About this document :

- Features mentioned in this document are super set of all features spread over all modules and versions that include Standard/ Professional/ Server & Browser versions of Addmen OMR Software. Some features may not essentially be a part of the version and module under procurement.

- **References from the User Guide and other Guides are also given in this document.**

Note on Design and Calibration of OMR Sheet

The OMR Sheet designer is an integral part of the OMR Software.

There are two basic OMR modules in Addmen OMR software: Answer Sheet Checker & Form Reader. These can be procured independently or in several combinations. In either case, the Standard Sheet Designer is integrated and FREE. The user can learn to design and create as many layouts as he wants.

IMPORTANT ! The OMR Software can easily read sheet layouts that have been created using the inbuilt sheet designer. Any sheet designs that have been created outside the Addmen OMR software must be calibrated into the software. **Read more about Creation of New Sheets and Calibration of Externally designed/ Pre-printed sheets in this document.**

It is most convenient to read layouts created inside the software and get 100% accurate results with ease because and internally created sheet allows the use of full flexibility and features of the software. This does not mean that you have a limitation to use readymade layouts only. The Addmen OMR software has a sheet designer, so **you can create as many layouts using the design facility**. But either the layout must be created using software or it should be calibrated in the software only then the software will respond to it.

If there are any **externally designed or pre-printed sheets** to be read then they have to be calibrated into the software. If this is a regular requirement, then the user will need the Advance Sheet Designer module and he will be trained to make use of it. If it is a onetime requirement, you may also consider the option of getting it calibrated by the support team on additional charges.

Generally it is suggested to avoid the use of calibrated sheets as it demands high user involvement and attention. So calibration should be seen as a last resort only in SoS situation when due to some reason, the test has already been taken on an externally designed sheet and the only option is to read these sheets.

For externally designed or pre-printed sheets that have been calibrated, the user has to follow cautious scanning and reading procedure to get accurate results. If there is slightest negligence at the time of scanning or reading, the result of calibrated sheets may come out inaccurate. Hence in case of calibration accuracy of the output cannot be guaranteed.

Calibration depends on availability of certain parameters and components in the printed sheet. If the sheet has necessary parameters required for calibration, then only the sheet can be calibrated and read from the software.

The **Advanced Sheet Designer module** can be used to calibrate most type of pre-printed OMR layouts which have been made according to OMR guidelines. Some typical sheets can be calibrated with some specific customization in the software. Not all layouts can be calibrated. **Consult the technical support team to know whether this sheet is suitable for calibration & reading.**

OMR Sheet Design Training and Support

IMPORTANT ! Though sheet design is apparently the first step in the process, but it is the last step in training. The user must first perform & practice basic steps of OMR reading and result extraction on some of the pre- designed sheet. A hands on experience in printing, scanning and reading OMR sheets is utmost important to understand the need and importance of sheet design components.

Without clarity on basic reading and the output obtained for various types of blocks, it will be difficult to understand the concept & the need of design parameters. Thus sheet design training is taken up as last part of the training curriculum.

Difference between Facility to design and Ability to design

It is important to acknowledge that Sheet Designer only provides a tool to creating designs. Same sheet design tool may be used differently by different individuals depending upon their individual sense of design and ability to execute it.

For ex. Using the same brush and palette, a deft artist can create magic within minutes, while a novice might not get any close to it, whilst the tool is the same, sense of visualization and planning is important for designing.

Users will be taught the use of sheet design module, and about sheet calibration, but this does not guarantee that they will be able to design or calibrate their sheets with professional efficiency.
Using this tool properly to create various layout depends on individual's creative ability to :
1) visualize the desired output and select the correct type of block for it;
2) arrange different blocks aesthetically and systematically to fit on a piece of paper;
3) understand and follow OMR design guidelines.

If required, Addmen support services can be availed to create or calibrate designs for users, the effort shall be charged separately.

Sheet Design and Calibration Services

OMR software has a sheet design feature using which you can create your own layouts. If you have not received the training of sheet design or yet not comfortable with using this feature, we can once again give you training for sheet design.

During startup, we create initially one design from our end to make your start up with OMR software comfortable. But regularly you have to create your sheet layouts yourself.

Any more layouts created from our side would be chargeable.

If Addmen technical support team has to do the calibration, we will require you to send about 5 to 10 images of the sheet scanned perfectly straight, in colour mode, in 100% size with no scaling and saved as BMP/JPG/TIFF.

In some cases where we feel the pre-designed/pre-printed sheet does not fulfill the basic criteria for accurate reading, we alert the user. If still insisted to calibrate against our advice, we do not assure any accuracy.
Sheets cannot be made or calibrated urgently. We shall deliver the new design in max 2 working days excluding date of order. Please take timely decision and place order with sufficient time buffer.

OMR Sheet Design Process

Design of OMR Sheets can be divided into two parts:
>   1) the technical OMR readable part; and
>   2) the ornamental part containing text instructions and images.

The design of OMR layout is done in the OMR designer panel through a very simple Drag-n-Drop process. The OMR layout is then exported to a PDF for direct printing, or Word or to an open source format that can be used in several popular DTP softwares for further editing.

OMR sheets are designed for various purposes and users of different regions, so sometimes they may contain instructions in different languages and might be required to make it more picturesque. These provisions would require the flexibility of DTP software. So after the technically readable OMR part is designed in OMR designer, we have kept a provision for exporting for further editing in DTP softwares.

When we create a sheet, its design reading information is stored in software and its layout is exported for printing. Both parts of sheet (printed layout and reading information) are important. Just printed sheet is not sufficient because if the software does not know where to look for bubbles, it will not read the sheet correctly and this information is provided by the reading layout stored inside the software. So the layouts to be read must be designed or calibrated using OMR Software so that both printing and reading information is generated.

There is difference between an Answer Sheet and Data Collection Form in terms of design requirements, design components and later process.

If only Answer Sheet Checker module is active, we can design only Answer Sheets that contain Form ID, Test ID and Questions. If only Form Reader module is active, we can design only OMR Forms which include all types of block except questions. But if both modules are active then we can design-Answer Sheets, Forms and Combo Sheets which work as Form & Answer Sheet simultaneously.

Sheet ID or Design ID

- Each sheet design is given a unique ID. The Sheet ID or Design ID or Layout ID is in the format XXXNNN or XXXXNNN, where XXX or XXXX is the client ID and NNN is the sheet sequence number. Together it forms a unique design number.

- A user can create sheet ID series only on his own client ID.

- The common sheets or readymade standard templates are available on ID series 101NNN and 112NNN. These cannot be edited or uploaded. They can only be duplicated and saved on Client ID series for further editing.

- The Sheet IDs of the multiple layouts used in reading Multipage Forms, must be in sequence of the page number. For example for 3 page form, the IDs would be : 101**006**, 101**007** and 101**008**

- In case of Duplex (both side printed) sheets, each side is considered as an independent layout and the sheet ID must be in sequence. The design or page with the form ID block is kept as first in order.

Backup Facility to keep the Designs Safe

IMPORTANT !   The sheet design that is created, is stored in your local database. If the database is refreshed intentionally or if mistakenly replaced due to reinstallation, then the sheet designs stored locally will be lost. If the sheet reading information is lost, then it will not be possible to read the printouts corresponding to this design. It is thus important to be aware about the backup of your sheets while replacing your database. However, if a layout is lost, it can be recreated, though it will take some effort to check and recheck with the printed layout.

Addmen provides a free online server backup facility to all the users during their active support term. It is an optional facility that can be used to upload the sheet designs to have a safe backup outside your local database.

If the sheet design is backed up on the server it can be downloaded back by the same license user who uploaded it. Because of this facility the Server can also be used to share sheet design in multi-branch institutes where one user can create and upload the design to be downloaded and used by all the other branches.

- When the user creates and uploads a sheet on some ID and if a sheet is already uploaded on the same ID on the server, then the sheet on the server will be overwritten and vice versa.

- To keep a final design safe on server and to safeguard it from accidental overwriting by any of the users, it can be locked while uploading. This will prompt the user when trying to upload again on the same ID and save the final sheet from being overwritten.

- There is a provision to see the list on the server with last creation and upload details.

- If your design is final and is being read properly, press the UPLOAD button to upload it on Addmen Server to keep it safe.

- You can check the 'Lock Design' checkbox so that this design is safe on the server and yourself or no other user ever overwrites it by mistake.

- In case of data loss at your end you can regain your sheet template back by downloading it from the server. Press the DOWNLOAD button to do so.

- Uploading facility can be used in case of distributed branches where one branch can create a sheet design and upload it for other branches to download.

Sample Sheet Design

with **OMR**, **OCR**, **ICR**, **Barcode**, **Image**, **Lithocode** and Variable Printing.

All type of fields can be read in single pass. Parallel Reading at Multiple Threshold in single Pass.

Your Institute Name & Logo
CANDIDATE INFORMATION

Preprinted number
Print: VDP (PE)
Read: OCR (PC)

Sheet Serial No.   Print No.
12055   * 5 6 7 2 1 *

Handwritten Name
Read: ICR(PC)

Candidate Name (In BLOCK Letters)
ANGEL

Name as OMR
Read: OMR(SB)

Unique ID Field
Read: All OMR

Roll No.   Exam Date

Additional Info fields
Read: OMR(SB)

School: GANDHI VIDYALAYA, PARBHANI
Exam Center: GANDHI VIDYALAYA, PARBHANI
Subject Group: ENGLISH
Examination: 01-Jun-2016

Variable Data
Print:VDP (PE)

Candidate Signature

Image/Photo
Capture: OMR (SB)

Enter Subject Code
1 1 2
Re-enter Subject Code

Handwritten Numbers
Read: ICR (PC)

OMR ANSWER SHEET
INSTRUCTIONS FOR FILLING THE SHEET
1. This sheet should not be folded or crushed.
2. Use only blue/ black ball point pen to fill the circles.
3. Use of pencil is strictly prohibited.
4. Circles should be darkened completely and properly.
5. Cutting and erasing on this sheet is not allowed.
6. Do not use any stray marks on the sheet.
7. Do not use marker or white fluid to hide the mark.

WRONG METHODS   CORRECT METHOD

Auto Sort Field
Read: All OMR

Test Paper Set   A   B

Multi Choice Questions
Read: OMR (SA)

A B C D   A B C D

Lithocode
Print: VDP (PE)
Read : OMR (PG)

Sheet No.
12055
Print No.
* 5 6 7 2 1 *

Barcode
Print: VDP (PE)

Barcode
Read: All OMR

Invigilator Signature

You must add Form Reader (SB) with OMR Answer Sheet Checker (SA) when you have to read any more type of fields like Name, Exam Date etc. beyond the basic test purpose fields like Unique ID, Auto Sorter and Questions on your sheet.

Understanding the OMR Sheet

An OMR sheet has 5 main components:

Index Points	These 4 points provided at the 4 corners of the OMR sheet are the most important components of an OMR sheet. The evaluation and accuracy of evaluation depends on the clarity of these 4 points in the scanned OMR sheet image. *In the old pattern, machine read sheets, were additional black marks placed at equal increments running throughout the length of the sheet on either side or on both sides. This strip of black marks is called a* **timeline** *which helps the OMR machine to identify the next row of bubbles.* **But Addmen software does not need a timeline to read. It has a radically different algorithm, which needs only 4 index points placed in a perfect rectangle.** In case of calibrated sheets, in which the index points have different sizes or are not arranged in a perfect rectangle, the advance sheet designer can be used to calibrate improperly placed index points.
Unique ID Field	This block is required to identify to which candidate this sheet belongs and in whose record this data should be recorded. In case of Answer Sheet it is the Roll No./Registration No. block. In case of a data collection form, it is the Form No. block. Unique ID block may be kept on the sheet as an **alphanumeric OMR block** for the candidate to fill or as Digitally pre-printed number to be read as **OCR or Barcode or Lithocode.**
Sorter / Test ID Field	This block serves the purpose of a sheet segregator block which the software uses to identify the sheet to read it differently in a mixed lot of scanned images. This block is required on Answer Sheet to recall the test definition to identify which set of correct answers to use for the evaluation of this sheet and how to calculate and distribute the marks into different sections. Sorter block can be of OMR, Barcode, OCR, ICR type. However the value must be numeric always.
Response Fields/ Information Fields	These are various types of OMR block matrices delivering different types of outputs. In case of Answer Sheet these are the question blocks to be evaluated. For an application or Survey Form these are various OMR based data collection fields. Besides the OMR based Information fields and Multiple Choice Question, the response blocks can be ICR type to accept and read handwritten input. In some sheets photographs are also pasted or the image of a certain area of the sheet has to be captured. Thus image blocks can also be assumed as one of the types of response blocks. OCR, Barcode, Lithocode and Qcode can also be used.
Open Design Area	This is a blank area which is not heeded by the software and can be customized aesthetically according to user requirements, the logo and name of the institute and the column for candidate information can be printed within this area. There can be several such areas on a OMR sheet. The content in text blocks and alteration thereof does not affect the OMR sheet.

Important Info about sheet components while creating a New Sheet Design

Unique ID field

- Any sheet design must have a unique Form ID field which uniquely identifies this sheet and its data from all the others. For example, a test answer sheet must have the student unique number or the registration ID field so that the scores from this sheet are posted in the database against this unique Form ID.

- Without the Unique Form ID field, the sheet design is not complete and does not show up in the list on the Test Definition Interface or Sheet Reading interface.

- In case of Two or more parameters forming the Form ID field, then the placement of such fields should be made such that they can be read as a unique block.

- It is possible to keep one single Form ID block overlapping on the visibly distinct multiple fields.

- The Form ID block gets special treatment than other block on the OMR Sheet. Unlike the other blocks, any exceptions and discrepancies in filling of Form ID field are prompted at the time of reading. There are several conditions for which the Form ID field is checked while reading.

BID: Blank ID (Candidate ID not filled)	**LID**: Invalid ID Length (ID does not have specified no. of digits)
DUP: Duplicate ID (Same Candidate ID Filled by more than 1 candidate)	
IID: Invalid ID (Candidate ID not in list)	**DID**: Multi Filled ID (Multiple bubbles filled in same column of Candidate ID Block)

- There are several Read-time Settings for the special treatment of Form ID block.

FormID Length [0-10], Sorter Length [0-10]
Set the LENGTH and RANGE of Form ID and Test ID fields, in case they are fixed in your institute. This will help in additional vigilance of erroneous filling of sheets.

ID Replace 1/2/3[0=Off/Column No, Values=V1|V2|...]
To obtain alphabetical form IDs, alphabet/general block can be used. To obtain numeric form IDs, numeric block can be used but to obtain alphanumeric form IDs, we use a Numeric Block with special arrangement to replace the numeric values of some column to alphabetical value. In current version upto 3 columns can be replaced with alphabets. This feature is only available with form ID field.

To read a column as alphabet, enter the column number separated by comma and followed by 10 values that would appear as replacements of 10 numerical values each of them separated by pipe "|".

For example to obtain a form ID like F2010M, do as follows:
Insert a 6 column numeric form ID block on your sheet layout.
Set the "ID replace 1" parameter value to- 1,A|B|C|D|E|F|G|H|I|J
Set the "ID replace 2" parameter value to- 6,M|N|O|P|Q|R|S|T|U|V

Default value is 0 for no replacements.

Auto ID [0=No; 1=Yes; 2=Ask]
To provide Auto system generated unique ID for each and every sheet.

Add Leading Zero to Form ID [0=No;1=Marked;2=Always]
To read Leading Zeros in the field of Form ID or Candidate ID.
For eg. 0001, 0002 etc

Unique ID field as Auto ID

- In case there is no need to collect any unique ID from the sheet, then such sheets will be read on the Auto ID mode, where the Form ID will not be read from the sheet, instead it will be auto allocated by the software in the sequence of reading of scanned images.

