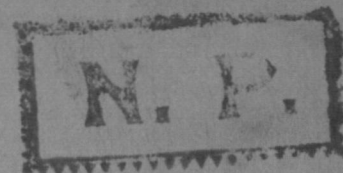


Educational (1904) Department.

ORDINARY PRINTED

G.O., No. 259

DATED 26. 4. 04



INDEXED

ORIGINAL

[Despatch Abstract.]

Practical Telegraphy.

Approving with certain modifications the
Syllabuses of the Elementary & Intermediate
Examinations in — & directing the publica-
tion in the Fort St. George Gazette of a
notification relating to the same

BACK PAPERS.

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

FURTHER PAPERS.

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

Government {1904} of Madras. EDUCATIONAL.

Recd.

Regd.

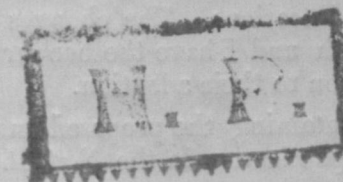
1904.

Enclosures

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ORIGINAL

G.O., No. 259, 26th April 1904.



APRIL.

Practical Telegraphy.

Approving with certain modifications the syllabuses of the Elementary and Intermediate examinations in —, and directing the publication in the *Fort St. George Gazette* of a notification relating to them.

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

READ—the following paper :—

From the Hon'ble Mr. A. G. BOURNE, D.Sc., F.R.S., Director of Public Instruction, to the Secretary to Government, Educational department, dated 14th April 1904, Ref. on Cur. No. 9067 of 1903.

In his report on the examinations conducted in April 1902 Mr. W. D. MacGregor, Chairman of the Board of Examiners for Electrical Engineering, brought to the notice of the Commissioner for Government Examinations that the present syllabuses for the Elementary and Intermediate examinations in Practical telegraphy were vague as regards signalling and that as a consequence the candidates, when they appear for the examination, are quite unaware of the precise nature of the test they are expected to pass and he, therefore, proposed certain alterations in the existing tests. His recommendations were referred for opinion to Mr. R. Ll. Jones, Professor of Physics, Presidency College, and some time Chairman of the same board, and he has approved of them with slight verbal modifications. The changes are embodied in the copy of the syllabus submitted herewith and I have the honour to request that Government will be pleased to accord sanction to their adoption.

2. A draft notification containing the proposed modifications is also submitted for approval and for favour of publication in the *Fort St. George Gazette*.

ENCLOSURES.

(1)

GOVERNMENT OF MADRAS TECHNICAL EXAMINATIONS.

PRACTICAL TELEGRAPHY.

ELEMENTARY EXAMINATION.

1. *Batteries*.—Description and use of different kinds.
2. *Signalling keys*.—Single and double current.
3. *Receivers*.—Morse sounders. Recorders. Relays. Needle instruments.
4. *Methods of working*.—Single and double current, open and closed circuit. Translation. (To be illustrated by diagrams).
5. *Electric bells*.—Chattering and single stroke.
6. *Lightning dischargers*.—Principle of action. Various kinds.
7. *Earths*.—Object, and method of installation.
8. *Fitting up a Telegraph office*.—Kind of wire suitable for connections. Methods of bringing in leading wires, and attaching them to walls.
9. *Faults*.—How to detect and trace a fault in an office.
10. *Signalling*.—Sending and receiving Morse signals. Reading by sound and from tape. Sending and receiving on the single needle instrument.

The examination shall comprise—

- (1) A written examination.
One paper of three hours' duration.
- (2) An oral and practical examination.

Candidates will be examined in signalling and will be required to prepare batteries and put up the connections of the instruments described. Those who may not be prepared to be examined on the single needle instrument will be allowed to pass, provided they are thoroughly proficient in 'Morse' signalling.

In the signalling test candidates must be able—

(a) to receive a message of 120 words (consisting of 550 letters and 30 figures) at the rate of 15 words per minute after allowing for errors—one word will be deducted from the rate per minute for each error made and no candidate will be allowed to pass who makes more than four mistakes in receiving;

(b) to send a message of the above length and composition at the rate of 15 words per minute after allowing for errors— $\frac{1}{2}$ th of a word will be deducted from the rate of sending per minute for each error of spacing, $\frac{5}{10}$ ths of a word for each error of other kinds and no candidate will be allowed to pass from whose rate of sending more than four words or more than the equivalent of four words have been deducted.

