Technical Education.

CITY AND GUILDS OF LONDON INSTITUTE.

Below we reprint another instalment of the questions given at the Technical Examining Tests, 1891.

INSTRUCTIONS.
The candidate must confine himself to one grade only, the Ordinary Honours, and must state at the top of his paper the grade to which he has selected.
The maximum number of marks obtainable is affixed to each question.

Three hours allowed for this paper.

19A. - CLOTH MANUFACTURE.

SECTION II. - WOOLEN AND WORSTED WEAVING.

INSTRUCTIONS.
The candidate must confine himself to one grade only, the Ordinary Honours, and must select his questions from those of Division I. or II.

Four hours allowed for this paper.

Not more than ten questions to be attempted in either grade.
The maximum number of marks obtainable is affixed to each question.

Candidates are requested to state the town in which they have been employed.

ORDINARY GRADE.

DIVISION II.

1. Give plan and particulars for accompanying pattern A, both as to counts of yarn and finish, (55 marks).

2. Make draft and pegging plan to weave the accompanying design on the least possible number of shafts. (30)

3. Find the number of heddles per inch on each shaft in the following draft plans; 12 reed, 5 in arched. (30)

4. How much weight of warp and web will it require to make a piece of 20 ends per inch of 30s. worsted fabric, 14-end gala web, the length to be 30 yards; 40 pairs warp, 12 picks, 36 inches wide? (20)

5. Convert the following yarn counts to gala counts; 2/25's cotton, 30's 2 span silk, 16'ss worsted (Yorkshire counts). (20)

6. Complete the accompanying design. (25)

7. What would be the resulting counts of two yarns twisted together, as follows: one thread of 70's and one of 40's single? (15)

8. What would be the resulting counts of two yarns twisted together, as follows: one thread of 70's and one of 40's single? (15)

9. Describe the worsted or double machine you are best acquainted with, single or double twist. (15)

10. Describe the different processes of a piece of woolen or worsted cloth, as to underlay starting with the yarn until it is finished. (30)

11. A pattern consists as follows:—

- 58 picks in the pattern; there are 60 picks per inch.
- What is the proportion of picks per inch of each colour? (20)

12. Supply several weaves on four, six, seven, and eight shafts, including such weaves as swanndown, doekskin, cork screw, mazy, burdickin, and others. (30)

ORDINARY GRADE.

DIVISION III.

1. Give a general description of woven fabrics, and explain the meaning of the terms "worsted," "twilled," "figure," and "gaaze" cloths. (15 marks.)

2. How many yards are there in a hank of cotton, also of worsted? State how many hanks are contained in a pound of single 60's cotton and two-fold 40's worsted. Give separately. (15)

3. Draw a tappet for weaving a six-end twill—vis, 1 warp, 1 weft, 2 warp, 3 weft, 4 warp, 4 weft, having a dwell of half a revolution. (25)

4. Make three designs for "fancy twills"—

- 1st, one where the warp should predominate.
- 2nd, a "вилла" warp.
- 3rd, "вилла" warp and weft should be equal.

And why? (20)

5. State formulae used for finding weight of warp in a piece of cloth, also twill. (30)

6. What would be the cost of material in a piece of cloth made as follows: 4000 ends of twofold 60's worsted warp, 56 yards long, at 1s. per lb, woven with 56 picks per inch of single 30s. worsted weft at 26s. 6d. per lb. Piece to be 48 inches wide, in reed of 6 and 52 yards long. Allow 10 per cent. for waste of weft in weaving? (25)

7. Describe the motion which is fitted to a loom to prevent thin places being made in the cloth, should the loom break and the loom run two or three picks before stopping. (25)

8. What is the difference between a single and a double lift? "Dabbled" or "dabbling" motion, and for what classes of goods are each particularly adopted? (10)

9. What are the chief causes of recklessness in plain worsted fabrics, and what are the means adopted for preventing them? (10)

10. Given 50 lbs. of twofold 60's worsted yarn, and you wish to make a warp containing 2,500 ends, how many yards long should it be made to use up the whole of the material? (20)

11. What will be the change wheel required to give 60 picks per inch, which ratchet wheel 60 teeth, intermediate wheel 120 teeth, intermediate union wheel 20 teeth, middle wheel 120 in dozen 12 inches, ratchet moving 2 teeth at once? (25)

12. From the following draft on joint paper the pattern it will produce, based on a 6-end twill, 3 warp and 3 weft. (30)

13. What are the comparative advantages and disadvantages of single and double lift Jacquard machines? What considerations would guide you in selecting one or the other for any particular class of goods? (15)

14. Arrange the following spot pattern in a 5-end satin order, plain ground, the full design when completed to occupy 20 ends and 30 picks; to have an equal quantity of ground between the spots. (25)

HONOURS GRADE.