- To meet this situation, a hidden Form ID field must be placed somewhere on the sheet. The unique Auto ID obtained upon sheet reading will be saved in the hidden form ID field that exist in the layout but is not actually seen on the printed OMR sheet.

- The hidden Form ID field can be 1x1 numeric block. The bubble of this dummy field can be deleted in the printout before printing, while the bubble corresponding to it in the reading layout will remain on the reading layout.

- When a sheet is read on Auto ID, the system allocates ID starting from 1, unless the Read-time setting is set as 2, which allows the user to specify the starting number of the series.

Unique ID field in Duplex Sheet

- In case of Duplex Sheet, the unique Form ID field must always be kept on the first scanned side.

- In case of Duplex sheet to be used in Test (which bears question blocks), the layout of the sheet must be so designed that the Question and the Form IDs are preferably kept on the same side i.e. the first side. However even if questions are placed on the second side, it is acceptable. Though the Form ID is always fetched from the first side.

Sorter Field (Test ID field)

- This field is used by the system to segregate the mixed up sheets according to the different values of the sorter field.

- The sorter field also gets special treatment at the time of reading. Unlike the other blocks, any exceptions and discrepancies in filling of Sorter / Test ID field are prompted at the time of reading. There are several conditions for which the sorter field is checked while reading.

BLT: Blank Test ID (Test ID not filled)	**ILT**: Invalid Test or Length (Test ID does not have specified no. of digits)
DBT: Multi Filled Test (Multiple bubbles filled in same column of Test ID Block)	
IVT: Invalid Test (Test ID not defined)	**FRM**: Manual ID or Test Skipped (Candidate ID or Test ID entered manually)

- Sorter block is not compulsory. If it is not required to read the Sorter block (in case no sorting is needed), then it is not must to keep a Sorter Block.

- The sorter field is always numeric. It can be horizontal numeric or vertical numeric in structure.

- In case of Answer Sheet Design the software will not seek the sorter block if it is not placed on the sheet. Even if it is placed, and yet not to be checked, then the 'Skip Test' option is must be selected during reading.

- The sorter finds its most common use in case of tests where multiple test papers are created by shuffling the same set of questions and called as Set A / Set B/ Set C…. by using the sorter field, the Answer Sheets can be segregated so that sheets of Set A are checked against the answer key of Test A and likewise.

- The Sorter block is also required in case of Answer Sheets to sort Answer Sheets according to the Test ID. So when a Test with multiple sets is to be evaluated, the Test Paper Sets are filled in the Sorter field. So that the software can automatically segregate sheets according to Answer Key.

Sometimes a test is conducted for multiple posts where there is a different question paper for each post. There are also multiple sets (A/B/C/D) for each test paper.

For example there are 3 posts P1, P2 and P3. Each post has a different level of test paper, each test paper is different from the other and has different questions. But at the same time, to avoid copying, each test paper of each post has been shuffled to form 2 test papers having same questions in a different sequence.

Thus there are total 3x2 question papers distributed in the room. The test answer key is changing as per the post and as per the set within the post. Then there are 3x2=6 Answer Keys. So we need to sort the sheets for each type of answer key.

Sorter values for Post 1: 11, 12
Sorter values for Post 2: 21, 22
Sorter values for Post 3: 31, 32
Total 6 filled as following.

This is how we will place a 3 column Vertical Numeric Block to be used as Sorter.

We will remove the central column so that it appears as two distinct blocks but will serve in combination as one Sorter block.

Fig. 1A	Fig. 1B	Fig. 1C	Fig. 1D	Fig. 1E	Fig. 1F
Post 1 Set 1	Post 1 Set 2	Post 2 Set 1	Post 2 Set 2	Post 3 Set 1	Post 3 Set 2
Sorter Value 11	Sorter Value 12	Sorter Value 21	Sorter Value 22	Sorter Value 31	Sorter Value 32

- In case of Two or more parameters forming the Sorter field, and these fields have also to be captured separately then the placement of these fields should be made adjoining such that they can be read as a unique block. One Sorter block should be kept overlapping the other two blocks.

Sorter/ Test ID field in Duplex Sheet

- In case of Duplex Sheet which is read from the Form reader, the Sorter field must be placed on the first page of the form. So that when mixed up forms are sorted, all the related pages are prefixed with the sort code on the first page. Even if the sorter field is placed on the second page, it will be treated as dummy field and not read by the software.

- In case of more number of questions or because of the need of design, if a test Answer sheet is so designed that the questions spread over both sides of the sheet, then 2 different tests should be defined. The Test ID must be in same order as the sheet ID, i.e. the first sheet should be used to define first test and the second sheet layout should be used in the second test in sequence.

- In case of Duplex sheets, if the tests are to be sorted then single side tests should be made. Sorting of two-sided test sheets is not possible. This means that if a duplex answer sheet is to be used for multiple sets of a test paper, then in such a design all the questions must be placed on the same side of the sheet.

Inclusion of Required Blocks

- Various types of fields in a layout are 'Block', 'Question', 'FormID' & 'TestID'.

- In case of Data Collection Form only one key field – 'Form ID' is required and any type of 'Blocks' can be used.

- In case of Answer Sheet 'FormID' and 'Question' are required. If a sheet layout has these 2 field types, only then Answer Sheet will appear in 'Select Sheet' dropdown list in Step 1: Define Test panel.
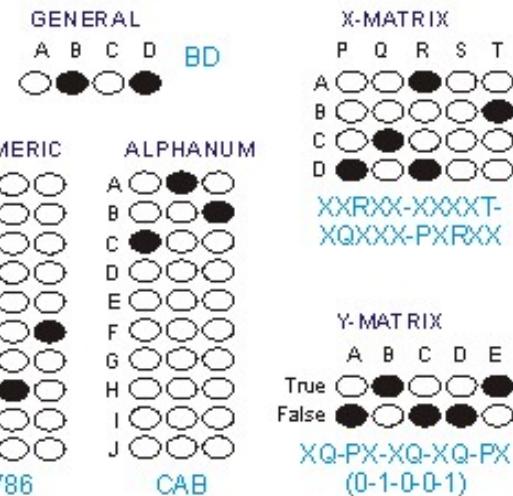
Various Block Types and Value Exceptions

Various type of Readable blocks available for design are listed below. Each read type has a different arrangement of bubble array. Their output is shown on right.

> **OMR-General MCQ**
> **OMR Numeric Integer (Horizontal/Vertical)**
> **OMR Numeric Decimal**
> **OMR Alpha-Numeric**
> **OMR Matrix (X-Matrix / Y-Matrix)**
> **OMR Lithocode**
> **OCR**
> **ICR (Alphabet/Alphanum/Custom)**
> **Barcode**
> **Picture**

Various type of Non-Readable blocks available for design are given below

> **Header**
> **Label**
> **Image**

OMR General (used for MCQ)

- This is the most basic type of OMR block which is horizontal in structure and in which each bubble (i.e. each column) corresponds to alphabets ABCD….upto Z (maximum 26 bubbles in a row).

- When this block is placed with more than 2 rows then the output is received as ABCD-ABCD i.e output of each row separated by a "-".

- While multiple rows might be suitable to obtain certain type of output in case of Form Reading or Data Collection, but when used as a Multiple Choice Question it is preferred to place this block as a single row block which give output like ABCDE…

- This type of block is used when (Yes/No/Cant Say) or (Poor, Average, Good) type responses are sought.

- This block can also be used in case of Feedback Forms where a range of responses on a scale of 1-5 are required. In this case replacement values must be set. A=1, B=2….E=5 and so on.

Fig. 2A Single Row General Block	Fig. 2B Multiple Row General Block
Ⓐ ● ⓒ ● Ⓔ = BD	Ⓐ ● ⓒ ● Ⓔ Ⓐ Ⓑ ⓒ ● ● = BD-DE
Fig. 2C Single Row General Block used as M/F	Fig. 2D Single Row General Block used as Y/N

(M) (F) ● (F) = A   (Y) (N) (Y) ● = B

OMR Numeric Integer (Horizontal)

- The Numeric Integer block delivers output in numbers. It only delivers positive integer values.

- All numeric blocks on the sheet will follow the same reading sequence either starting from '1' like 1234567890 or starting from '0' like 0123456789 depending upon the setting made for the sheet.

- A single row OMR Numeric block is treated as Horizontal Numeric OMR block. However if the Numeric block is inserted with more than one rows, it follows the properties of Vertical Numeric block.

- In Horizontal Numeric block each bubble in the single row corresponds to values starting from 1,2,3,4,5…… or from 0,1,2,3,4,5….. depending upon the setting made for the sheet.

- Horizontal Numeric block is used when Yes/No type responses are sought or in case of Feedback Forms where a range of responses on a scale of 1-5 are required.

- If more than one bubble is filled in the same row of horizontal Numeric block, then all bubbles are read and a concatenated string is presented as output.

Fig. 3A Horizontal Numeric Block	Output 14
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) ● (15)	
Fig. 3B Horizontal Numeric Block used regular block	Output 214
(0) (1) ● (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) ● (15)	
Fig. 3C Horizontal Numeric Block used as Sorter	System Alert DBT
(0) (1) ● (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) ● (15)	

OMR Numeric Integer (Vertical)

- Single column vertical numeric block behaves in the same way as Horizontal Numeric block except that its structure is vertical.

- In vertical Numeric block each bubble in the single column corresponds to values starting from 1,2,3,4,5…… or from 0,1,2,3,4,5….. going upto 8,9,10,11,12,13,14,15….and so on.

- In the multiple column vertical Numeric block, each row corresponds to a digit from 1-0 or from 0-9 (depending upon the numeric block read settings), while each column corresponds to a digit in a string of digits.

- The multiple column vertical Numeric block also has provision to deliver negative number values as output. If vertical Numeric block is allotted more than 10 rows, the 11th row is read as '-' (minus) sign and delivers a negative integer.

- Columns left blank are omitted during reading. So if a vertical Numeric block having 3 columns is filled only for 2 columns, then a 2 digit string will be obtained irrespective of the position of columns filled.

- If more than one bubble is filled in the same column of Vertical Numeric Block, then all bubbles are read and a concatenated string is presented as output.

- However the Form ID and the Sorter blocks are an exception to this and system either prompts for correction or skips the sheet with appropriate tag.
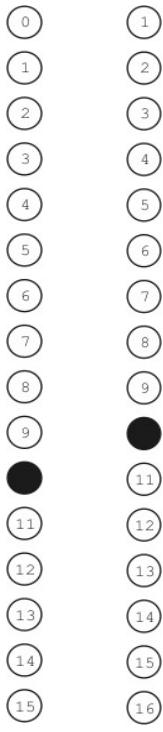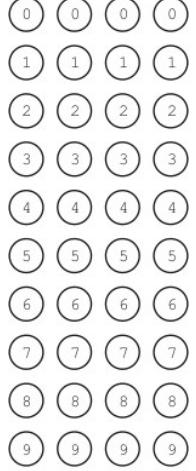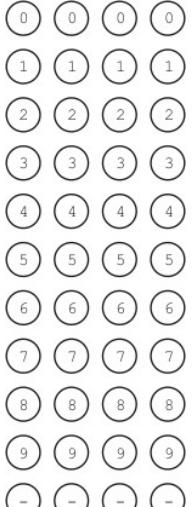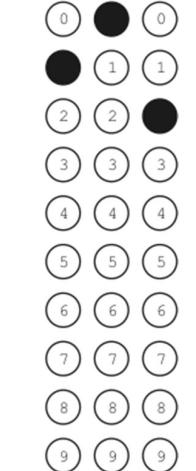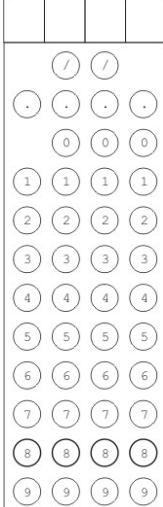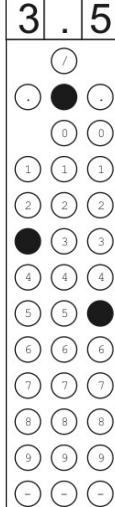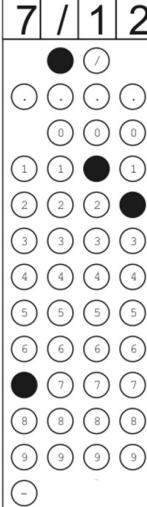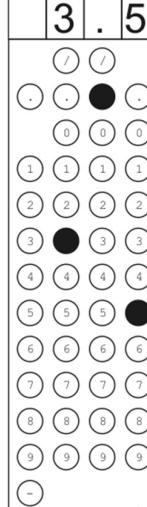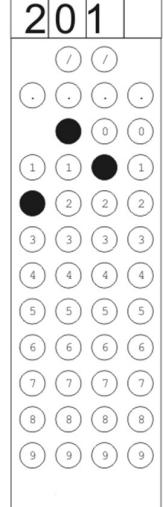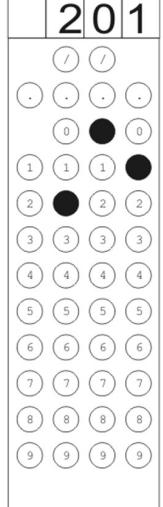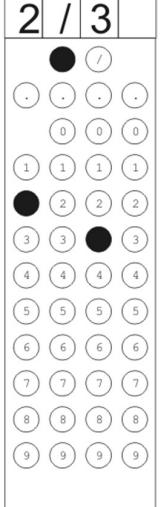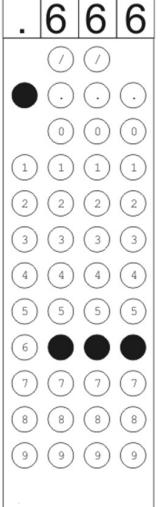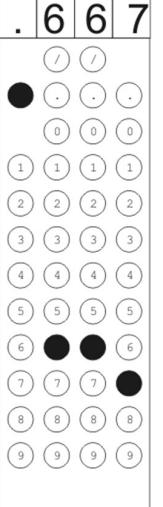
Fig. 4A	Fig. 4B	Fig. 4C	Fig. 4D	Fig. 4E
Single Column Vertical Numeric Block Starting from 0 or 1	Blank Multi Column Vertical Numeric Block Starting 0	Vertical Numeric with Limited Rows Starting 0	Blank Vertical Numeric Block With 11 rows for Negative numbers	Correct print of Vertical Numeric Block With 11 rows for Negative numbers

Fig. 4A — Output 10 In both cases

Fig. 4C — Read _102 Output 102 ; Starting 1 — Read _213 Output 213

Fig. 4E — Read -102 Output -102

Fig. 5A	Fig. 5B	Fig. 5C	Fig. 5D	Fig. 5E	Fig. 5F
Blank Vertical Numeric Block	Read _25 Output 25	Read 25_ Output 25	Read 2_5 Output 25	Read 025 Output 25	Read 275_ Output 275

- Use the setting 'Sort Multiple Marked' to set the behavior of the field that has multiple filling in the same column of a Numeric block.
- If the Vertical Numeric block is used as Form ID, it has a provision to insert Leading Zero depending upon the settings made for the sheet.

OMR Numeric Decimal

- This is similar to OMR Numeric Vertical with some added restrictions. The reading sequence of bubbles in a column starts from 0 irrespective of the setting. It is always multiple columns with minimum 3 columns. The number of columns can be increased.

- It is essentially either 12 or 13 rows. It is 12 rows when the positive number is expected. It is essentially 13 rows for negative numbers output.