The distribution of marks and the minima required for passing shall be as follows :—

	Max.	Min. for passing.	
		1st class.	2nd class.
Written examination	50	35	25
Oral and practical examination	50	35	25
Total	100	60	40

INTERMEDIATE EXAMINATION.

1. The principal phenomena of electricity in their application to the electrical industries.
2. Practical units of electrical measurement.
3. *Batteries*.—Different kinds in practical use with their chemical action, E.M.F., and resistance. Storage batteries. 'Universal battery' system. Determination of battery power required for a given circuit. Method of joining up cells for maximum effect. Testing batteries for E.M.F. and resistance.
4. *Switches*.—Commutators. Current reversers or pole changers.
5. *Receivers*.—Siemens', Post office, and other relays. Embossers and ink recorders. Chemical recorders. Sounders for direct working, and for local circuits.
6. *Multiple and fast speed transmission*.—The general principles of duplex, quadruplex, multiplex, and automatic telegraphy.
7. *Induction*.—Effect of induction on long land lines. Static discharge and how to counteract its effect. Condensers.
8. *Testing*.—Wheatstone's bridge. Differential and tangent galvanometers. Testing of land lines, regular and fault. Measurement of received currents. Testing the resistance of 'earths'. Determination of the working range of instruments.
9. *Calling up closed stations*.—Different methods, with and without clock work.

Submarine Telegraphy.

10. *Receivers*.—The principles of Thomson's syphon recorder. Reflecting galvanometer.

Telephony.

11. *Telephones*.—Description of different forms of transmitters and receivers in use. Modes of connecting transmitters and receivers with automatic switches and call-bells both with and without induction coils. Principles involved in telephone transmission.
12. *Induction*.—How to obviate the effect of induction between telephone wires.

Telegraph Construction.

13. *Materials.*—Different kinds of supports, wire, brackets, and insulators generally used and advantages of each.
14. *Tools.*—For jointing and binding. Block and tackle. Rope stops. Wire reels.
15. *Aerial lines.*—Surveying and marking out route. Distribution of material. Paying out wire. Fitting stays and struts. Measurement of angles. Calculation of strain at angles. Formula for calculating the dip to be allowed.
16. *Jointing and binding.*—Britannia and twisted joints. Joints in stranded wire. Soldering. Fluxes. Methods of fastening the wire to the insulators.
17. *Underground lines.*—Systems of placing wires underground, pipe lines.
18. *Cables.*—Methods of protection from mechanical injury. Deep-sea and shore-end types. Jointing guttapercha and indiarubber core. Laying cables across rivers and creeks.
19. Application of electricity to such purposes as controlling clocks, fire alarms, house bells, etc.

The examination shall comprise—

- (1) A written examination.
Two papers, each of three hours' duration.
- (2) An oral and practical examination.

In the signalling test candidates must be able—

(a) to receive a message of 160 words (consisting of 720 letters and 48 figures) at the rate of twenty words per minute after allowing for errors—one word will be deducted from the rate per minute for each error made, and no candidate will be allowed to pass who makes more than two mistakes in receiving;

(b) to send a message of the above length and composition at the rate of twenty words per minute after allowing for errors— $\frac{1}{20}$ th of a word will be deducted from the rate per minute for each error of spacing, and $\frac{5}{20}$ ths of a word for each error of other kinds, and no candidate will be allowed to pass from whose rate more than two words or more than the equivalent of two words have been deducted.

The distribution of marks and the minima required for passing shall be as follows:—

	Max.	Min. for passing.	
		1st class.	2nd class.
Written examination	60	25	20
Oral and practical examination	40	—	—
Total	100	60	40

ADVANCED EXAMINATION.

The subjects in the Intermediate examination, and, in addition, such subjects as the following:—

- (1) The materials used in telegraph and telephone lines, overhead, underground, and submarine; and the testing of their quality.
- (2) The speed of signalling and the conditions necessary for rapid transmission. Appliances used for the increase of speed and the principles involved in their operation.
- (3) The relation of practical, electrical and magnetic units, to the fundamental units of length, Mass and Time, and to the absolute units of the centimetre, gramme and second system.
- (4) Electrical measurement as applied to the testing of apparatus, the regular testing of the condition of overhead and underground lines, and to the localization of faults.
- (5) The application of electricity to railway working, excluding the use of electricity as a motive power.
- (6) The telephone and its accessories, telephone installations, and the construction of switchboards.
- (7) The conditions necessary for good articulation on long lines. Simultaneous telegraph and telephone transmission.