DIVISION III.

1. Give plan and particulars for accompanying pattern B, both as to counts of yarn and finish, (60 marks)

2. What are the counts and price of two threads twisted together, one 30s. worsted and 30s. worsted, the price of worsted 2s. 6d. per lb, and worsted 5s., allowing for the twisting up of the worsted 3 per cent. (20)

3. A cloth woven with 68 ends per inch and 44 picks, 24 skeins worsted (Yorkshire counts), what number of picks and ends should it have to make the same class of cloth if you make it of 2/30's worsted? (30)

4. Put a backing warp on the accompanying plan, one end of face to one end of backing. (25)

5. A worsted warp, made with 4,000 ends 60 yards long of 2/24's should weigh 33 lbs., but on being weighed is only 28 lbs. What are the actual counts of the yarns, also the price; the price of 2/24's 2s. 6d. per lb. (20)

6. What would be the average grit of yarn in a cloth made with two threads of 2/30's and one of 2/40's cotton? (10)

7. Calculate weight and cost per yard of following cloth—40 ends per inch of 2/16's worsted at 2s. 6d., 36 picks of 15 count (gala counts) at 1s. 6d. per lb., 30 yards warp 70 inches wide in loom, 40 yards when finished, 3 per cent. waste; cost of production 2s. 6d. (30)

8. (a) Work out on joint paper a double cloth, a six-end Celtic, three up and three down; put a back on, one end of face to one end of back; work your back six-end twill, and stitch all as we are to show. Also give plan for cloth, cashmere face; one end of face, one end of back; two of face; two of back to one of back, and stitch together. (30)
9. Make a plan on point paper from accompanying sketch. The large strip twines to have an angle of 45°; the short strip an angle of 65°; cut by a straight line, in fine worsted not thicker than 2/40's, or woolen not thicker than 35 skeins. Give number of ends and pick and point paper. The work will be represented on a 3/4-in. rule made by the work. (20.)

10. (a) Supposing you have a Jacquard 34 hooks in three inches, you want to weave a design consisting of 65 hooks in one inch, and 34 hooks in one inch, and it is required to know how many threads are required to form the warp. (b) Is there anything in the frame of weaving that will allow you to weave your cloth with? (c) Also give directions for making a cloth, with 34 hooks, with 32 hooks, and 20 hooks in one inch, and 16 hooks in one inch. (21.)

11. Work out on point paper, an original design, 8-figured shawl in double plain, to be warped a thread of black and a thread of dark green; pick and point same colors. (22.)

HONORS GRADE.

DIVISION II.

1. If you twist together three threads—vir., 30's, 40's, and 60's—worsted—what would be the resulting counts, and what proportion of each would be contained in 100 lbs. of yarn? (15 marks.)

2. Give a cross-section drawing of a single and double Jacquard machine, and state the comparative advantages and disadvantages of each. What considerations would guide you in selecting one or the other for any particular class of goods? (20 marks.)

3. With what counts of yarn would you double a thread of single 30's, so that it would be equal to single 20's when doubled? (15 marks.)

4. Draw a cloth made of twofold 40's worsted warp and single 32's worsted weft, 64 ends and 56 picks per inch, so that the yard, and in the yard, and in the yard, to make a cloth of the same character weighing 22 oz. to the yard, what counts of warp and weft, and how many ends and picks will you require? (20 marks.)

5. Draw a twill pattern in the order of the following particulars:—1 warp, 1 weft, 1 warp, 2 wefts, 1 warp, 3 wefts, 1 warp, 4 wefts, 1 warp, 5 wefts, 1 warp, 6 wefts, 1 warp, 7 wefts, 1 warp, 8 wefts, 1 warp, 9 wefts, 1 warp, 10 wefts, 1 warp, 11 wefts, 1 warp, 12 wefts, 1 warp, 13 wefts, 1 warp, 14 wefts, 1 warp, 15 wefts, 1 warp, 16 wefts, 1 warp, 17 wefts, 1 warp, 18 wefts, 1 warp, 19 wefts, 1 warp, 20 wefts. (20 marks.)