Fig. 6A	Fig. 6B	Fig. 6C	Fig. 6D	Fig. 6E	Fig. 6F
Decimal Block expecting only positive value	Minimum size of Decimal Block expecting only positive value	Minimum size of Decimal Block expecting only positive value	Minimum size of Decimal Block expecting negative value	Decimal Block expecting negative value	Decimal Block expecting negative value

Fig. 6G	Fig. 6H	Fig. GJ	Fig. 6K	Fig. 6L	Fig. 6M

Correct print of Decimal Block expecting negative value					

OMR Matrix (X-Matrix and Y-Matrix)
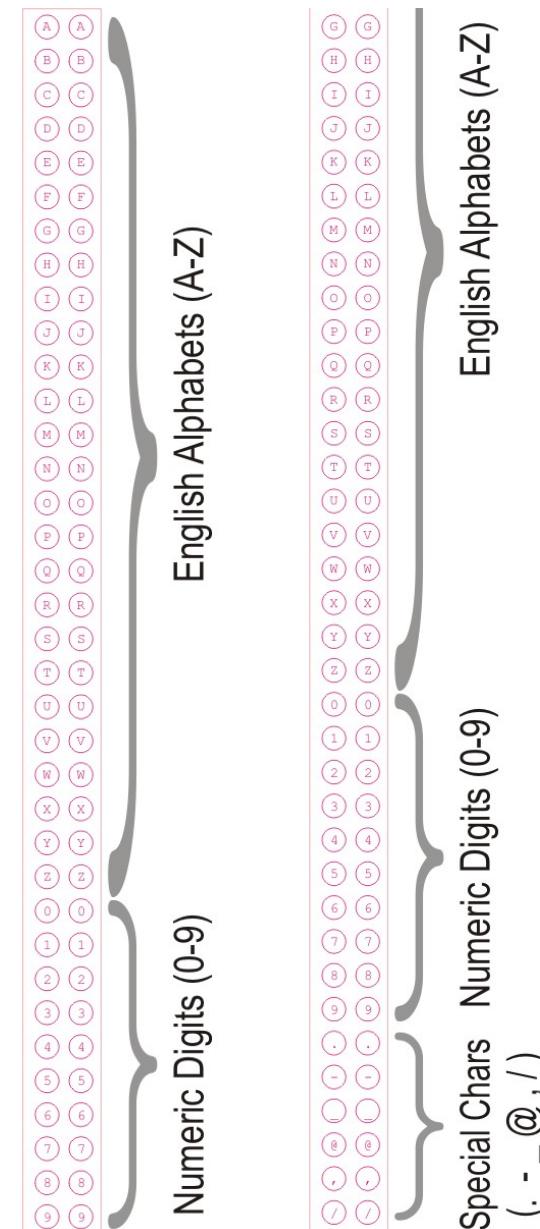
- A Matrix type block has multiple rows and columns of bubbles which are read collectively to provide a string of output.

- There are 2 types of matrix blocks: X-matrix and Y-matrix.

- This type of block is an excellent option when a single string output of several interrelated questions is expected in the same field.

- X-Matrix and Y-matrix type of block is generally used as question especially where several sub questions or multiple interrelated questions are asked and each question has multiple choices and the correct answer is a perfect combination of all the answers to all questions.

- The Matrix blocks are most used in case of comprehension passage based questions where each sub-question has to be evaluated and scored individually as well as collectively, while the general MCQ block can be used only when each sub-question has to be treated individually.

- The X-Matrix block is best used in case of matching type questions while the Y-Matrix block is most suitable for true-false type questions..

X-Matrix		Output String **PXRXX-XQXSX-XXXXX-XXXXT** Responses are read in a **row first**, then output of several rows is concatenated.
Y-Matrix		Output String **PX-XQ-PX-XQ-XQ** Responses are read in a **column first**, then output of several columns is concatenated.
Y-matrix type question asked as X-Matrix type block		Output String **PX-XQ-PX-XQ-XQ**

OMR Alphanumeric

- This block is used to take Alphabetic input like Candidate Name, Parent Name, City Name etc…Since this block is a matrix of 26 English alphabets thus it consumes maximum space on the sheet.

- In case of Address or Email or certain Alphanumeric IDs, the character on the same location could be a Alphabet or a Numeric digit. For this the number of rows of the Alphabet block can be increased to 36 (26 Alphabets + 10 digits) ABCD….XYZ0123456789.   Numeric bubbles read from 0, irrespective of settings.

- Further if special characters like " . (dot) -(dash) _(underscore) @(at) ,(comma) /(slash) " are to be used, the number of rows should be further increased to 42.

- In order to take the input of Name upto 20 characters long, there must be 26 rows for 26 alphabets and 20 columns for 20 characters.

- If the space permits, it is always better to keep separate blocks for First name and last name. However if the space is limited, it is suggested to have just one block so that the total number of characters and corresponding number of columns can be decreased to occupy less space.

- Since the printed size of this block is quite large, with too many bubbles close to each other, hence It is mostly suggested to make use of blocks with inner label inside the bubbles to help the user to easily identify the bubble he is marking. It is for this reason also recommended to print color sheets when using this block.

ICR Alphanumeric / ICR Alphabet / ICR Custom
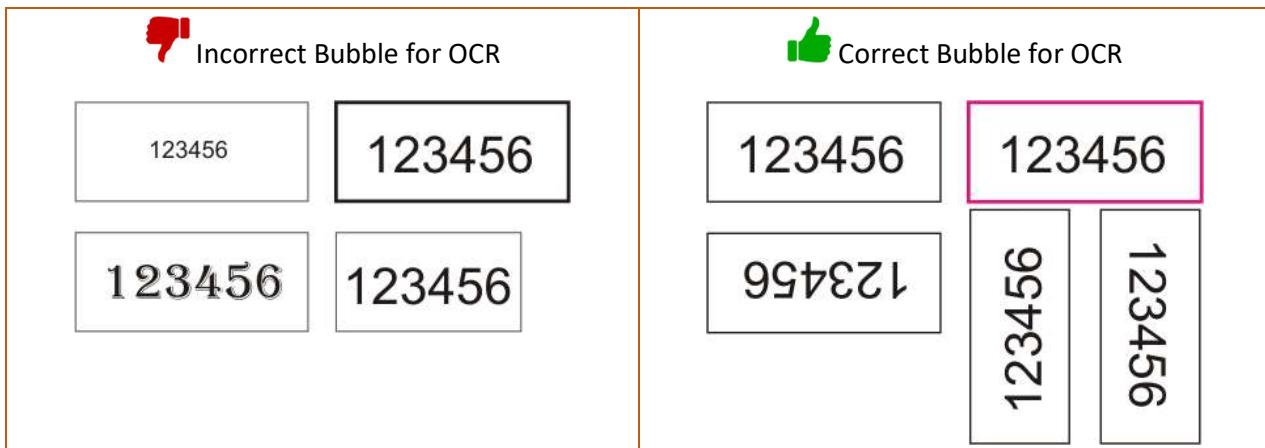
- ICR is always single character block.

Candidate Name (In BLOCK Letters)

A N G E L

- ICR does not read special characters. So if fields like email have to be captured, the '@' sign should be pre printed on the layout and ICR should be made to capture only the preceding and succeeding part of '@' sign.

- **ICR Alphabet** field is used in ICR block that expects to receive only alphabet values. For example in the block where name is expected, there is no possibility of receiving numeric input. So we shall use ICR Alphabet field which restricts its search and matching only to alphabetic characters. In this way, conflict between L / I / 1 / 7 can be eased out.

- **ICR Alphanumeric** block is used where the expected output could either be alphabetic or numeric. Hence it finds most likely use in Address or Email fields.

- **ICR Custom** block allow you to restrict the data values which are expected on reading that block. Thus ICR custom block is used in case of digits, it can be used in case of Alphabets or Alphanumeric expected values.

- The default values of ICR custom blocks are set as digits from 0-9. ICR custom can also be used for Alphabetic values if possibilities are limited.

- The MERGE keyword must be used to merge values obtained from different ICR blocks.

OCR Block

- OCR is always single bubble block, the entire text to be read must fall within one single bubble.

- The OCR block can contain text written in 0°, 90°, 180°, 270° orientation.

- There is suggested minimum font size and spacing of text to be used for accurate reading through OCR. This dictates the required size of OCR bubble.

- In case of black and white sheets, or where the design requires to print the border of the OCR bubble, it is suggested to keep the OCR bubble sufficiently large to avoid conflict of border lines with the strokes of the text to be read.

- OCR reads only Alphabets and Numeric Digits. It does not read special characters.

CERTIFIED ISO 27001 & 9001

Steps for Creating a new OMR Sheet Design

Screen Shot of the OMR Sheet Designer Module- Starting Page

Start with the sheet Designer icon on the Homepage. The Sheet Designer index page opens up, which lets you choose the required sheet design for editing.

- All the sheets created are available in the **dropdown list** of sheets in the descending order of ID (Last sheet first).

- **Thumbnails** of all the sheets are also available facilitate visual selection. Thumbnails appear in order of last modified listed first.

- Besides the Sheet name, **brief info** about Number of blocks used in sheet is displayed on the sheet thumbnail. Date of Creation, last Modified Date, last Upload Date and last Download dates are also visible on the thumbnail to facilitate easy selection.

- Click on the **'Blank Layout'** thumbnail to begin a new design.

- Each thumbnail has a **[DUPLICATE]** and **[DELETE]** icons on the right top. To open the same layout, click directly on the thumbnail.
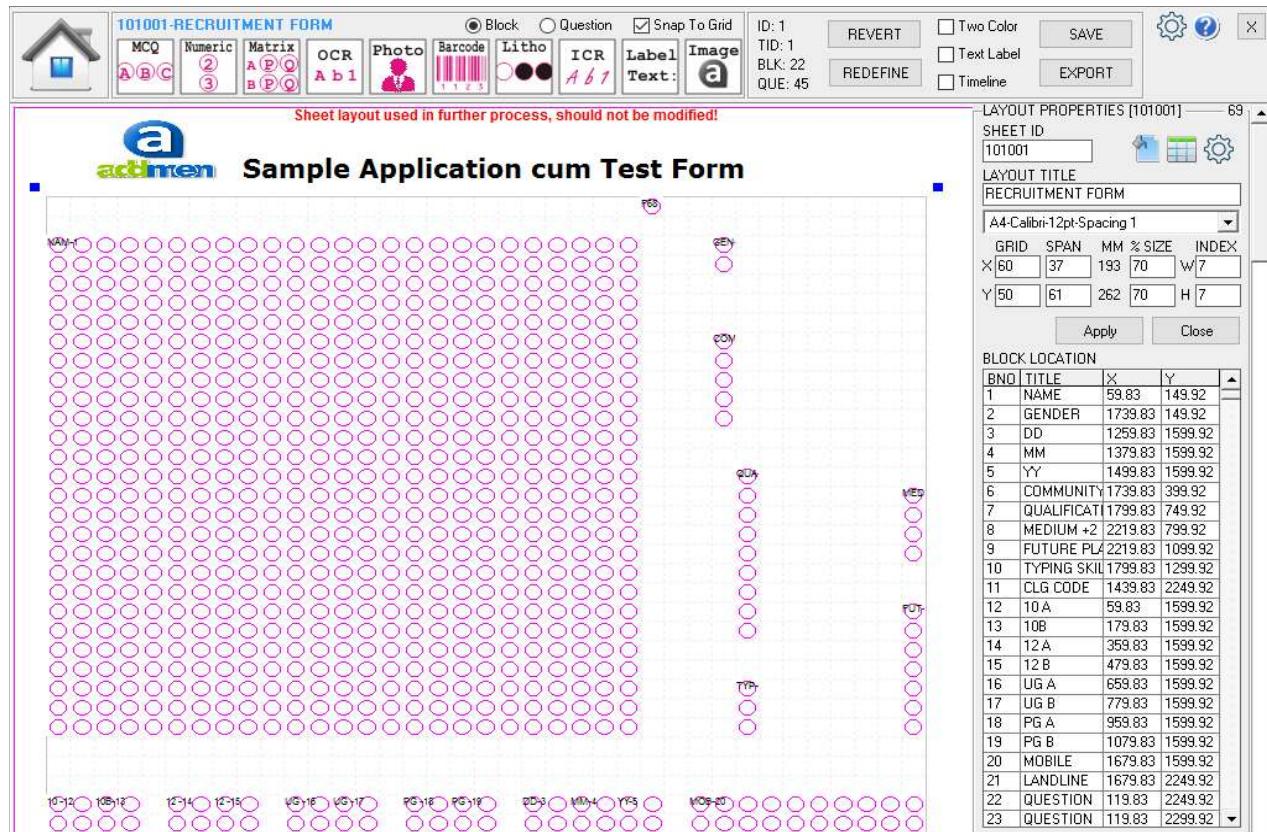
Using Readymade Standard Templates

- Though you can yourself create as many new templates as you want, but to make your work easy and to avoid repetition, the software has many **readymade templates** that are helpful. These templates can be used as starting point to quickly create desired template with minor changes.

- You can download these several ready to print and use readymade templates created by Addmen by pressing the [DOWNLOAD TEMPLATES] button.
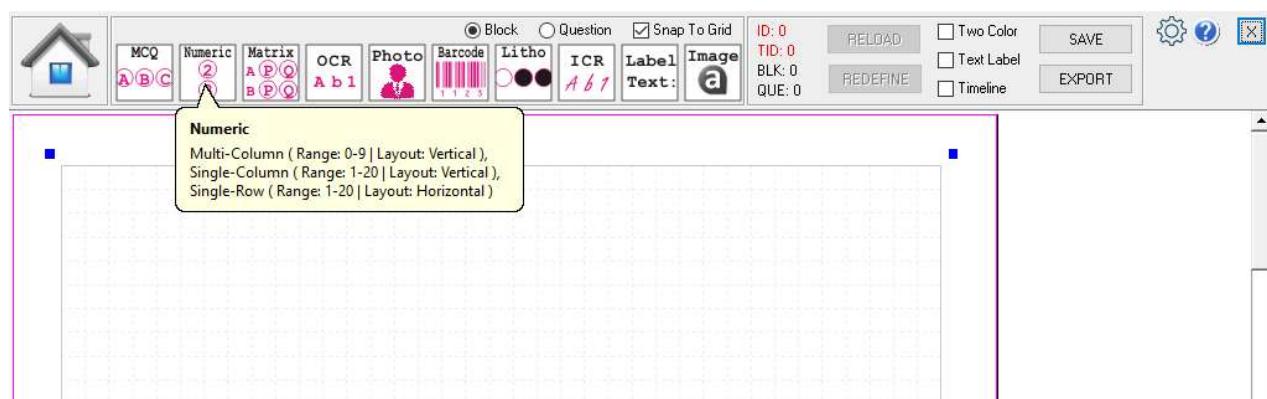
- The Readymade Templates are Standard layouts that cannot be edited directly. For editing in standard sheet template first you have to duplicate it and then you can do customization in the duplicate copy and save it by new name.

- If your requirement is to make a design which mostly resembles a standard design or your own design that you created earlier, you may choose an existing layout and duplicate it.

Once you have selected an existing template for editing or created a new duplicate,

- The selected layout opens on a page. If it is a bank sheet, it only contains the rectangular main container with 4 index points on its 4 corners.