- (8) Different methods of constructing underground lines.
- (9) The construction of submarine cables, their laying, picking up and repair.
- (10) The working of submarine cables. Principle and construction of condensers and inductive resistance for duplex working, and the adjustments required.
- (11) Electrical measurement as applied to submarine cables, including the tests made during manufacture and laying; periodical testing, and the various methods of localizing faults.
- (12) The construction of hill lines with posts at different levels. River spans with calculations as to dip height of masts and terminals, lengths of back spans. Erection of rail and tubular masts.
- (13) The principles of telegraphy by electro-magnetic induction; also by Hertzian Waves, as applied by Marconi, etc.

The examination shall comprise—

- (1) A written examination.
Two papers each of three hours' duration.
- (2) An oral and practical examination of three hours' duration, in which special attention will be paid to the measurements of electrical quantities.

The distribution of marks and the minima required for passing shall be as follows:—

	Max.	Min. for passing.	
		1st class.	2nd class.
Written examination	60	25	20
Oral and practical examination	40	—	—
Total	100	60	40

APPENDIX.

List of Instruments, etc., necessary for teaching Elementary Telegraphy in order to comply with Revised Syllabus.

Keys.—Morse, English or American pattern, single current.
Simple key for current reversing.

Sounders.—One Dubern's (translating) and one of the ordinary British Post office, or Siemens' patterns.

Morse Recorders.—One for each school, to teach reading from tape and to check bad signalling. (This instrument is expensive and can be done without), but it should be found in all Government institutions of any appreciable magnitude.

Relays.—Siemens Polarized, or other well-known pattern.

Single Needle Instruments.—Simple model will suffice for teaching purposes, as students have not to pass in this method of signalling.

Bells.—At least one good trembling bell with push complete.

Switches.—One simple plug or two way switch.

Lightning Dischargers.—One at least in each school. Preferably Siemens pattern as used by Government Telegraphs.

Battery Cells.—One at least of the following Minotto Daniel's with } These are cheaply
porous pot and copper cylinder. Leclanche with porous pot, Leclanche } made up.
with two agglomerate blocks, Fuller's Bichromate.

Wire.—Telegraph iron galvanized specimens of different gauges. Wire insulated Hooper's core and ordinary loose wire. Specimens of each. Binding screws. Several specimens for one and more connections.

Soldering Bolts, Copper.—One, with soldering materials.

Pliers, Cutting.—One, knife one.

Files.—Three square, one for cutting iron telegraph wire.

Emery Cloth.—Few sheets medium and fine for cleaning connections.

Insulators.—One, of each of the following:—
O.P.P. or Siemens, shackle.

For the Intermediate Stage.

All the above with following additions: one tangent galvanometer, one detector galvanometer, horizontal or vertical, one Wheatstone's bridge or equivalent arrangement of resistance boxes, one sensitive galvanometer for use with same.

2. Telephone receivers and transmitters with microphones and bells.

Extra battery cells and insulated wire for testing purposes.

Extra iron galvanized telegraph wire, with binding wire, joint coils, etc., solder, salamoniac, and lime for washing joints.

Tools.—T-shaped.

Iron.—Soldering bolt for telegraph construction, Britannia joint vice, binding tool, eyebolt, three square file, cutting pliers, large, knife, one double one treble block for $1\frac{1}{2}$ " rope, 30 yards $1\frac{1}{2}$ " rope and 4 yards 3" rope for straining wires.

Insulators.—Several extra specimens of various kinds.

(2)

Draft Notification.

His Excellency the Governor in Council has approved of the following changes in the syllabuses for the Elementary and Intermediate examinations in Practical Telegraphy.

In the syllabus for Elementary examination omit "of three hours' duration" after "(2) an oral and practical examination," inserting a full stop.

For the paragraph beginning with "candidates will be examined" and ending with "Morse signalling" and the note accompanying it, read the following:—

"Candidates will be examined in signalling and will be required to prepare batteries and put up the connections of the instruments described. Those who may not be prepared to be examined on the single needle instrument will be allowed to pass provided they are thoroughly proficient in 'Morse' signalling.