6. Draw a pattern of a single 16 ends by 24 picks, and a double 32 ends by 24 picks, and a double 64 ends by 24 picks, and a double 96 ends by 24 picks, and a double 128 ends by 24 picks. (20 marks.)

7. Draw a section of gauge weaving, and explain how the deep thread is drawn through the bobbins, and its movements in weaving, and state why it is necessary to ease the deep warp during casting. (20 marks.)

8. Give a design on point paper, to be a combination of gauge, a plain 2-pick warp (crank and a weft) the whole to occupy 40 ends; and give draft showing least possible number of bobbins it can be woven on. (30 marks.)

9. A worsted cloth is made with twofold 50's, and has 72 ends per inch, and it is required to make a similar cloth of 40's cotton. How many ends per inch will be required of the cotton? (20 marks.)

10. In the construction of an 8-end satin plain ground, the whole design to occupy 76 ends and 272 picks in harness. Supposing you wish to make a design in a 40 sett, and that it requires 60 ends in a harness, and 100 twines in a harness, how many ends and picks would pick the design exactly? Answer this question if you have to cast out to weave straight in the harness. (20 marks.)

11. A cloth is required to be made in the design given below, the warp to be single 40's cotton. Give on point paper how many ends will be required to make a cloth of perfect structure? (20 marks.)

12. The book is required to have a length of 12 inches, required to give 60 picks per inch, with ratchet wheel 60 teeth, intermittent pinion 2 teeth, roller 10 teeth, circumference of beam 12 inches, ratchet moving two teeth, and intermittent wheel 20 teeth. How many more teeth will be required to weave a 9-pick pattern, pattern shaft wheel of 120 teeth, top or crank shaft wheel 24 teeth? (15 marks.)

13. Make a design paper for a single 40's cotton, as follows:—Face and back are both to be 6-end twill, 3 warp and 3 weft: to 1st only back cloth to be 1st or 2nd, and 3 ends; find and point paper for 2nd, 3rd, 4th, 5th, and 6th way to prevent any stitches showing through on to the face. (20 marks.)

14. Illustrate the Schaff's spike of blue serger, and C and give following particulars:—Set, counts of warp and weft (approx.) picks per inch and draft for weaving on lowest number of bobbins. (20 marks.)

20.—LACE MANUFACTURE.

ORDINARY GRADE.

1. Illustrate three different kinds of net made on the warp machine, and state also the name of the inventor of point net, on what kind of machine it was produced, what its fluid was and in what it was impregnated. (30 marks.)

2. Give the number of the inventor of the machine that superseded the point net machine, and describe the machine and its net as well, state and indicate its advantages over every other kind of netting machine. (20 marks.)

3. On how many different kinds of machines is the net mentioned in question 2 made? Name various gauges on which it is made, and the principal purposes for which it is used. (20 marks.)

4. Give an account of the difference between warp machine with main warp and 60 steel bars, and explain its method of working. (20 marks.)

5. Give an illustration of the newest and strongest type of warp machine, made to produce all kinds of netting; illustrate with figures, and describe at length its method of working. (20 marks.)

6. Give a description of the method of producing an imitation Cambric net on the curtain or go-through machine when a top-jacquard is used. (20 marks.)

7. What are the warp threads, also the motion of the wheels or carousels to operate the guide bars? (20 marks.)

8. What is the distinctive character of nets made on warp machines, plain net machines, and Lever's machines? (20 marks.)

9. Which is the best method of producing lace or nets with designs worked on them at the same time as the net is being produced? (20 marks.)

10. How is silk of various kinds, cotton, linen, and wood—such as are used in the manufacture of lace—computed? (20 marks.)

HONORS GRADE.

1. Why are lace sometimes called single warps, double warps, and triple warps? Name two varieties of each kind, and give illustrations of them. (30 marks.)

2. How many mottlings of the carriages does it require to make a double warp, and what kind of machine is necessary on which to produce it? (20 marks.)