Sheet Design page opened with a Duplicate Standard Template
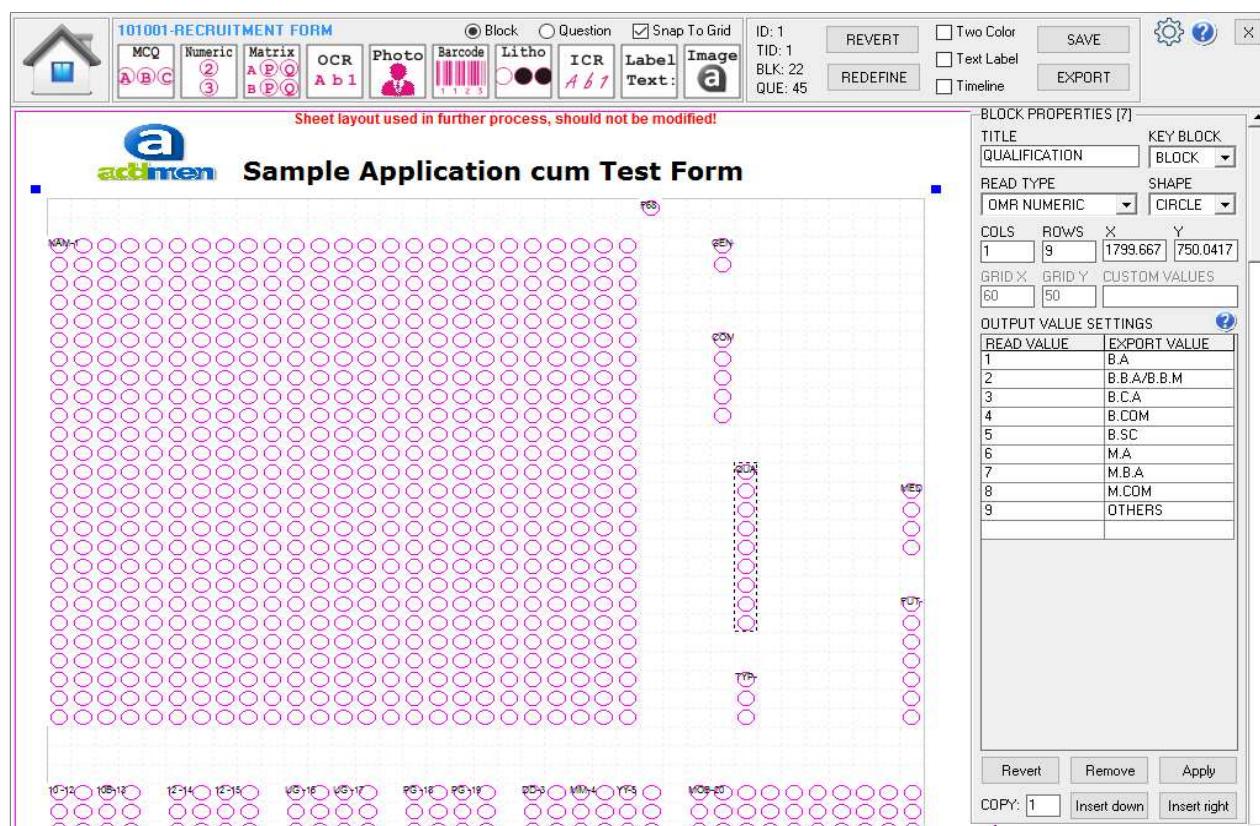
Sheet Design page opened with a Blank Template – Block Icons Guide the Output Type

Adding Blocks on the Sheet

- The type of OMR blocks that can be placed for a particular type are depicted as small icons. Put the mouse over the icon to see the output type of the block. It helps the user to easily identify the type of bubble he wants to use and type of output expected.

- There are 2 Radio buttons on the top which decide the basic treatment of the block to be added. If the block is only to be used as data extraction, leave the **'Block'** button as default choice. If a block is to be used as a Question, which will be further considered for comparison with answer key, then use the **'Question'** button.

- Click the desired block icon, to add a new block with default properties. The new block is placed on the left-center of the screen.

- Specific blocks appear in specific color.

  o OMR readable bubbles = Pink Bubbles

  o Barcode Box = Blue Border

  o OCR Box = Orange Border

  o ICR Box = Cyan Blue Border

  o Photo Capture Box = Light Green Border

  o Non-readable Design Blocks (Label, Header, Image) = Black Border

- The Block title alongwith block ID is shown on the left top corner of each block.

- Multiple identical blocks can be placed on the sheet by creating copies of an existing block. The copy is inserted either below or to the right of the existing block.

- New Block with identical definition can be inserted in between by clicking the **[INSERT DOWN]** or **[INSERT RIGHT]** button at the bottom of the property menu of the block.

- When a copy of any block is inserted, it automatically changes the numbering sequence of blocks. The new block is inserted in-between, immediately after the selected block. The earlier immediate-next block is shifted to next in sequence.
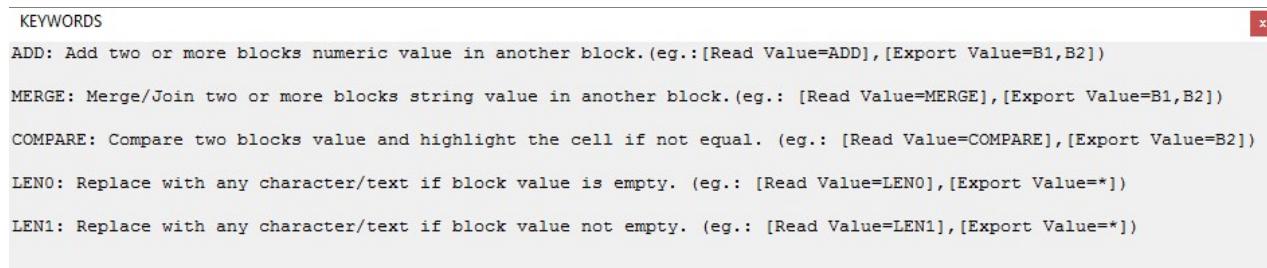
Changing Block Properties

- Upon selecting any block on the sheet, the block properties panel is displayed on the right hand side of the screen. These properties can be altered to get the desired block.

- The **'Block Title'** is displayed as the column header in the Excel file where the data is exported.

- Certain block types have different variants like Matrix (X-Matrix and Y-matrix); Numeric (Horizontal Integer, Vertical Integer and Decimal Number); ICR (ICR Alphabet, ICR Alphanumeric and ICR Custom). Each variant has a different form of output. **'Read Type'** can be changed in certain block types to use the desired variant of the block.

- **'Count of Rows and Columns'** to get block with required number of bubbles for desired output.

- **'X and Y location'** are the coordinates of the starting bubble with reference to the left top index point to create block at the desired location.

- **'Horizontal and Vertical Grid'** is the distance of the bubbles within a block. In standard designer a uniform grid applies throughout the sheet and the ability to alter block specific grid is disabled.

- # Block specific 'Horizontal and Vertical Grid' can be set in Advanced Designer.

- **'Custom Values'** can be set to restrict the output for certain types of blocks. This feature is mostly used in ICR blocks to narrow down the range of expected value and thus improve accuracy.

- Right Click on the block to **[DELETE]** or to change the layer order of selected block **('Bring to Front', 'Send to Back')**.

- When a block is inserted in between, it clears the output column settings of the sheet, because the output column settings are purely dependent on the column sequence.
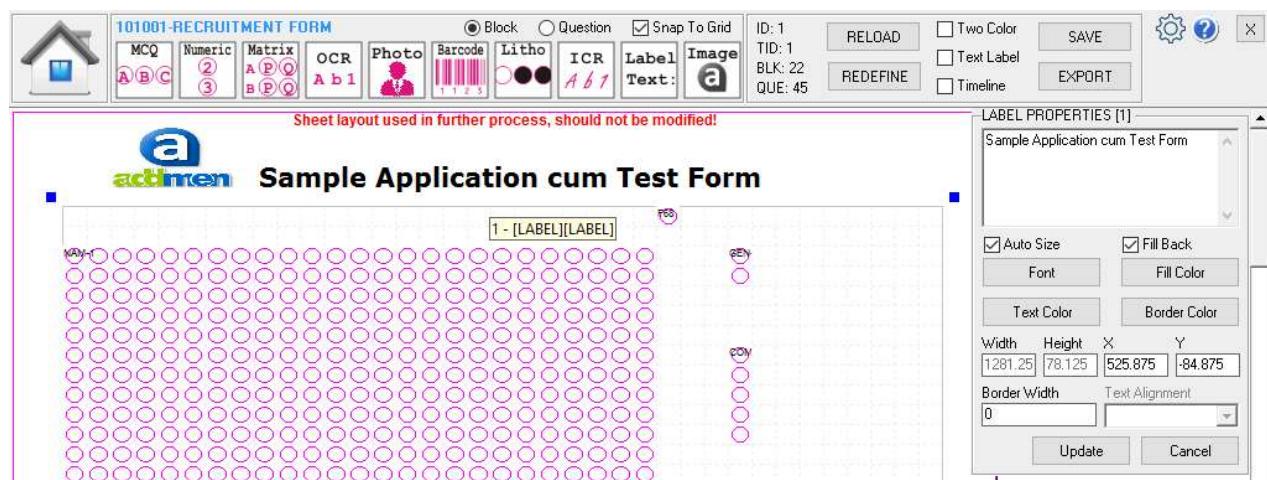
Setting the properties of a Readable Block

- The panel opens with current set of properties everytime you click on a block. Press the **[APPLY]** button to affect the changes. Press **[REVERT]** to discard all last changes not applied. Click anywhere on the sheet to close panel and deselect the block.

- Output Values of the blocks can be different from the read values of the block. Replacement values can be set for each distinct read value or a combination of read values.

- Use the setting 'Sort Multiple Marked=4' to tag the field that has a concatenated output string due to multiple filling in the same column of a Numeric block.

- Certain **Keywords** (ADD, MERGE, COMPARE, LEN0, LEN1) can be used to perform specific manipulation of the read values.

```
KEYWORDS                                                                                    x

ADD: Add two or more blocks numeric value in another block.(eg.:[Read Value=ADD],[Export Value=B1,B2])

MERGE: Merge/Join two or more blocks string value in another block.(eg.: [Read Value=MERGE],[Export Value=B1,B2])

COMPARE: Compare two blocks value and highlight the cell if not equal. (eg.: [Read Value=COMPARE],[Export Value=B2])

LEN0: Replace with any character/text if block value is empty. (eg.: [Read Value=LEN0],[Export Value=*])

LEN1: Replace with any character/text if block value not empty. (eg.: [Read Value=LEN1],[Export Value=*])
```

Keywords for Manipulating Values of a Readable Block

- Certain **Blocks like Text** Label, Block Header, Logo Image **are used only for design**. The property Panel for these blocks is different.

- Header is single row block. It is a dead non-readable block only used for ornamentation.

- Label can contain text, the font properties of which can be modified to make as desired presentation.

- Image can be inserted to place logo or illustrations on the OMR sheet. Image must be in JPG format.

Adding Text Labels
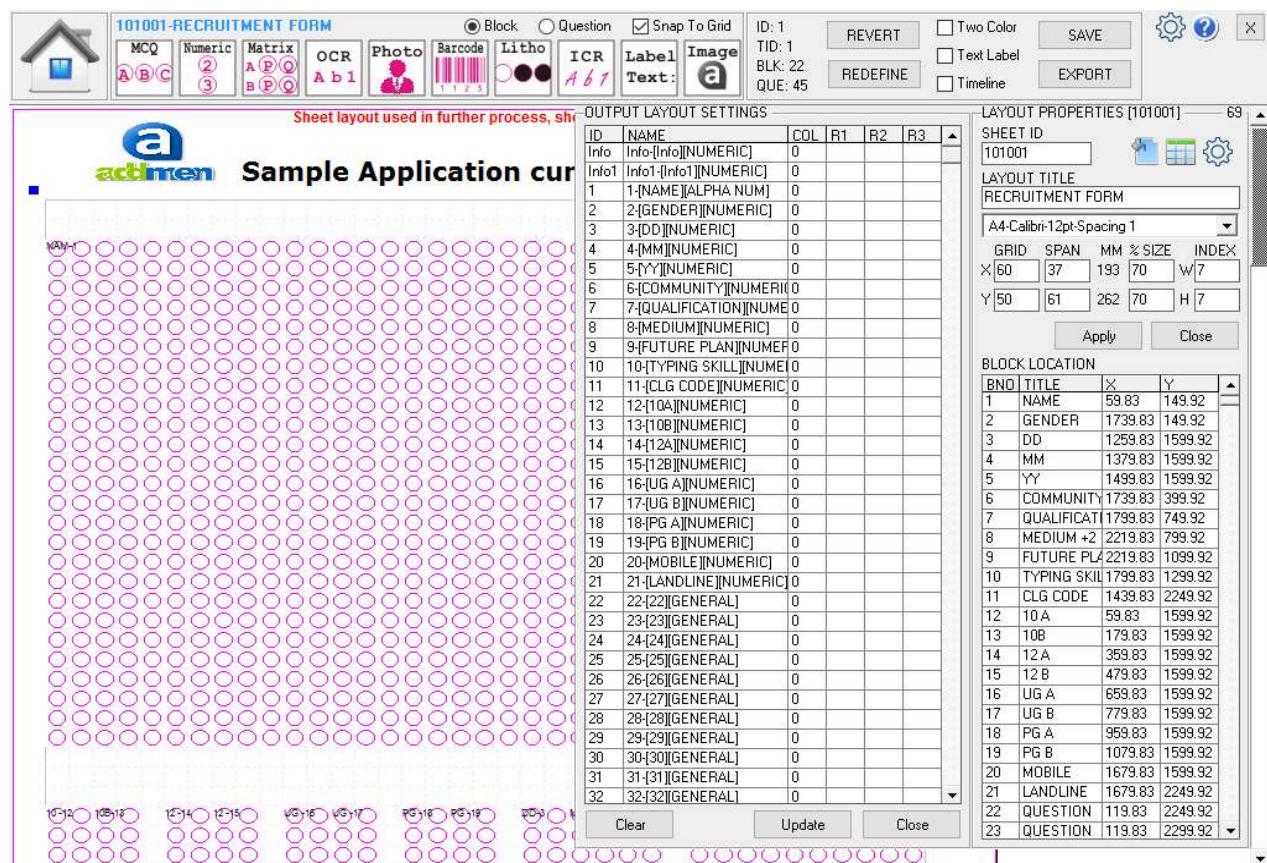
Adding Logo and other Images

Setting the Layout Properties

- **Layout Properties Panel** opens on the right hand side of the screen. It does not open unless you have saved the new blank or duplicate design with a name. Once saved, click on [REDEFINE] button to open Layout Properties.

- Layout dimensions are defined on the basis of **2 parameters: Grid** (distance between bubbles) and **Span** (Number of Bubbles (horizontally and vertically)).

- The printable size of the layout in pixels is equal to :
(Horizontal Span * Horizontal Grid) **X** (Vertical Span * Vertical Grid)

- Changing **Grid** (Distance between bubbles) or **Span** (No. of Bubbles) will alter the final layout size.

- Different grid sizes can be used. Most commonly used grid sizes range between 60-45 pixels. Grid of 60x60 is the most strongly recommended size as it gives most appropriate bubble size and interspacing between bubbles.

- It is **not recommended to reduce the bubble size or spacing between the bubbles** below a certain extent. Crammed up designs with too small or tightly placed bubbles are not suggested because they are likely to get affected on accuracy.

- Preset Layout sizes like 'A4' OR 'B5' can be selected to begin a new sheet layout with grid and span properties that fits well into a standard size of paper.

- In case of timeline based sheets, mostly grid of 52px is used. This information is useful when the user is attempting calibration of preprinted sheet, which is most likely to have a grid size of 52px. So keeping 52px as the starting grid, the user can attempt several combinations to see if they match.

Setting the properties of Sheet Layout

- Horizontal and Vertical grid is applicable throughout the layout and affects all blocks uniformly.

