in the United Kingdom. Candidates must pass to the satisfaction of the Civil Service Commissioners in all these subjects. When two or more candidates are considered equal in any of these subjects, the competition will be in subjects 6, 6, and 7. The limits or age will be 21 to 30, with an extension up to 38 in the case of a candidate who has been occupied as master, manager, foreman, or workman in a factory or workshop for at least seven years, and has acquired practical acquaintance with the working of factories and workshops. An official examination by the Home Secretary is required for this situation.

Technical Education.

THE EXAMINATIONS OF THE CITY AND GUILDS OF LONDON INSTITUTE.

The following questions were set in the subjects marked at the recent examinations held by the above Institute. The remainder of the technical questions will appear in our future issues:

10A. CLOTH MANUFACTURE.

Sect. II. WOOL AND WORSTED WEAVING.

INSTRUCTIONS.

The candidate must confine himself to one grade only, the Ordinary or Honours, and must select his questions from those of Division I. or II. He must not answer any question which has been asked in the same subject. If he has already passed in the first class of the Ordinary Grade, weaving and pattern designing (former Programme), he must select his questions from those of the Honours Grade of this subject. Three pieces of material and a piece of point paper are supplied to each candidate. Four hours allowed for this paper. No more than ten questions to be attempted. Candidates are requested to state the town in which they have been employed.

ORDINARY GRADE.

Division I.

1. Convert the following yarns into Yorkshire woolen weights: 20/2 worsted, 15 cat. gals. 9/0's cotton, 60/2 spun silk.

2. Complete the diagram of the order in which the accompanying plans are arranged.

3. Give a plan and particulars to weave an accompanying pattern.

4. Make a draft and pegging plan to weave the accompanying designs on the least possible number of shafts.

5. Describe the Gobel or dobby machine you are best acquainted with, single or double lift, either for hand or power loom.

6. Give the difference between open and close shading, and state the advantages of each system.

7. Give the thickness of woolen counts of a thread of 20 silk weft doubled with a 3/2 twist spin silk, also give the cost of the twisted thread, the woolen yarn costing 2s. 6d., and the silk 15s. per lb.

8. Find the number of threads per inch on each shaft in the following draft plan. 40 reed, 6 ends in a reed.

9. Complete the design from the pegging plan, taking your draft plan from previous question.

10. A check weave with 50 picks of 50 silk woolen yarn, how many picks should it have if you change it to 50 ends with the same plan and same weight on warp beam?

11. Make a drawing of a sketch of stocks and bows for a 2-end loom.

12. What pinion and intermediate wheels will be required on a loom to weave a 18 pick twill pattern, supposing you have 100 teeth in your tappet shaft wheel?

13. Give draft showing the least possible number of heddles Design A can be woven on, and draw a tappet to form pattern of the first end of design.

14. Why should the heddles have an eccentric motion imparted to them during weaving, and what would be the effect if it were not so? On what principle are tappets drawn to give that particular motion?

15. What would be the resulting wound counts, if two yarns, as follows, were twisted together; one 9/0's worsted, and one 20's single worsted? Also state what they would be equal to in cotton counts.

16. Draw a section of a Jacquard machine, showing eight hooks, cylinder, needles, and spring box in position, and the mode of fastening the needle ends to the hooks (single HJ).

17. From Fig. 1, construct a design in the colors of a 6-end satin. Design to occupy 40 ends and 40 picks, and the ground space to be equal between each of the spots.

FIG. A.

18. If you have a cloth made with 80 ends per inch of 2-fold 40's worsted warp, 48 inches wide in the loom; warp 70 yards long; and 72 picks per inch of 3-fold 80's worsted weft, piece to be 66 yards long out ofloom—warp_to cost 2s. 6d. per lb., and weft 1s. 1d. per lb.—give weight and price of each, separately.

19. What are the advantages gained by sidng a single twist warp, both in worsted and cotton, and state your opinion as to what you think the best

method of siding same, and give reasons.

20. State why in weaving some classes of plain goods the bottom warp, when the shed is open, is depressed more below the centre than the top warp is raised above. Give a drawing showing position of warp and weft when the shed is in full open.

21. Supposing you have a cloth made in a 56 sett (Breadal system) with three 2-fold 60's worsted warp, having 64 picks per inch of 3-fold 60's worsted weft, weight of cloth 16 ounces to the yard. What warp and weft, size, and picks will be required to make it 2 ounces heavier, and still retain the same character of cloth?

22. Give draft and pegging plan for weaving gauze cloth, 2 ends crossing 2 ends, and say how many picks will be required to make it 4 ounces heavier, and still retain the same character of cloth?