3. Illustrate the motions required to make a Japonese net, 10 ends to the inch and a 12-inch single rail, the mesh to resemble an snow net. (20 marks.)

4. Give a plan of the marking out of the net, for the sake of manufacturing a 4-inch lace having 40 thick threads. (20 marks.)

5. In making Mechlin on a single tier machine, how would you use the guide bars to produce a twelve motion net? Describe also the motion necessary to produce the double tier machine. (20 marks.)

6. Give the movements of the guide bars to produce on the double tier machine an extra twist traversed bobbin net. (20 marks.)

7. Which kind of cotton is the best in your opinion to use on the warps of Lever's machines, and also in the loom, giving the reason why? (20 marks.)

8. Illustrate your method of laying out the sley for a Cantonese lace 6-inch wide, 95 point, with 20 centres, 40 thick and 50 thin, and 1,312 yards long, on a 4-end satin plain ground, and tell what kind of work it would be if it weighed 12 lbs. 8 oz. (20 marks.)

19.—JUTE MANUFACTURE.

SECTION II.—WEAVING.

1. Give the number of yards in a cut, in a beer and in a spool of yarn. (10 marks.)

2. Why do some manufacturers prefer to buy their weft in bundles rather than in bobbins? (10 marks.)

3. Describe a chain-beaming machine, and explain the use of the "heave". (20 marks.)

4. How many dressing machines would be required for a factory of 4,000 spools of 40's cotton? (15 marks.)

5. What count of cotton would it be on a warp weighing 100 lbs. composed of 5,750 yards, 3-1/2 yards long? What pick would the same warp be made if it weighed 12 lbs. 8 oz. (20 marks.)

6. In 1860, the leading printer, the cloth, 430 yards long, with a draw of 18 lines, with a print, composed of 3-1/2 yards, 3-1/2 yards long. What was the weight of this cloth, and what was the weight of the print? (20 marks.)

20.—FRAMEWORK KNOTTING.

ORDINARY GRADE.

1. Not more than twelve questions to be answered. (20 marks.)

2. Give a short outline of the working of the stocking frame. (20 marks.)

3. What are the various apparatus used in connection with the hand frame, and how are they worked? (20 marks.)

4. Describe the kind of fancy stitches produced by machine hands, of which not more than two shall be rib work. (20 marks.)

5. Describe the working of an ordinary circular wheel frame, and also one kind of latch needle circular frame. (20 marks.)

6. Describe the German circular frame, showing wherein it differs from the English circular frame;
also what are the advantages and disadvantages of each species. (9p.)
7. In what respect do rotary frames differ from hand and circular frames? (15)
8. What is the manner of cotton and worsted yarn calculated, and what is the number of yarns in a hank and a bank of worsted yarn? (15)
9. Describe the various parts of a cotton calculating machine. (15)
10. Describe how the calculations mentioned in your last answer are to be arrived at. (20)
11. What is the difference between narrowing and widening the frames, and what is performed so as to leave the work without any holes in it? (20)
12. What instructions would you give for making a woolen or cotton merino half-hose, and a man's lake-gauge merino half-hose, both fully fashioned? Give examples in both woolen and cotton. (20)
13. How is it that the number of warp threads is different from the number of weft threads? (20)
14. What are the characteristics of yarns spun on male, cap, ring, and flyer frames? (15)
15. What are the general defects in yarns, and the causes of these defects? (15)

Honors Grade.
5. Give an average of the net results after washing of the following woods:—
Port Philip washed fleece.
Sydney washed fleece.
Adelaide grey.
New Zealand crocheted grey.
Lincoln House, spun with spirit and Cheviots, 10 marks.
What is the cause of these defects? Do cotton yarns have any such defects? (15)
16. Explain the difference between ordinary and widening narrowings. (25)
17. Say why it is that pocket heel is made, and whether it is preferable to the ordinary fashioned heel. If so, why? (25)