- # The Advanced Sheet designer module, allows the horizontal or vertical grid of any specific block to be altered in the Block Properties Panel.

- The layout properties panel also makes it possible to **edit all block locations** through a single grid. This feature is useful in case of calibration where you need to repeatedly align and adjust the block locations to properly overlap an image used at the background.

- **Bubble size** is defined as % of grid size. The default value is set as 70%. However it can be increased and decreased as per the requirement of size of printed bubble on the sheet.

- Size of the inner text label must be kept minimum yet readable. So if the size of the bubble is reduced beyond suggested limits or if the grid is small, then it is preferred to use a coloured sheet instead of black and white sheet. The default label inside the bubble is kept as text in Courier Font in 6pts size.

- The size of **Index point** is defined in pixels on redefine panel. It is generally 7px X 7px in new sheet designs created form the software.

- Click on the **[SETTINGS]** icon on the sheet properties panel to open additional dialogue to set Read-time preferences.

PREFERENCES

SETTINGS > OMR PREFERENCE

ID	PARAMETER	VALUE
1	NUMERIC BLOCK [0=(0-9);1=(1-0)]	1
5	RESPONSE THRESHOLD [5-100]	30
6	SKIP THRESHOLD (UPPER,LOWER) [0-100]	0,15
7	FORM ID LENGTH [0-50]	0
13	SORTER LENGTH [0-50]	0
21	READ MARGIN [TOP,BOTTOM,LEFT,RIGHT]	1,1,1,1
24	OCR READ ANGLE [0,90,270]	0
25	MAXIMUM ACCEPTABLE SKEW	10
30	STORE IMAGES[0=NO;1=DATABASE+FOLDER;2=FOLDER]	0
32	MULTIPAGE SHEETS SUFFIX [S1,S2]	A,B
33	INDEX POINT SIZE [WIDTH,HEIGHT]	7,7
36	ID REPLACE 1[0=OFF/COLUMN NO,VALUES=v1|v2|...]	0
37	ID REPLACE 2[0=OFF/COLUMN NO,VALUES=v1|v2|...]	0
38	ID REPLACE 3[0=OFF/COLUMN NO,VALUES=v1|v2|...]	0
39	AUTO ID [0=NO;1=YES;2=ASK]	0
40	LEADING ZERO ID ON READ [0=NO;1=MARKED;2=ALWAYS]	0
42	COLOR TO B/W THRESHOLD [1-255]	128
47	DEFAULT SHEET DPI	100
59	CHECK INDEX IN VERTICAL(LT,RT,LB,RB) [0=NO;1=YES]	0,0,0,0
60	SEARCH MARGIN(0=DEFAULT)[LTx,y,RTx,y,LBx,y,RBx,y]	100,100,100,100,100,100,100,100
64	SORT PROBABLE MARKED [0=NO;1=SKIP SHEET;2=SHOW ALL;3=SHOW MA	0
65	SORT MULTIPLE MARKED [0=NO;1=SKIP SHEET;2=SHOW ALL;3=SHOW MAR	0
74	MULTI PAGE FORM SHEET IDS[0=NO;SID1,SID2,...]	0
75	INDEX SIZE(LTw,h,RTw,h,LBw,h,RBw,h)	7,7,7,7,7,7,7,7
76	INDEX DISPLACEMENT(LTx,y,RTx,y,LBx,y,RBx,y)	0,0,0,0,0,0,0,0

Additional Read Time Settings Panel opened from the Sheet Layout properties Panel

- Change the margin (distance from left/top edge of paper) on the Sheet Design Panel Preference Settings to alter overall position of layout container on page.

- The position of the container on the page can be changed by simple drag and drop procedure. When you drag the container, it contents are also moved. This ability is required when the OMR sheet does not cover the entire page. Instead a large part of the page is covered by simple non-readable text or design and the OMR fields are concentrated to the lower or upper half of the page.

- # In Advanced Sheet Designer, for calibration of pre-printed designs, where timeline or other markers have to be used as index points, the size of each index points can be different.

- # In Advanced Sheet Designer, it is possible to set displacement of index point. This feature is useful in case of sheets where 4 index points do not form a perfect rectangle.

- # Advanced version allows to insert a **'background image to trace'** and create an overlapping OMR layout suitable for reading the OMR sheet images identical to the one that has been used as background. This process of tracing a pre-existing OMR design plays major role in calibration.

Positioning and Navigation of Blocks

- Alter 'Snap to Grid' Check box in the menu bar to activate or deactivate snapping. Blocks can be moved with or without snapping either using arrow keys or mouse.

- Press [SHIFT+Arrow] to move by double grid distance and press [CTRL+Arrow] to move by half grid distance.

- Blocks and Questions should be essentially placed in the sequence as they are to be read.

- It does not matter whether position wise the block for Question 2 is placed before Question 1, but while reading the block for Question 1 will always be read prior to Question 2. Hence it is a good practice to create the blocks in sequence as they are to be placed on the printable layout.

- The maximum number of rows or columns in any type of OMR block (except Matrix) is limited by the horizontal and vertical span of the sheet. i.e. if the sheet can contain maximum 30 bubbles horizontally, then a horizontal numeric block of more than 30 bubbles cannot be added.

- Blocks can be placed at negative coordinate locations and at locations exceeding the OMR layout container. This however is not suggested until the user is mature enough to know the implications of blocks laced outside the readable area.

Output Column Settings

- Generic output contains one row for one sheet. In certain cases the sheet layout is intended to collect data of multiple candidates. This data of multiple candidates is then to be presented in multiple excel rows one below the other.

- In order to break the output of one sheet into multiple rows, there is provision to create Output Column settings, where certain fields fall below the other in a certain predefined columns.

- Click on the **'Column Settings'** icon to set the column structure and row wrapping in the output spreadsheet.

- The fields (blocks) that will form distinct columns must be kept first in sequence and all in continuity.

- Enter the Column# of the Header column against the field which is to be taken under that column.

Example Sheet

Feedback Form ID	123456

Student ID	Question 1	Question 2
1001	● N	Y ●
1002	Y ●	Y ●
1003	Y ●	● N
1004	● N	Y N
1005	Y N	● N

Output Column Setting

ID	NAME	COL
Info	Info-[Info][NUMERIC]	0
1	1-[S1][OCR]	0
2	2-[S1Q1][GENERAL]	0
3	3-[S1Q2][GENERAL]	0
4	4-[S2][OCR]	1
5	5-[S2Q1][GENERAL]	2
6	6-[S2Q2][GENERAL]	3
7	7-[S3][OCR]	1
8	8-[S3Q1][GENERAL]	2
9	9-[S3Q2][GENERAL]	3
10	10-[S4][OCR]	1
11	11-[S4Q1][GENERAL]	2
12	12-[S4Q2][GENERAL]	3
13	13-[S5][OCR]	1
14	14-[S5Q1][GENERAL]	2
15	15-[S5Q2][GENERAL]	3

Generic Output

All fields of a sheet in one row.

FRMID	S1	S1Q1	S1Q2	S2	S2Q1	S2Q2	S3	S3Q1	S3Q2
123456	1001	Y	N	1002	N	N	1003	N	Y

Columnised Output

Single row record broken into multiple rows under fixed columns.

FRMID	STU	Q1	Q2
123456	1001	Y	N
123456	1002	N	N
123456	1003	N	Y

Save & Export for Editing

- After finalizing the sheet design, save and export it. Take a few printouts and check their scanned images before doing any other ornamentation.

- Designed template can be exported in black and white or colored formats with or without the labels inside the bubbles. Use 'Two Color' and 'Text Label' checkboxes are given near the **[EXPORT]** button.

- The design can be exported to SVG format (Open source) which can be edited in open source InkScape Software or CorelDraw. The design can directly be printed or converted to PDF.

- While you edit the reading information of fields on the sheet in the Create Sheet Design Panel, mostly there is no need to export the design again unless there is any inclusion of new blocks or change in location of existing blocks. If you have only deleted or reduced the number of rows or columns of some blocks then you may save the changed design in the panel and directly edit the exported standard file in DTP software.

- Click on the **[SETTINGS]** icon on the sheet design panel to set additional preferences as seen in the screenshot below.

ID	PARAMETER	VALUE
19	USE TIMESTAMP IN EXPORT [0=NO;1=YES]	1
35	TEXT LABEL FACE IN SHEET [FONT,SIZE]	Courier New,5
41	SHEET MARGIN [LEFT,TOP]	126,238
52	SHEET EXPORT TYPE [0=SVG;1=MS-WORD;2=OTHER]	2
54	INKSCAPE PROGRAM PATH	C:\Program Files (x86)\Inkscape\inkscape.exe

Design of sheets with BARCODE/ OCR/ ICR/ Stamped Serial no.

- **Barcode**- All barcodes are not the same. The size and quality of Barcode dictates the scanning resolution, speed and many other parameters of the process to follow. Barcode type and printing method and quality should be planned and checked properly such that it supports further processes and does not pose unwanted limitations.

  For example, in a project of 100,000 sheets, the result was urgently required and the purpose of barcode was just to collect sheet number, to be used if ever required in future. But the barcode was printed of very poor quality which posed a limitation to scan at high resolution and this tremendously increased the time involved in scanning, reading and file handling (copy-paste) of heavy size images. Though the result was urgent and the value of barcode was of no immediate need, still it delayed the project and made it more difficult. It could have been a simple clear barcode or simply a stamped number captured as image, which could have been read at minimum resolution sufficient for OMR reading.

- **Barcode-** There are specific fonts for certain types of Barcode. Code-39 Barcode fonts can be download from within the software. These barcode (fonts) to be printed in 32-36 font size in black color only. Size of Barcode font should be decided based on DPI used for scanning and vice versa.

- **Barcode-** Some Barcode are generated by external Software and included in the OMR design as embedded image or printed on the sheet on a second run. Such barcodes should be first sampled by adopting same printing and scanning mode and method as will be used to scan the final sheet.

- **OCR/ICR-** OCR and ICR technologies are not 100% accurate like OMR. So they are only used as supportive tools to help in data collection. Manual interpretation and correction may be required.

- **OCR/ICR-** Valid only for English Alphabets and English Numbers. The characters and digits should be written in capitals, clearly and neatly with consistent strokes.

- **OCR-** Characters to be read through OCR should be printed in basic OCR-friendly fonts like Arial, Courier. Times family and other few can also be used, if there is no choice. Fonts can also be download from within the software. Should be printed in 16+ font size in black color only.

- **ICR-** For best results, maintain the optimal size of character box (60x90px) and inter-spacing (90px) in a ICR block. It can however be varied in certain limits as per the needs of the design, provided the basic technical requirements for ICR reading are fulfilled.

- **ICR-** Colored sheet with thin bubble outlines should be used. It helps to minimize the impression of the bubble outlines during scanning and color dropping, so that the software is easily able to identify the filled mark without conflict. Use of color sheets for ICR highly improves the accuracy.

- **Barcode/OCR-** Sheets that require digital reading should be produced either using digital offset printing process or laser/Inkjet printing. Photocopies should not be used for such sheets.

- **Barcode/OCR-** The barcode and OCR characters should be clear and smudge free. Never use barcodes or OCR characters printed on dot-matrix or dithered mode.

- **Stamp-** Stamped numbers can be read only where the quality of stamp and other parameters required for OCR reading are largely fulfilled. Confirm with sufficient sampling before assuming to read stamped numbers. During stamping, DO NOT spoil the sheet by stray ink marks.

- **Barcode/OCR/ICR/Stamp-** The character or value to be read should not touch or be closer than roughly 10 pixels to border of the area box.

- **Barcode/OCR/ICR/Stamp-** If you are printing Barcode or OCR for Critical blocks that are to be used as key fields like sheet ID/ student ID etc., then it is suggested to print at two different places in the same sheet so that in rare case if one is not read accurately, the other one can be read. Same precaution can be applied for ICR and stamp wherever possible.

- **Barcode/OCR/ICR/Stamp-** The sheets should be created strictly as per guidelines to achieve best results. Any deviations from Guidelines or use of preprinted sheets will affect the accuracy.

Design of sheets with Pencil filling or Tick marks
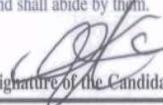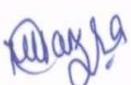
- Read the Note on Accuracy Document to understand better the concept and provisions that should be made for accurate pencil reading.

- Just writing in Instructions to use HB pencil, and then allowing any pencil will not make sense.

- If pattern allows pencil filling, a light colored sheet with thin outlines and big bubbles should be used. By using color sheets we are able to minimize scanning impression of the bubble outlines and are able to clearly identify the filled mark.

- If black & white sheets are used with pencil, then the black outlines of bubbles will be scanned and will create conflict if we read at high sensitivity to accommodate for light pencil marks. However, if pencil filling is strictly done using dark pencil, even black and white sheets are OK.

- In case of pencil use, it is better to have bigger bubbles on the sheet. By using sheets with bigger bubbles, it facilitates to draw contrast between the size of blackness created by mark to the size of blackness created by the outlines of bubble and label text.

- A Black and white design that is suitable for use of Pen may not become suitable for use of pencil just by printing it in color. Always keep into consideration the basic guidelines and objective behind development of certain design before altering its usage instructions.

Pre-printed/Externally designed OMR Sheet Calibration Process

How to judge whether OMR sheet will be calibrated or not?

- OMR Sheet must have four index points in corners. The markers assumed to be index points must be same in size and must form a perfect rectangle.

- The timeline or any other printed material should not be so near the index point so as to affect the clarity of the index point.

- Bubbles should be of same size and placed in uniform grid distance i.e. horizontal and vertical distance between the bubbles of one field and all the fields must be equal to X & Y Grids.

Example of OMR sheet that can be calibrated, but NEEDS CUSTOMIZATION at programmer level:

Limitations/Incorrect parameters in the above sheet:

1. Index points do not form a proper rectangle. *(However his can be managed with extended capabilities of advanced designer, we can consider the sixth marker from top on the left as top-left index point.)*

2. The vertical grid spacing is unequal amongst various blocks. Observe the vertical distance between bubble of 6th and 7th columns. The columns 1,2,7,8,9,10,11,12,13,14 have same vertical gap but columns 3,4,5,6 have a different vertical gap. *(This will need program customization.)*

Example of OMR sheet that can be calibrated, but NOT SUGGESTED to be calibrated:

This following sheet can be calibrated with customization, BUT if the user with basic knowledge and exposure to the system has to read this himself, it is definitely not suggested because it will require very meticulous reading or else it might give inaccurate results. It is suggested that this calibrated sheet should be used only if it is going to be read by a professional team (by us or any other).