In the signalling test candidates must be able—

(a) to receive a message of 120 words (consisting of 550 letters and 30 figures) at the rate of 15 words per minute after allowing for errors—one word will be deducted from the rate per minute for each error made and no candidate will be allowed to pass who makes more than four mistakes in receiving;

(b) to send a message of the above length and composition at the rate of 15 words per minute after allowing for errors— $\frac{1}{20}$ th of a word will be deducted from the rate of sending per minute for each error of spacing, $\frac{5}{20}$ th of a word for each error of other kinds, and no candidate will be allowed to pass from whose rate of sending more than four words or more than the equivalent of four words, have been deducted.

In the syllabus for Intermediate examination omit "of three hours' duration" after "(2) an oral and practical examination," inserting a full stop; and insert the following paragraph between this and the paragraph beginning with "The distribution of marks &c." :—

In the signalling test candidates must be able—

(a) to receive a message of 160 words (consisting of 720 letters and 48 figures) at the rate of twenty words per minute after allowing for errors—one word will be deducted from the rate per minute for each error made, and no candidate will be allowed to pass who makes more than two mistakes in receiving;

(b) to send a message of the above length and composition at the rate of 20 words per minute after allowing for errors— $\frac{1}{20}$ th of a word will be deducted from the rate per minute for each error of spacing and $\frac{5}{20}$ th of a word for each error of other kinds, and no candidates will be allowed to pass from whose rate more than two words or more than the equivalent of two words, have been deducted.

ORDER—No. 259, Educational, dated 26th April 1904.

The changes proposed in the syllabuses of the Elementary and Intermediate examinations in Practical Telegraphy are approved with slight alterations and will be published in the Gazette.

(True Extract.)

H. D. TAYLOR,
Ag. Secretary to Government.

To the Director of Public Instruction.

„ Commissioner for Government Examinations.

[Appendix.

APPENDIX.

NOTIFICATION.

His Excellency the Governor in Council has approved of the following changes in the syllabuses for the Elementary and Intermediate examinations in Practical Telegraphy :—

In the syllabus for Elementary examination omit "of three hours' duration" after "(2) an oral and practical examination", inserting a full stop.

For the paragraph beginning with "Candidates will be examined" and ending with "Morse signalling" and the note accompanying it read the following :—

"Candidates will be examined in signalling and will be required to prepare batteries and put up the connections of the instruments described. Those who may not be prepared to be examined on the single needle instrument will be allowed to pass provided they are thoroughly proficient in 'Morse' signalling.

In the signalling test candidates must be able—

(a) to receive a message of 120 words (consisting of 550 letters and 30 figures) at the rate of 15 words per minute after allowing for errors; one word will be deducted from the rate per minute for each error made and no candidate will be allowed to pass who makes more than four mistakes in receiving;

(b) to send a message of the above length and composition at the rate of 15 words per minute after allowing for errors; $\frac{1}{20}$ th of a word will be deducted from the rate of sending per minute for each error of spacing, $\frac{5}{20}$ th of a word for each error of other kinds, and no candidate will be allowed to pass from whose rate of sending more than four words or more than the equivalent of four words have been deducted."

In the syllabus for Intermediate examination omit "of three hours' duration" after "(2) an oral and practical examination", inserting a full stop, and insert the following paragraph between this and the paragraph beginning with "The distribution of marks" :—

"In the signalling test candidates must be able—

(a) to receive a message of 160 words (consisting of 720 letters and 48 figures), at the rate of 20 words per minute after allowing for errors; one word will be deducted from the rate per minute for each error made, and no candidate will be allowed to pass who makes more than two mistakes in receiving;

(b) to send a message of the above length and composition at the rate of 20 words per minute after allowing for errors; $\frac{1}{20}$ th of a word will be deducted from the rate per minute for each error of spacing, and $\frac{5}{20}$ th of a word for each error of other kinds, and no candidates will be allowed to pass from whose rate more than two words or more than the equivalent of two words have been deducted."

EDUCATIONAL DEPARTMENT.

NOTES CONNECTED WITH G.O., No. 259, EDUCATIONAL, DATED
26TH APRIL 1904.

[SUBJECT.—*Changes in the syllabuses of the Elementary and Intermediate examinations
in Practical Telegraphy.*]

From the Director of Public Instruction, No. 9067, dated 14th April 1904.

The changes proposed may, it is submitted, be approved. Such changes in, or revisions of, syllabuses are not however notified in the Gazette. Please see G.O., No. 363, Educational, dated 30th July 1903. There is therefore no necessity to publish any notification on the subject.

A draft is placed below for approval.

T.K.—16-4-04.