Honors Grade.
Not more than twelve questions to be answered.
5. Describe a cotton or woolen weaving machine, and show how any complete articles are made upon it. (35 marks.)
6. Describe a circular knitting machine, producing a double row of work, and show it with both male and female half-hose made upon it. (25)
7. Describe a weight-process to make a loom with a plain warp, and place the laps of a fabric made with two guide bars half filled. (30)
8. Describe the construction and working of a double rag warp loom, and the making of any fabrics you know are produced upon it. (30)
9. Say whether or not the processes in spinning lamb's wool hosiery, or the dyeing and finishing of merino hosiery, is (30)
10. What are the processes in spinning lamb's wool hosiery, or the dyeing and finishing of merino hosiery? (30)
11. How many yards are there in 40½ basket, 2½ sack, 20½ yard, and 30½ yard hosiery silk? (20)
12. How many inches are there in 18, 42, and 36½ equal divisions for weaving, in either cotton or woolen yarns? (20)
13. Show how a wrought shirt and how laced fashioned combinations are made. (30)
14. Design on the accompanying paper a pattern of a sheet work made upon a circular frame with four feelers and 1,200 needles, and show how to cut the pattern. (30)
15. Describe the making of wrought frame-ready, gloved, and of gloves cut from a piece of fabric. (30)
16. Show how a Cotton patent frame differs from the old jack and sinner rotary, and describe any improvements and additions that have been made to the original frame. (25)
17. Cost a dyed merino half-hose, showcasing all the various items, and leaving a profit of 14½ per cent., and show how the total cost is calculated. (25)
18. Explain the difference between the fibers of cotton and wool, and show how each is bleached. (25)
19. Design the accompanying point pagers a pattern of a sheet work made upon a circular frame with four feelers and 1,200 needles, and show how to cut the pattern. (25)

Honors Grade.
Not more than fifteen questions required to be answered.
5. Give a short history of jute, its cultivation, introduction into the country, original modes of spinning it, and the progress of the cotton industry and the uses to which jute is now applied. (50 marks.)
6. Say what are the faults in jute which most seriously affect its value to the spinner. (50)
7. State the most economical mode of removing 'juice' from jute having a short root and an end, (60) and from jute having a long root with 'tammers' and low coloured pieces running through the stalks. (60)
8. Design a sketch of the relative positions of the wheels comprising the shaft gearing of a spinning frame, and calculate the drafts from the following particulars:
   Diameter of drawing roller, 5 inches.
   Diameter of retainer roller, 30 inches.
   Diameter of retainer, 3½ inches.

Ordinary Grade.
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system of licences to wear them. No person, but such as were qualified by their estates to sit in the House of Commons, was entitled to such a licence. The number of licences was limited, the licence to be £20 per annum, and the names of those taking them were given quarterly, with all particulars, in the London Gazette, to let everyone know the enemies of their country. No mercer was to be allowed to sell such licences, and he who licensed was to keep a book of account of purchases and customers, subject to inspection of excise. The writer was either unable or not inclined enough to make the computation of a revenue of £40,000 from these sources, which was as to be devoted to the encouragement of the manufacture by premiums, and a heavy bonus upon the importation of raw silk; of course, nothing more was heard of his project.

Chinese Velvet.

"Manufacture of velvet," says United States Consul Jones, of Chin-Kiang, China, "is mostly for the imperial household. The manufacture of ribbons is done on small looms by women and young girls. Their wages are from 80 to 100 cash a day; that is, 8 to 10 cents, besides their food. The looms employed in manufacturing silk, etc., for the imperial household, are about 200. Last year (1899), on account of the Emperor’s marriage, there were about 5,000,000 worth of goods made. The wages of the women on this work are greater than on the ordinary looms."

This Moldah Hirahal Mill at Ahmedabad seems to be working with considerable energy, and a started work towards the end of last year with 5,600 ring spindles of preparatory machinery, 1,000 forward and backward, and to further 16 thousands ring spindles, were added subsequently, and arrangements have just been completed, we understand, for a further supply of some additional nine thousand ring spindles, with preparatory machinery by the same makers. The extension will include carding, roving, spinning, doubling, and finishing. Cochin-China engines, by Mr. Benjamin Goodfellow, of Hyde, capable of producing herewith power, will be an additional boiler and a cotton carding mill and girdles for the building, which is fire-proof, and will be of English pattern, and originally furnished by Messrs. Greaves, Cotton and Co., of Bombay, with whom the orders for the additional machinery have also been placed.