It has several Limitations/Incorrect parameters which might give problem later on while reading.
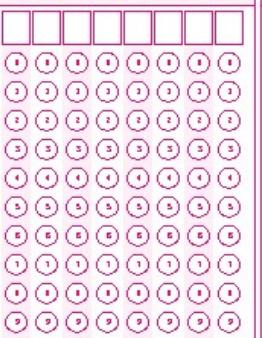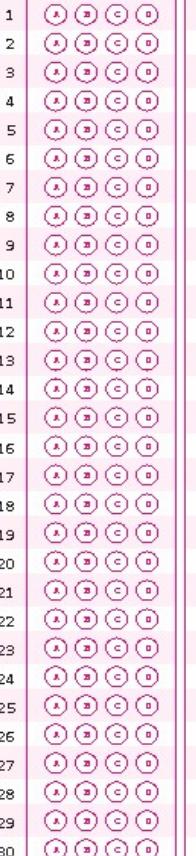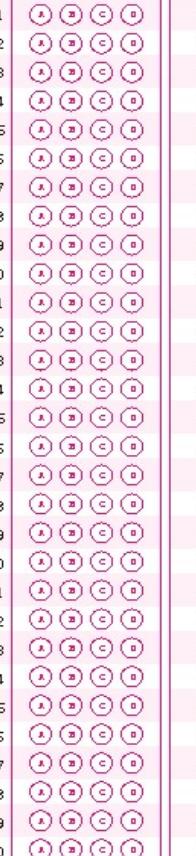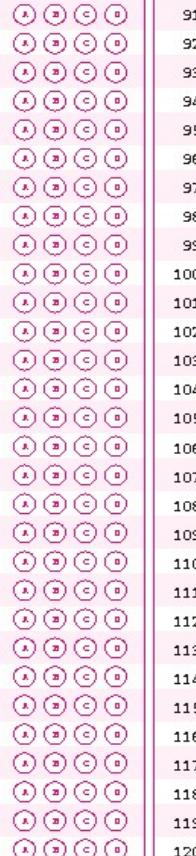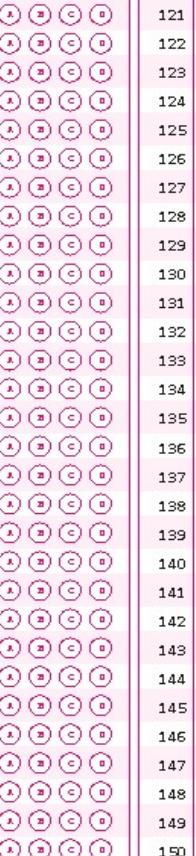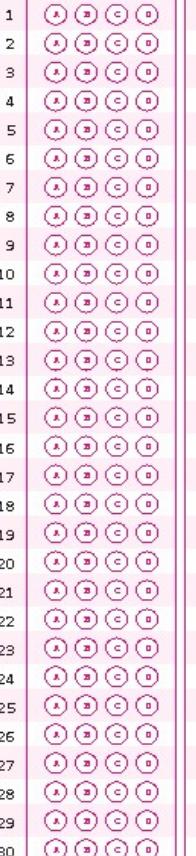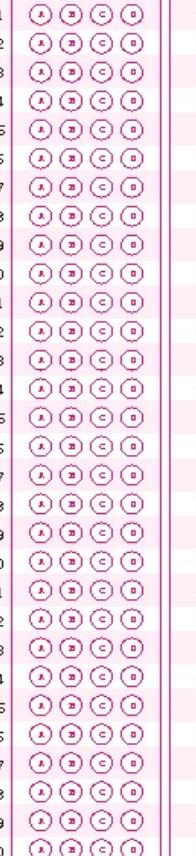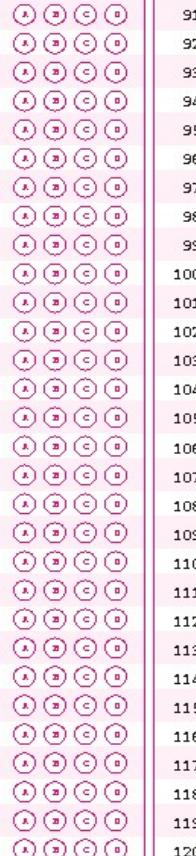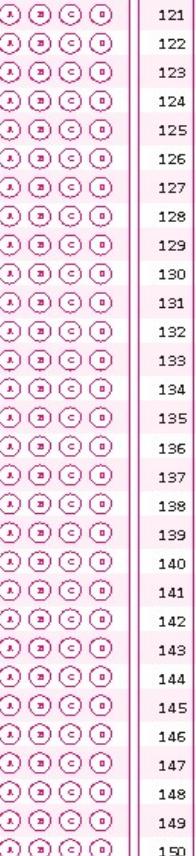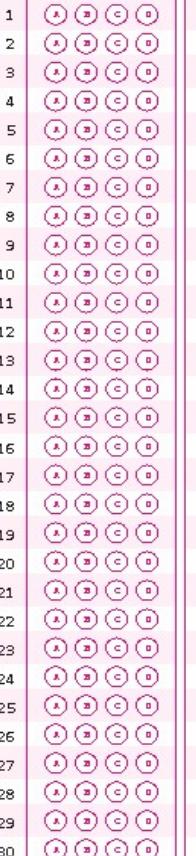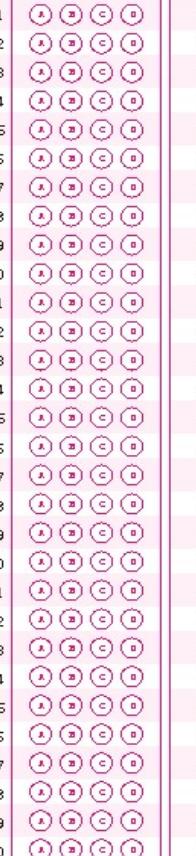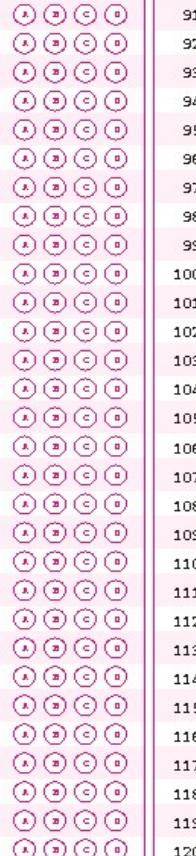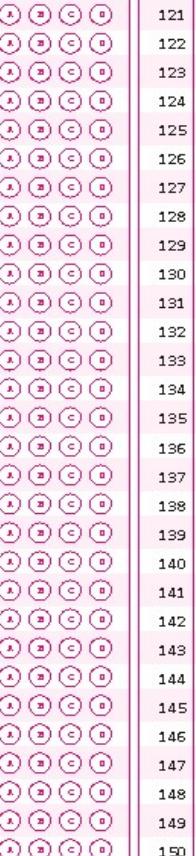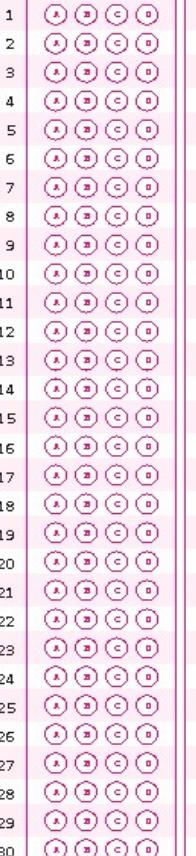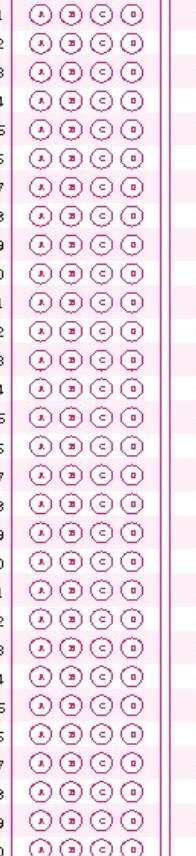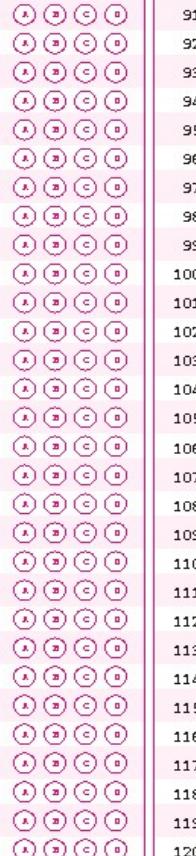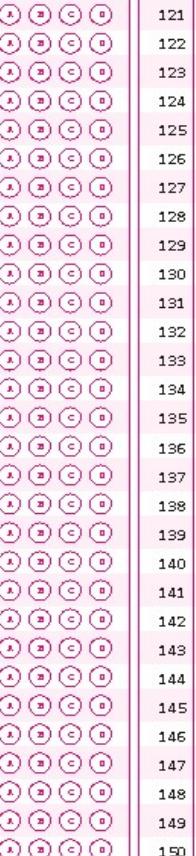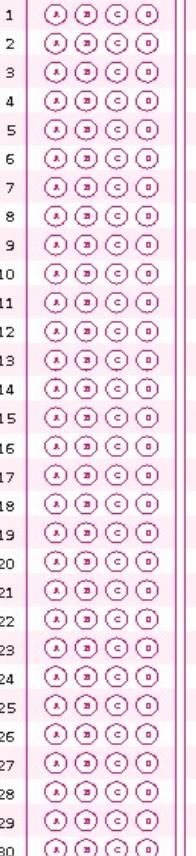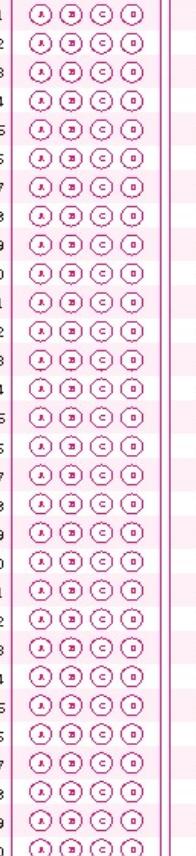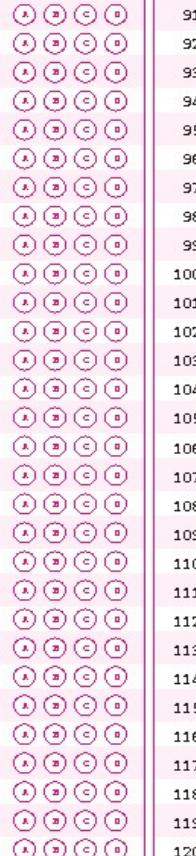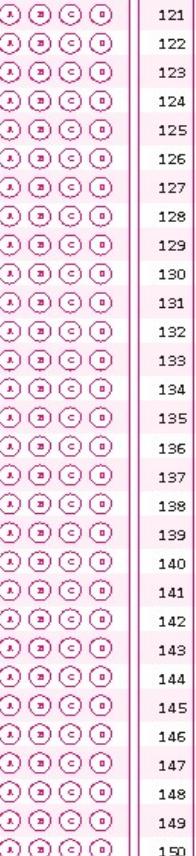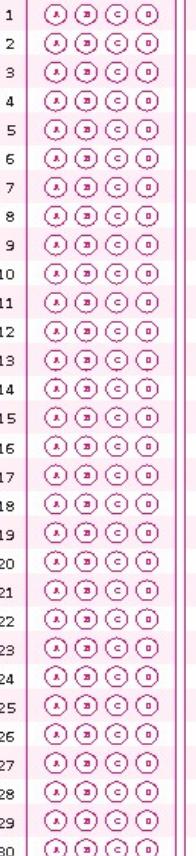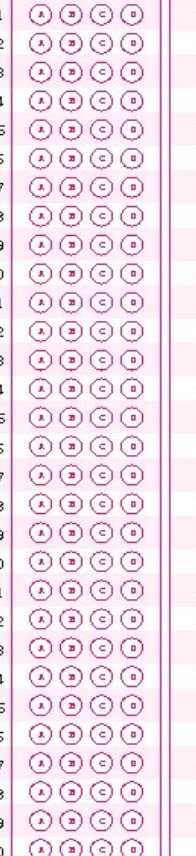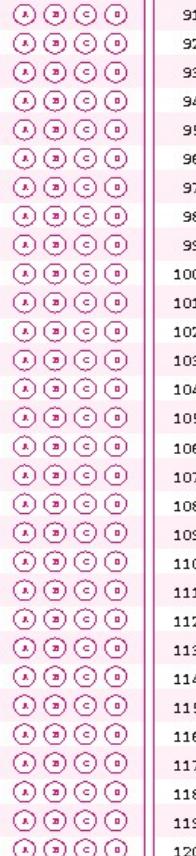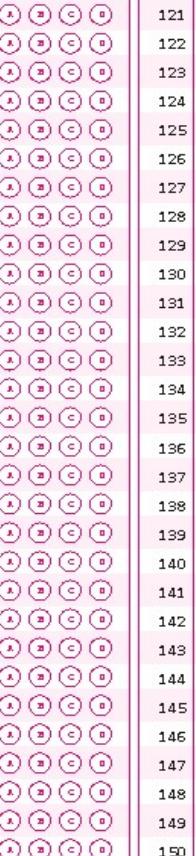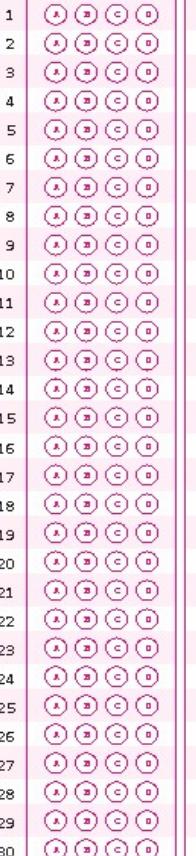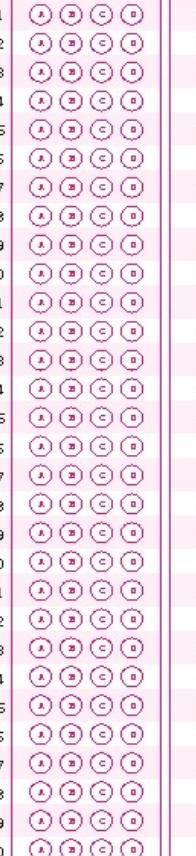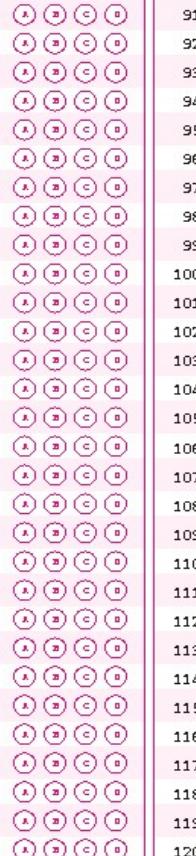