23. Describe the difference between the dobby and a Jacquard machine, and state the advantages, if any, that the one has over the other.

24. Give a drawing of a weft fork and lever in position.

HONOURS GRADE.

Division II.

25. Give a base of cloth with a capacity of 306 holes in a loom of 3 inches, and then require to weave a design of 46 threads in a set of 36 threads per inch, how many you will have to cast out, and how would you distribute them?

26. Give a plan and particulars to make the accompanying pattern.

27. What length of cloth can you make from 10 lbs. of 200's worsted cotton, 9 reed, 4 in a reed, and 44 picks?

28. What would be the average price of yarn in a cloth made by two threads of 2/0's worsted, and one thread of 20's cotton?

29. Make a plan from accompanying sketch to be composed of three different weaves, give the particulars for weaving and figuring, the whole pattern to be not more than 99 ends and 99 picks.

30. Describe a Kendal carpet Jacquard, or loom for weaving double dobbles.

31. Convert weight and cost per yard of following cloth—60 ends per inch of 30 slinm worsted warp 92 yards; 66 picks of 32 slinm webs at 1s. 6d. per lb., 50 yards warp 10 in. wide in loom, 40 yards when finished, 10 per cent. waste; cost of production £

32. (a) Work out a double cloth with a cut check pattern, give heading design along all weaving particulars. (b) Also give plan for double cloth with a pattern face and back, one thread face and one thread back, both warp and weft, both being two treads together as not to show stitching.

33. Put in a backing weft in the accompanying plan two picks of face to one of backing; give the design on point paper.

34. A cloth is required to be made with 40's cotton, the pattern an 8-end satin with four intersections of how many threads per inch it is required, the diameter of the thread being 9s.

HONOURS GRADE.

Division II.

35. For what classes of goods are hand-looms preferable to power looms, and why? Describe the class of hand-loom most generally used.
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26. What will be the resulting counts of the following annual crops, twisted together: one thread of 50’s, one of 40’s, and one of 10’s cotton? (100)

27. What is the weight of 1 lb. of 50’s cotton? (100)

28. Draw a design on point paper of the fig, showing in order of an 8 and 3 stylus, with 12-2-2 around, the whole design to cover 110s and 72 picks, and the ground to cover the space between each of the spots. (90)

29. Give and describe the uses of a pressure harness, and the class of goods for which they are used. (30)

30. Analyse attached bit of cloth, and give the following particulars: texture, the material of which it is made, the quality, estimate of the counts of yarn (both warp and weft), and, how it is finished to get the brightness so full on the cloth. (200)

31. Give the length of time required for properly retting the flax. (200)

32. A thrifty farmer should not be tied too tightly; and, in ordinary flax farm, may have a farmer just in front of the retting process, from observing the alterations he has to make in weighing down the flax. (100)

33. In retting, should the beets not be tied too tightly; and, in ordinary flax farm, may have a farmer just in front of the retting process, from observing the alterations he has to make in weighing down the flax. (100)

34. To what three points, in connection with his flax-grower, should the farmer pay most particular attention, in order to get the best possible result from the retting process? (100)

35. Under what circumstances and to what marks is the flax used under which marks is Peruvian flax usually shipped, and under what circumstances and to what marks is the flax used under which marks is the relative value of the other marks? (100)

36. Speaking generally, would prolonged storage, after retting, be likely to improve, or to injure, the quality of the flax-fiber, and would you also suffer such improvement, or injury, as likely to be transitory or permanent? (100)

37. Select three of your best flax bales and all three bales (or courses) before backing—describe the advantages and disadvantages of this system, and shew how it affects all the subsequent manufacturing processes. (300)

38. Describe the process of the Horner "striping" machine—giving, if possible, a rough sketch, in section, showing positions in sheets, striping-ends, etc. (100)

39. Describe the work performed, in a tow card, by the ordinary strippers, warmers, and roapers respectively. (100)

40. In the three-doffer card—why is the silver of the top doffer sometimes taken off separately? (100)

41. The silver is planting bulky in the gift of a drawing frame—what effect is given by the yarn would be likely to cause, and how would you proceed to remedy the evil? (100)

42. In an ordinary moving frame, to produce a properly made rope the speed of four of the principal organs have, necessarily, to be taken into account—namely, (1) the number of bobbins, (2) how many do the speeds remain constant, and (3) in those the difference of their variation, in each case, proportionally? (100)

43. Why in unspinning attention to rove traverse such an important thing as the dirt of a spinning room-overlooked? (100)

44. Denote any (more or less) automatic systems with whirl. You may be acquainted for (1) intricate spindles; (2) dropping bobbins; and (3) cleaning rollers of spinning frame—giving your opinion as to their practicability, utility, cost, etc.? (100)