Mention of the suspension of the needlework circles on the charismaticock fog of English country ladies may be connected with ancient forms of worship, brings to mind the unquestionable instances in which there has been expression in fibres, and gives, to those who need it, another proof of the woman’s study. Of cases in which words or sentences have been woven into materials there are enough to spare, if that subject were critically appraised, but even the most selective utterances, by means of threads or weaving, to which we are now referring. The few to clay with the Leviticus and the Commandments of God, and in his remembrance, through the frowns upon the borders of his garments, he was given the name of the Almighty in the alphabetical value of the number of threads in the fringe sometimes worn, and an alphabetical value of the name of God. An inscription in the Jawsh of Cashmere shawls evolved after much trouble and effort by a learned Professor one year ago, in the Indian Museum. The Egyptians of old had both textile and language, and the Pharaohs, with perhaps many more consciences, besides, have sort of symbolic writing through the patterns and colours of many garments, etc., they wore, but in their case the secret has never been revealed or discovered.—Wearieman.

Textile Markets.

**Owing to the present being Wold-week, The Textile Mercury is printed two days earlier than usual, consequently the market reports and some other features are set partially with curtailed sections.**

COTTON

MANCHESTER, WEDNESDAY.

The holidays this week have, of course, completely disorganised the market. On Friday last Liverpool “knocked off” until Wednesday morning, leaving such business as Manchester might attempt to transact, not receive any stimulating guidance as the city upon the Mersey is always waiting to afford. No material disadvantage was experienced from this source; however, as a disposition was very generally prevalent to adjourn over the week everything that would bear such treatment; and there was a considerable stagnation in the business. The ultimate outcome of the current crop of cotton is uncertain, but it continues to engage attention, more so, however, out of curiosity than from any apprehension that the highest point possible to reach will have any further material influence on the market. We are not, at present, in a position to determine whether cotton will, at that point, as stated weeks ago in this column, be closed upon the 25th; if not, it does not slightly exceed 8,700,000 bales. Perhaps the full figure may not be forthcoming from the plantations, owing to the abundant supplies at every centre here with the result that the market is not in a position to form an opinion. However, we have no doubt whatever. By carrying a fair proportion over, planters may possibly think that their crops last year were more than adequate, and if this be so, the market may not be extended. It has been quite evident for three or four weeks that prices have been necessarily depressed as far as it was possible for the current crop—evidently from this latitude—above to send them down. There is, in our opinion, very little likelihood that they can be further reduced by this influence. It is a very natural or the top operators and jobbers in cotton, who confine their views to the raw material and its statistics, and who have for a good while been dependent on going in heavily for a rice. Let us briefly glance at the salient facts, and begin with what we may term competing countries. Each of these, in our opinion, has a different advantage. Germany, France, and other Continental states, have materialised their interest in the manufacture, but India. The latter has a large internal market and amongst the most important of these must be mentioned the Lancashire cotton. Great Britain’s financial and political disturbances ruleing in almost every country forbid the indulgence of a reasonable hope that an early resumption of a satisfactory business with these quarters will be seen. Next take the countries of the Mediterranean; from those on the European, we can, for the present, make no statement such as could in any way make itself felt in affecting the future price of cotton, and the Levant may improve their takings very considerably, but whatever they may do in this respect they are not of sufficient magnitude to supply any start on the up-grade. There only remains India, China, and Japan, with the few small subject countries. The potentialities of these lands are great, but whatever material stimulus will spring from them or not is difficult to contemplate on. In any case we do not see much probability of extension, but a demand on an enlarged scale may spring up at any time. These are the positions, and the most finished and closest attention from spinners and manufacturers, and should price in our opinion, out of the market. The only event, then will be the time for manufacturers and spinners to buy in advance of their requirements.

WOOLLENS AND WORSTEDS.

BRADFORD.

The holidays are welcomed as affording relief, in the present state of trade, by spinners and manufacturers. Very little attention is given to the ordinary market now.

HUDERSFIELD.

There has been very little business done this week. The firm has been too busy taking measures to reduce stocks, but for so this has not been felt here.

LEEDS.

Prices for cloth are firm, in consequence of their advance in the wholesale market. Gwyther & Co. are doing a satisfactory trade in all-wool goods. Medium and low twilled cloths are gathering stock.

ROCHDALE.

The mills were running on Friday, Monday, but business was slow. Merchants’ travellers are on the road, but it is not yet known how stocks in the hands of retailers will appear.