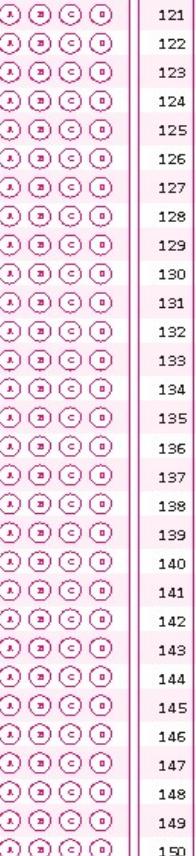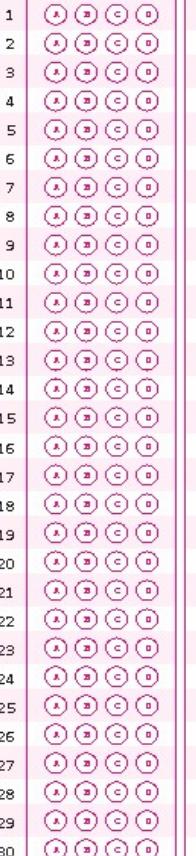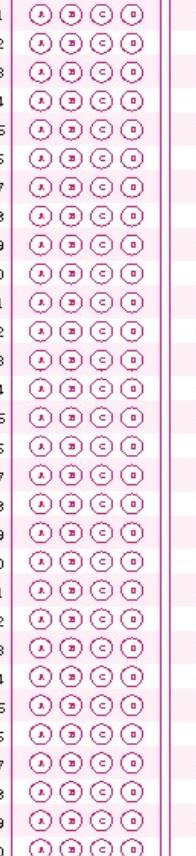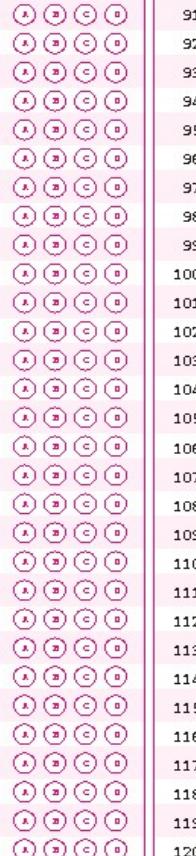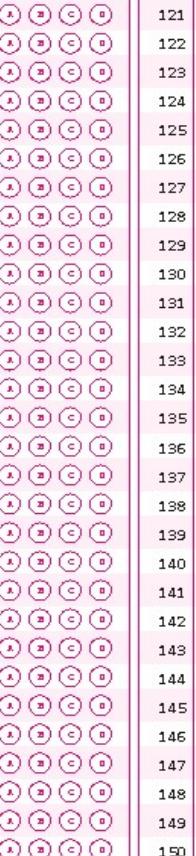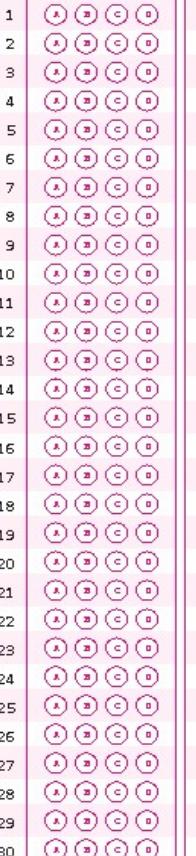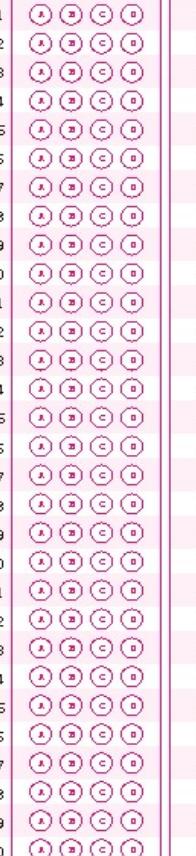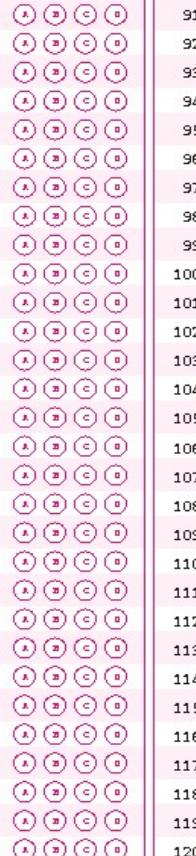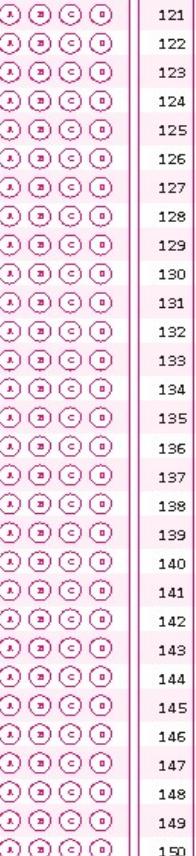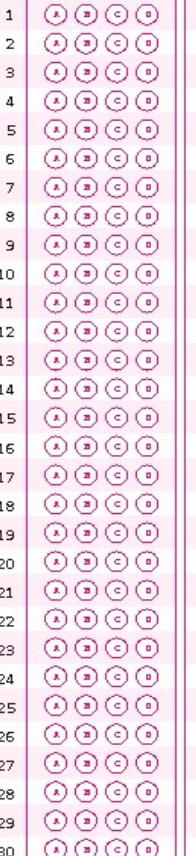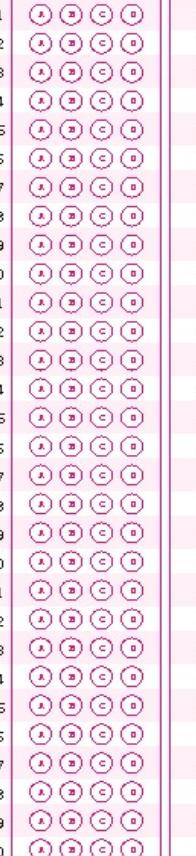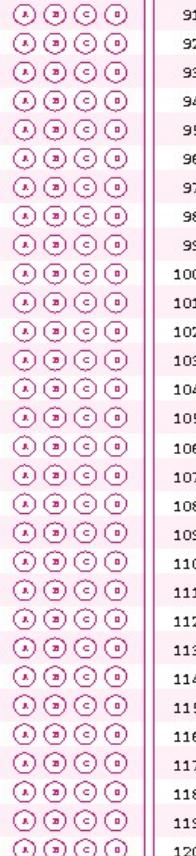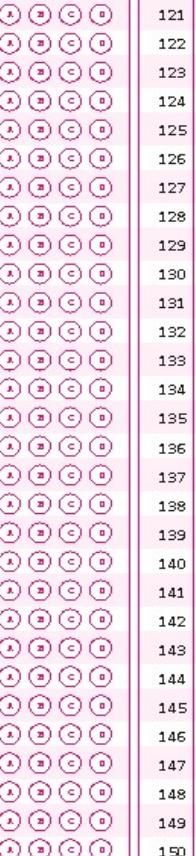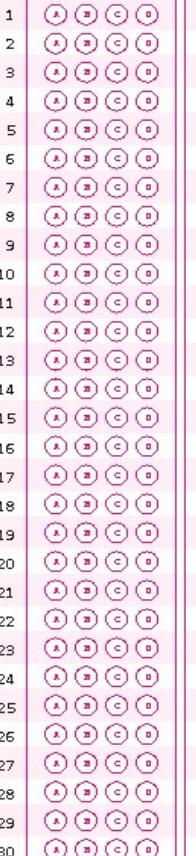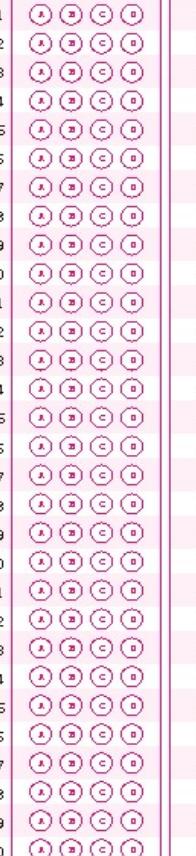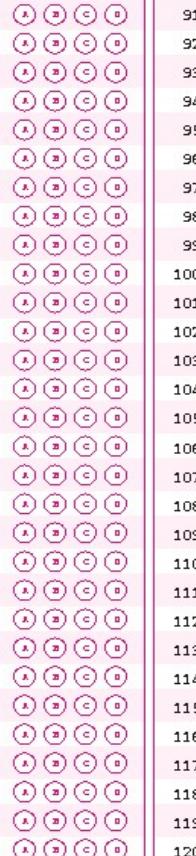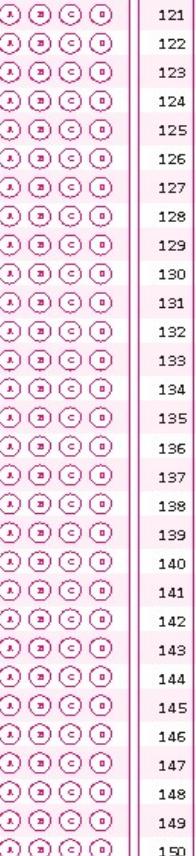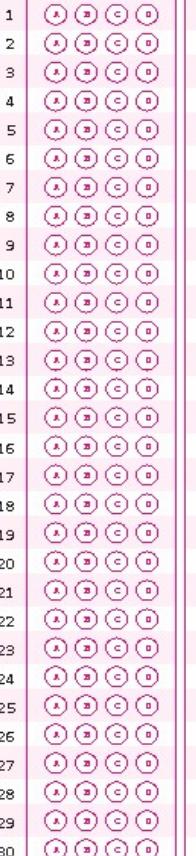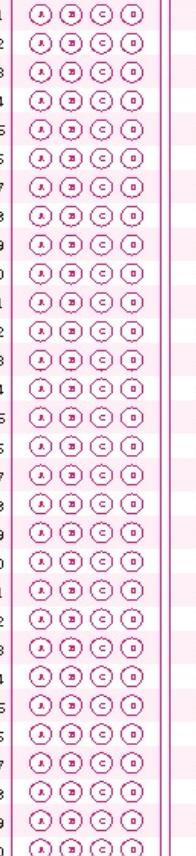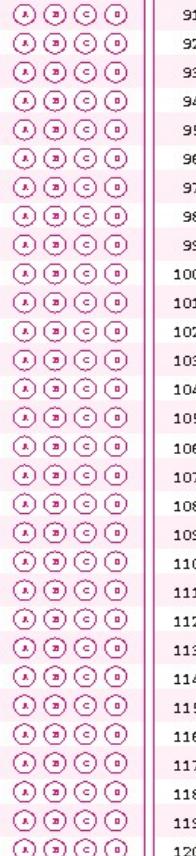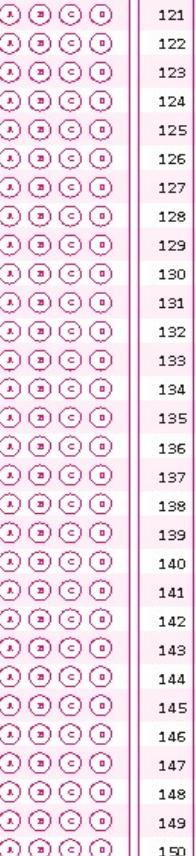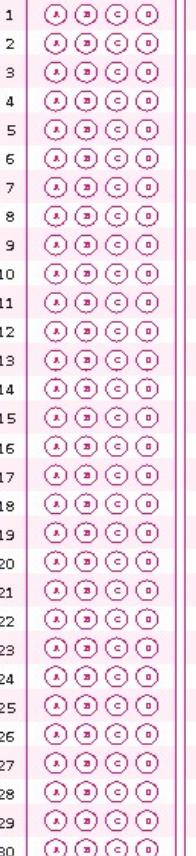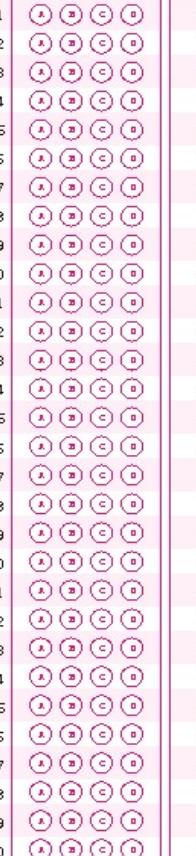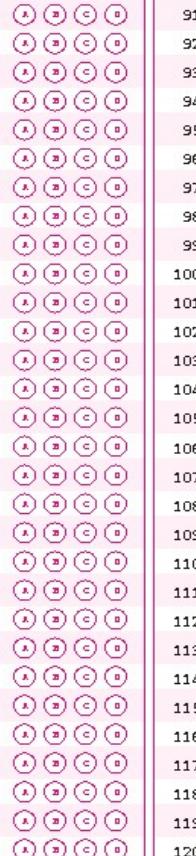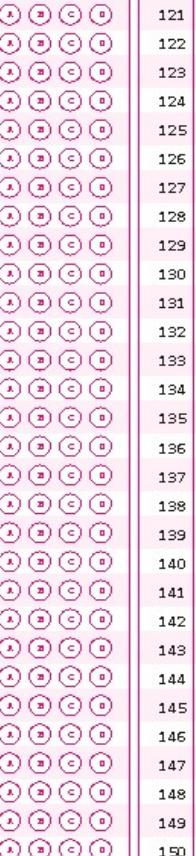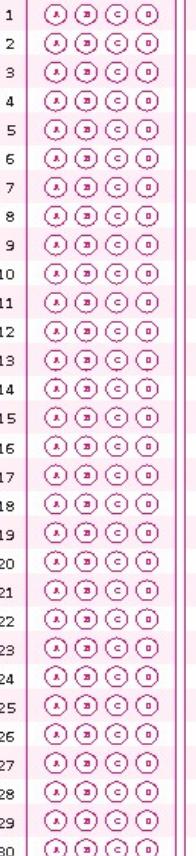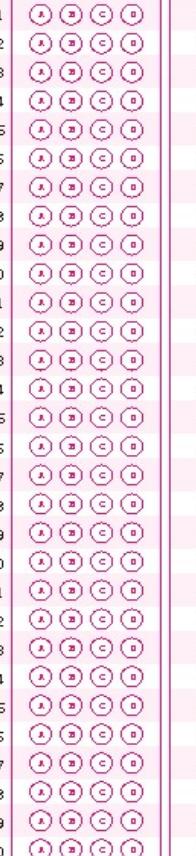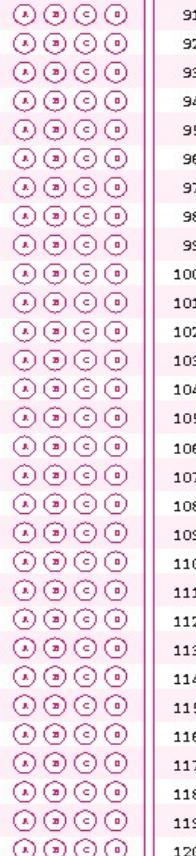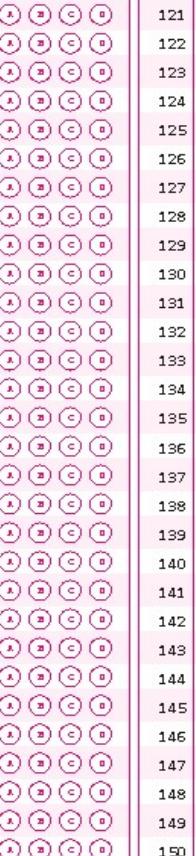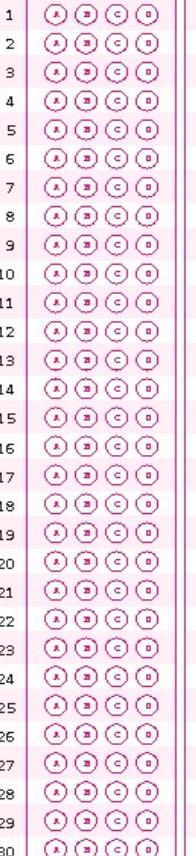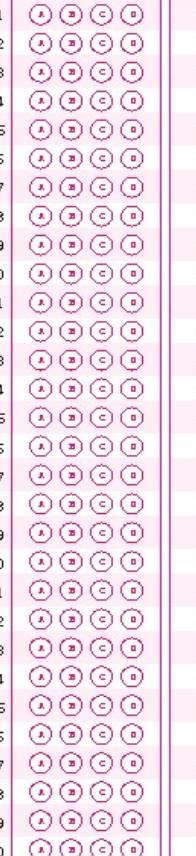