45. Give a rough sketch, showing driving arrangement,—with treadle (stop) motion—for a double power. (100)

46. Assuming you have a well-arranged dressing place, (1) what temperature (Fahrenheit) would you recommend for dressing? Which parts of your dressing? When you may be acquainted with, (2) how would you place the finer yarns, and (3) coarse ones, with respect to the power and the hot supply; and (4) what arrangements would you make to minimise the effect of these? (100)

47. Can you suggest any changes likely to improve the health of the workpeople in the heaving, dressing, and pressing departments? Without interfering sensibly with the proper treatment of the material? (200)

48. About what I.H.P. per 1,000 spindles (machinery in all the departments included) would you consider a fair basis for an average mill, spinning moderate numbers—and, what revolution in the yarn per spindle you would reasonably expect, as, on an experiment made at say, seven a.m., and another at twelve noon? (100)

49. Examined under the microscopes, what difference can be observed between the fibres of flax and cotton, as to (1) form; (2) length; and (3) colour? (200)

50. Describe sifting, or black dust, on the flax plant—what causes it? What is it, usually, most prevalent? (100)

51. What should the farmer do when he notices his crops affected by it? and what does it mean? (100)

52. Describe the process of reeling the flax fibre. (200)

53. How you would proceed to test flaxseed, as to germinating power, and if, the seed had been mixed (either with that of another district, or of another species), would you test your point to such admixture? (200)

54. Two samples of Dutch flaxseed have been purchased at two different times, in one 80,000, in the other 88,000; (a) germinating power, 80,000; (b) price per pound, 13,30 per pound; (c) running power, 83,30; and, from above data, what are the average values of the two seeds? (100)

55. How you would test the strength of flax, on land with a stiff clay subsoil, and on peaty or sandy soils, with a poor bottom. (100)

56. Discuss the question—(1) as to whether the surface of the ground should be (a) loose; or (b) gently broken up, to receive the flaxseed; (2) should clover or rye grass be laid down with the flax—if so, how would you proceed to get it up, by rolling, which follows the sowing of the flax? (200)

57. The five tests of flaxseed, (a) is a farmer usually employed to judge if his flax has been sufficiently retted; and, what other tests are sometimes employed. (100)

58. Describe the principles on which the three, the four, and the six-cylinder looms are made. (200)

59. Watts and Passey are founded; and give the general classification of the fibres produced by each method. (200)

60. On what three different principles have machines for flax cleaning been successively designed giving an example of each class; and which principle, up to the present, has been most approved of by flax-growers? (200)

61. In the thickness of plaiting, in addition to the wooden matter requiring necessary tension from the flax, what percentage, roughly, of the fibre is also taken off, in the form of tow? (100)

62. Costs of production of flaxseed may be taken at, say, 92.8 per cent.; and seed selling for about 25; give your opinion as to the relative proportions to be set down against (a) preparation of soil, including plowing; (b) retting, including grassing; (c) sowing; (100)

63. To what six points, in connection with Russian (especially Luga) flax, has attention lately been directed, with a view to effect improvement; and what action is the Russian Government reported to have taken, to revive and extend the flax industry? (200)

64. Discuss the advantages and disadvantages of spreading the line by direct operation (without going through the sowing process)—showing effect on cost of material, and quality, etc., of flax. (100)

65. Describe the differences in the various arrangements, on the Horner and Cotton hacking machines—as to rollers, hackles, attachment of the hackles, direct strains, etc. (200)

66. Taking the development (or surface speed) of a card cylinder to be represented by 1,000—what would be, very roughly, the average developments of the strippers, warmers, and roapers? (100)

67. State the arguments for and against tow-coming; and give, roughly, a description of any new invention of which you are acquainted. (100)

68. A rolling-frame produces a rope which, while too soft, looks "dragged"—"how would you correct these evils? (100)

69. The differential-motion on an ordinary rolling frame—prove the correctness, or otherwise, of the following information, that (1) for tension, the rotary movement of the bobbins varies, in inverse ratio, to the circumference to be wound on; and that (2) for proper tension, the whole builder is inversely proportional to the diameter of the machine. (100)

70. (1) What is ring-spinning—how would its adoption probably affect (a) the twist; and (b) the yarn of flax?; ring-spinning is a system where the (c)pitch of spindle, flyer, and form of see employed; explaining how the build is made, in view of the rising generation to follow? (100)

71. Describe hand-end—stating how generally necessary is the process of toughening. (100)

72. You require to make some new reed-barrels—how would you design proper form and length of such barrels, when fly and eye are attached, would produce proper size of barrel? (100)