map-drawing. Representation of ground by contours. Sections on contoured plans. Location of dams, roads and railways on contoured plans, showing cuttings and embankments. Estimation of areas and volumes.

[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.]

PROBATIONARY CLASS.

MATHEMATICS.

1. **Arithmetic.**—Use of decimals in preference to vulgar fractions for practical calculations. Degree of accuracy of measurements. Contracted multiplication and division. Labour-saving methods: (1) use of tables of squares, cubes, square roots and cube roots; evaluation of the forms $\frac{a}{\sqrt{b}}, \frac{a}{\sqrt[3]{b}}, \sqrt{\frac{a}{b}}, \sqrt[3]{\frac{a}{b}}, \frac{3/a + \sqrt{b}}{b/c + \sqrt{d}}, \sqrt{a \pm 2\sqrt{b}}$; (2) use of logarithms and antilogarithms in multiplication and division, involution and evolution. Graphical solution of simple arithmetical problems. Use of slide rule.

2. **Mensuration.**—Rules for length of circumference of a circle. Rules for area of triangle, parallelogram, circle, sector and segment of circle. Area of irregular plane figure by mid-ordinate rule and Simpson's rule. Rules for surface and volume of prism, cylinder, cone, sphere and ring. Volume of an irregular solid by plotting ordinates representing areas of cross sections. Estimation of areas, surfaces and volumes from actual measurements of objects. Measurement of areas and volumes by weight or displacement. Meaning of specific gravity. Calculation of the weight of a body when its volume and specific gravity are known.

3. **Plane Trigonometry.**—Measurement of angles in degrees and radians. Definitions of sine, cosine, etc., and graphic determination of their values. Setting out angles from values of sine, cosine, etc. Use of tables of natural sines, cosines, etc. Solution of right-angled triangles by calculation and drawing and simple applications to heights and distances.

NOTE.—During the courses of instruction all classes will pay visits of inspection to constructional works in progress and places such as—

- (1) Pallavaram stone quarries.
- (2) Government brick fields, Poonamallee Road.
- (3) Lime kilns, Cochrane's Basin.
- (4) Cement Works.
- (5) Madras Harbour.
- (6) Corporation water and drainage works.
- (7) Railway shops, Perambore.
- (8) Weaving and spinning mills.
- (9) Electrical power stations.

Order—No. 517, Educational, dated 4th June 1913.

The Government approve the modifications in the syllabuses of the various classes of the College of Engineering and the revised distribution of marks proposed by the Director of Public Instruction.

(True Extract.)

W. FRANCIS,
Ag. Secretary to Government.

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

NOTES CONNECTED WITH G.O. No. 517, EDUCATIONAL, DATED
4TH JUNE 1913.

[SUBJECT.—Proposals for the distribution of marks and the modification of the syllabuses consequent on the re-arrangement of the college classes in the College of Engineering, Madras.]

From the Director of Public Instruction, dated 8th April 1913, No. 1879.

In their order No. 451, Educational, dated 8th July 1911, the Government approved the proposals of the Principal of the College of Engineering to lower the general educational qualifications prescribed for admission into the engineer and upper subordinate classes of the college and to extend by one year the courses of training laid down for these classes, and the consequential alterations in the rules regarding the working of the upper and lower subordinate classes, the admission of military students and the bifurcation of the engineer class into civil and mechanical engineering divisions.

2. The Director of Public Instruction now submits with his recommendation the proposals of the Principal of the college for the distribution of marks consequent on the re-arrangement of the college classes and also the modifications necessary to bring the syllabuses up-to-date.

3. The following statement shows in one view the present and proposed distribution of marks and the proportion which the number of marks for practical work bears to the total number of marks :—

	Practical work.		Test examinations.		Total.		Percentage for practical work.	
	Present.	Proposed.	Present.	Proposed.	Present.	Proposed.	Present.	Proposed.
Engineer class	3,200	3,250	1,800	2,750	5,000	6,000	64	54
Upper subordinate class . .	1,740	850	1,700	1,150	3,400	2,000	50	42½
Lower subordinate class . .	1,250	550	750	450	2,000	1,000	62½	55

From the above statement it will be seen that, as observed by the Director, the proportion of marks assigned for practical work in the college examination is smaller than formerly and that there can no longer be any ground for the complaint of the Hon'ble Mr. Seshagiri Aiyar that 70 per cent. of the marks is given to college work.

4. The Director says that the proposed modifications in the syllabuses involve no radical changes; but there is one point in the syllabus for the upper subordinate class which requires explanation. In the syllabus for that class the portions relating to geometry and mensuration are proposed to be omitted, as these are "covered by the syllabus of probationary class." Turning to the syllabus proposed for probationary class it is observed that no mention is made

of geometry: in fact geometry is not one of the subjects prescribed for this class.

Un-officially.

L. DAVIDSON.

The Director of Public Instruction may be asked to obtain explanation for the discrepancy.

† Paragraph 4 of notification on page 9 of G.O. No. 451 of 1911.

B. GOPALACHARI—30-4-13.
C. RAMANUJACHARI—2-5-13.

I do not think Public Works Department need be consulted, but the doubtful point mentioned above wants clearing up. Please ask the Director of Public Instruction.

L. DAVIDSON—2-5-13.

To the Director of Public Instruction.

OFFICE OF THE DIRECTOR OF PUBLIC INSTRUCTION.

Mr. James states that "geometry" under the upper subordinate syllabus was inadvertently scored out with "mensuration" whereas it was only intended to omit the latter as is evident from the distribution of marks. He submits a revised syllabus for mathematics, upper subordinate class, which is placed below.

J. H. STONE—25-5-13.

To the Educational Department.

EDUCATIONAL DEPARTMENT.

Submitted for orders. The revised syllabus will have to be substituted for that
W. FRANCIS. originally submitted. Subject to approval
a draft is submitted below.

B. GOPALACHARI—30-5-13.
C. RAMANUJACHARI—31-5-13.

Approved.

W. FRANCOIS—2-6-13.

[G.O. No. 517, Educational, dated 4th June 1913.]

READ AGAIN G.O. No., dated 191

" " " " "

191

C. No. 1241, From the 2nd, No. 1879, dated 0-2 1913

ORDER.

No. 51784, dated 4. 6. 1913

The Govt. approve the modification in the syllabus of the various classes of the College of Engineering and the ^{revised} distribution of marks proposed by the B.P.D.

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Docket. *College of Engineering, Appraising the work of the students of the College of Engineering, and the revised distribution of marks prepared by the Director of Public Instruction*

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(c) For rules regarding printing of notes, see the rules in G.O., No. 1220, Public dated 30th November 1900.

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(e) In the absence of special instructions to the Press to keep matter standing for a specified period, ordinary papers of 8 pages and under will be kept standing for one week, and larger papers for two weeks only. The type of notes and of all confidential papers is distributed immediately after striking.

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