P. T. THARYAN—16-4-04.

Should the Director-General of Telegraphs be consulted?

A. GALLETTI—22-4-04.

I do not suppose that the Director-General of India has anything to do with this matter of examinations. The Board of Examiners for Electrical Engineering ought to know its business.

2. The changes made in the wording of the notification are, I think, not for the better. The two underlined may stand. Elsewhere please restore the original. Syllabuses—gross word though it be—is long in use and syllabi is no improvement.

3. G.O., No. 363, Educational, dated 30th July 1903, gives no rule of conduct. The present proposals are made because candidates are ignorant of what is expected of them, and the new arrangements should be notified in the Gazette.

J. T[HOMSON]—23-4-04.

Please issue draft and restore the original wording of the notification in accordance with Honourable Member's remarks.

H. D. TAYLOR—25-4-04.

[G.O., No. 259, Educational, dated 26th April 1904.]

Educational (190⁴) Department.

CURRENT No. 702

From

[Name] The Hon'ble Mr. A.G. Bourne, D.Sc., F.R.S.,

[Designation] Director of Public Instruction,

[Station] Madras.

Ref No. Cur No. 9067 of 03

Received 190 .

Dated 14th April 190⁴.

Enclosures Two

Registered 80 190 .

SUBJECT.

Submitting, for approval and favour of publication in the Fort St. George Gazette, a draft notification containing certain modifications proposed to be made in the existing syllabus for the Elementary and Intermediate Examinations in Practical Telegraphy.

BACK PAPERS.

297-25-5-99
708-23-10-99
637-22-9-99

537-30-10-03 SC
363-30-7-03

FURTHER PAPERS.

SK/16/4

The inside draft
 is correct the inside
 was used of the certification
 is accordance with H. M's records
 HOS
 25-40

3
4 88p 9
Notification.

His Excellency the Governor in Council has approved of the following changes in the syllabus for the Elementary and Intermediate Examinations in Practical Telegraphy.

In the syllabus for Elementary Examination omit "Of three hours' duration" after "(2) an oral and practical examination" inserting a full stop.

For the Paragraph beginning with candidates will be examined-----and ending with 'Morse signalling' and the Note accompanying it

read the following

"candidates will be examined in signalling and will be required to prepare batteries and put up the connections of the instruments described. Those who may not be prepared to be examined on the single needle instrument will be allowed to pass provided they are thoroughly proficient in "morse" signalling.

In the signalling test candidates must be able (a) to receive a message of 120 words (consisting of 550 letters and 30 figures) at the rate of 15 words per minute after allowing for errors, ~~one word will be~~ ^{being} deducted from the rate per minute for each error made and no candidate ~~will be~~ ^{being} allowed to pass who makes more than four mistakes in receiving;

(b) to send a message of the above length and composition at the rate of 15 words per minute after allowing for errors, 1/20 of a word ~~will be~~ ^{being} deducted from the rate of sending per minute for each error of spacing, 5/20th of a word for each error of other kinds, and ~~that~~ no candidate ~~will be~~ ^{being} allowed to pass from whose rate of sending more than four words or more than the equivalent of four words, have been deducted.

In the syllabus for Intermediate examination omit 'of three hours' duration' after (2) an oral and practical examination, inserting a full stop, and insert the following paragraph between this and the paragraph beginning with "The distribution of marks. ~~etc.~~

4

5 980 10

In the signalling test candidates must be able (a) to receive a message of 160 words (consisting of 720 letters and 48 figures) at the rate of twenty words per minute after allowing for errors, ~~one~~ ^{set} ^{set} ~~one~~ word ~~will~~ ^{be} deducted from the rate per minute for each error made, and no candidate ~~will~~ ^{be} allowed to pass who makes more than two mistakes in receiving;

(b) to send a message of the above length and composition at the rate of 20 words per minute after allowing for errors, ~~1~~ ^{set} ^{set} ~~1~~ 1/20th of a word ~~will~~ ^{be} deducted from the rate per minute for each error of spacing and 5/20th of a word for each error of other kinds, and no candidates ~~will~~ ^{be} allowed to pass from whose rate more than two words, or more than the equivalent of two words, have been deducted.

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Despatched in print.

READ AGAIN G.O., No.
190 .

, DATE

CURRENT No.

ENCLOSURE TO C. No.

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LETTER OF GOVERNMENT.

STATEMENT WITH DITTO.

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IN ORIGINAL.

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 B = Not to be printed.
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