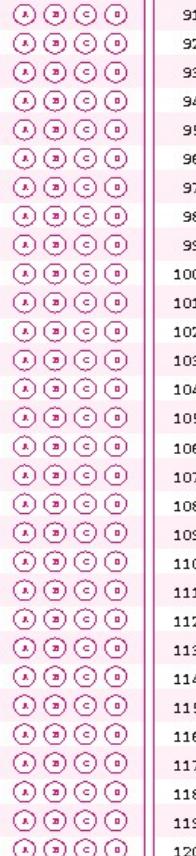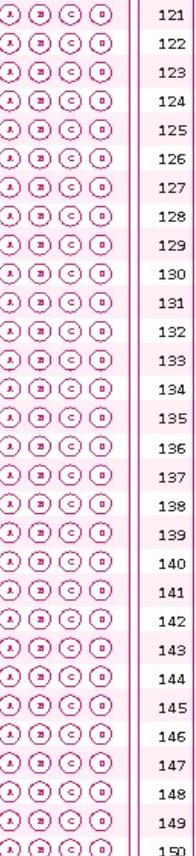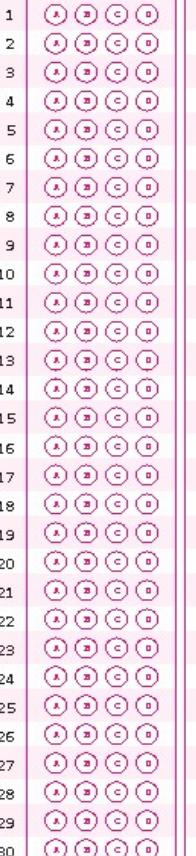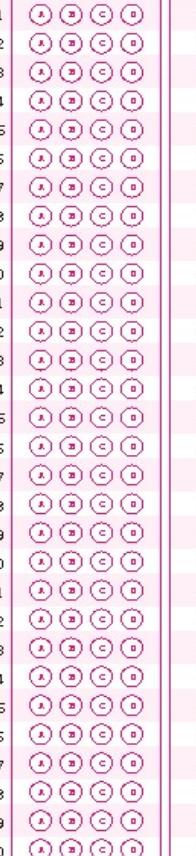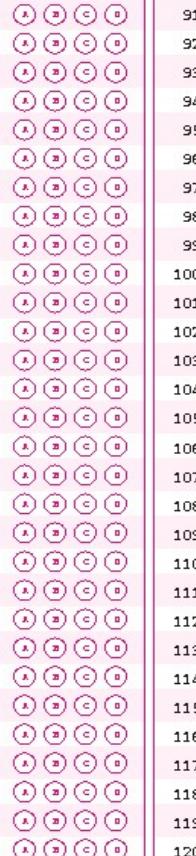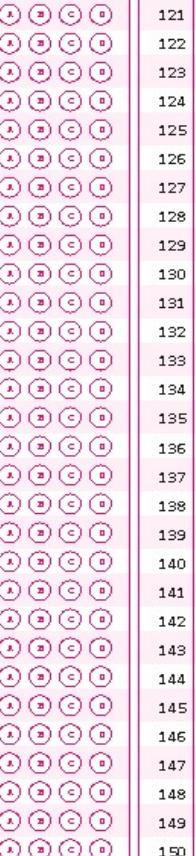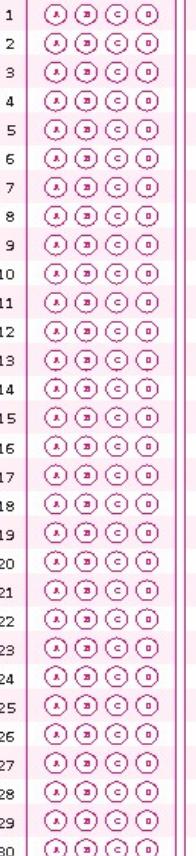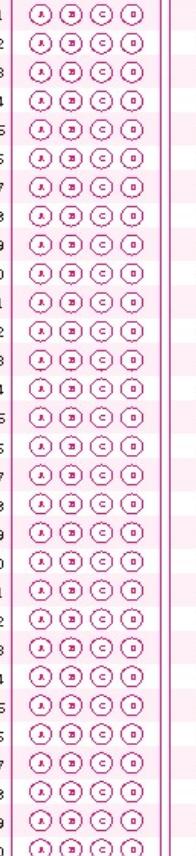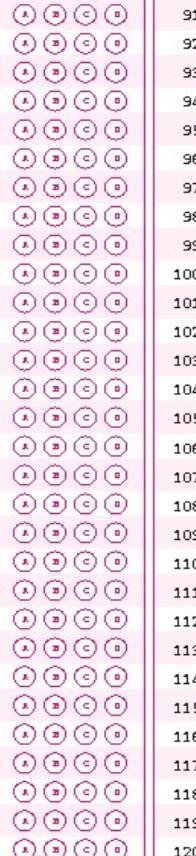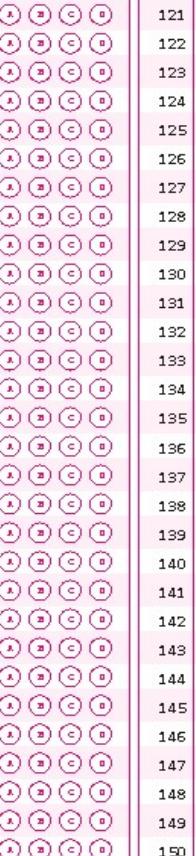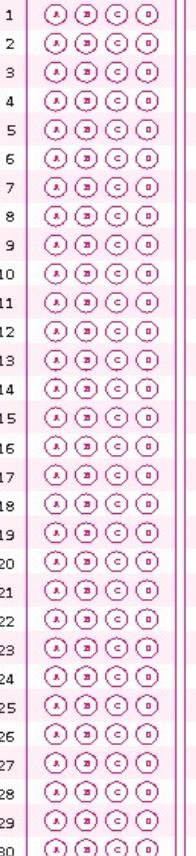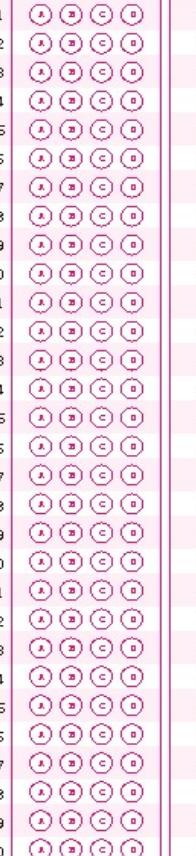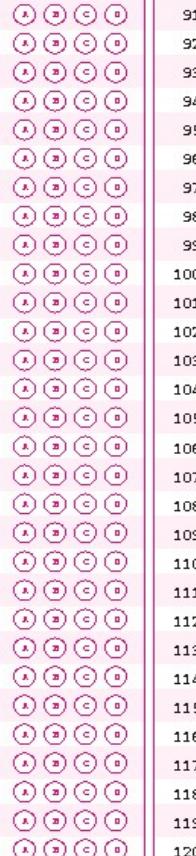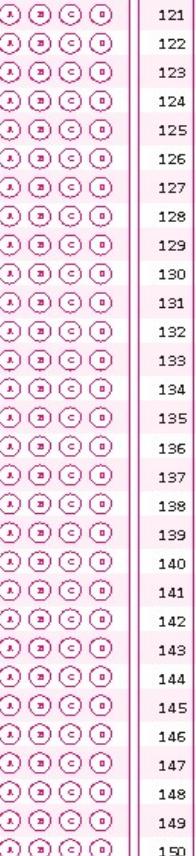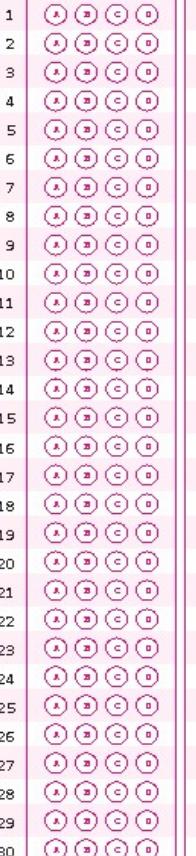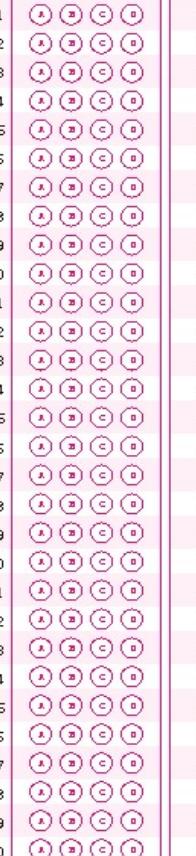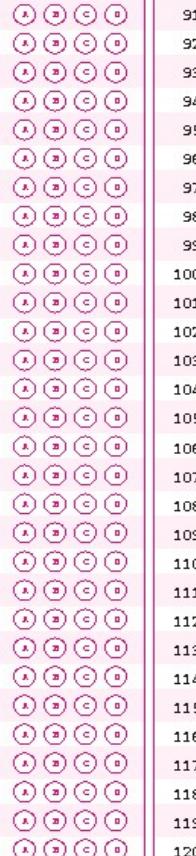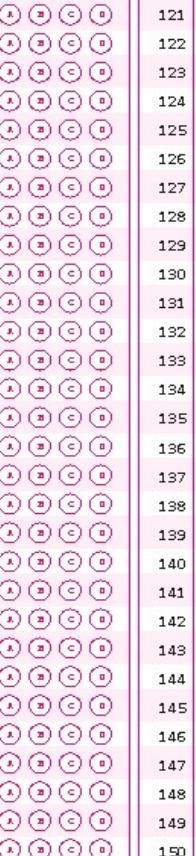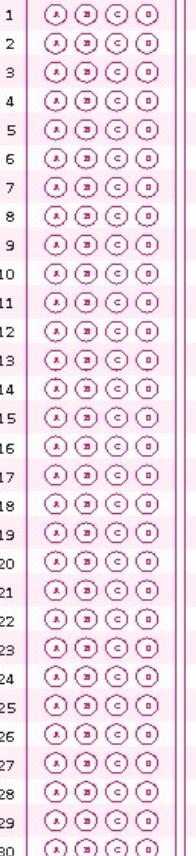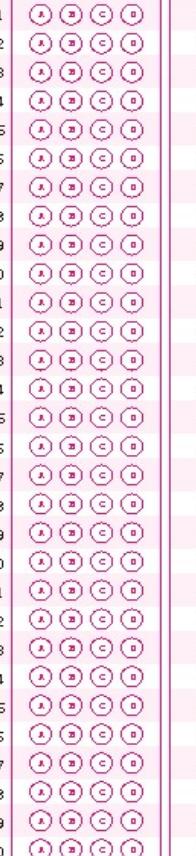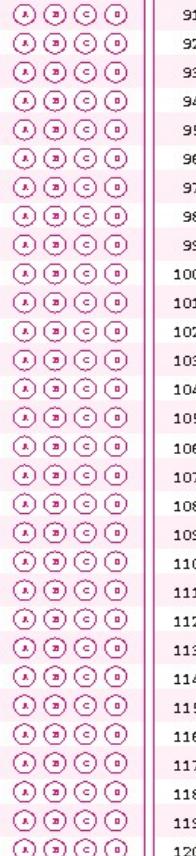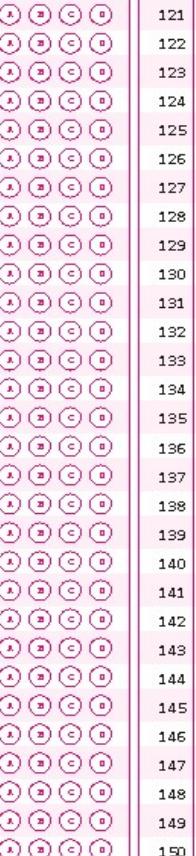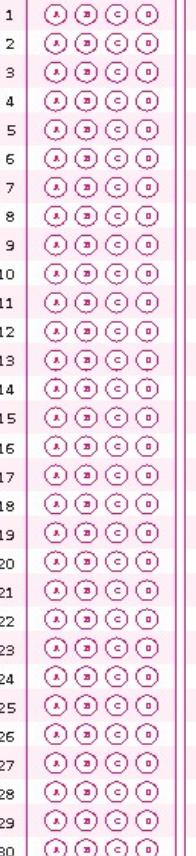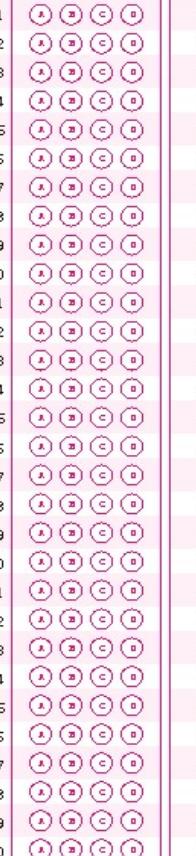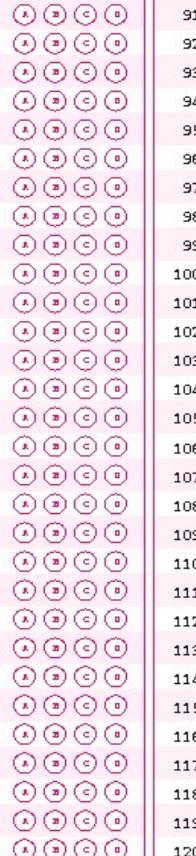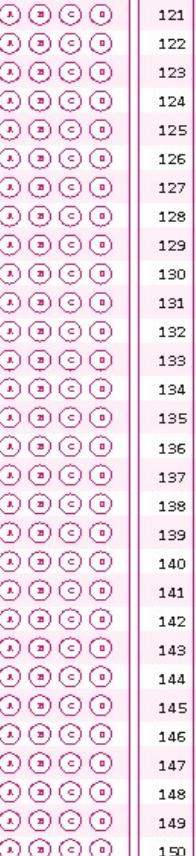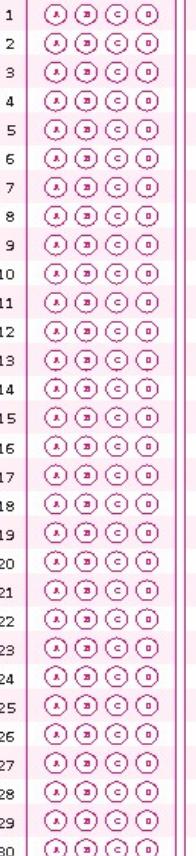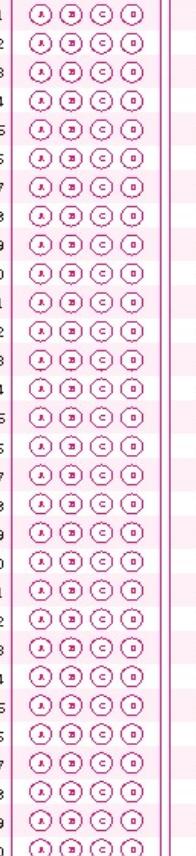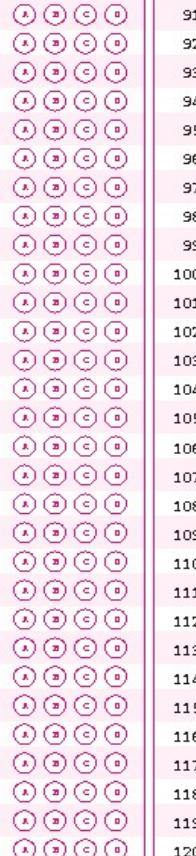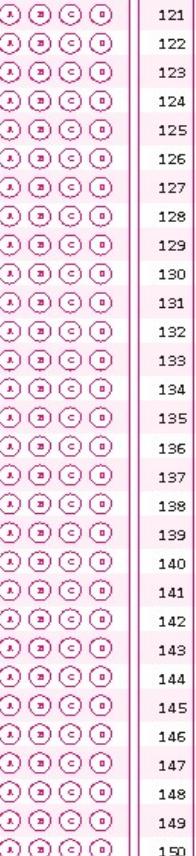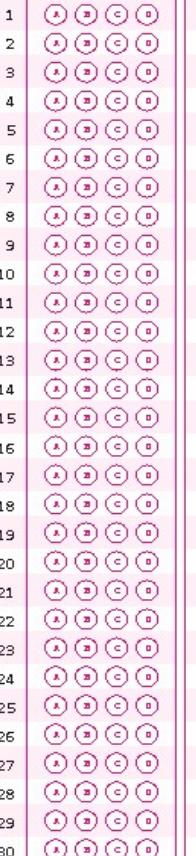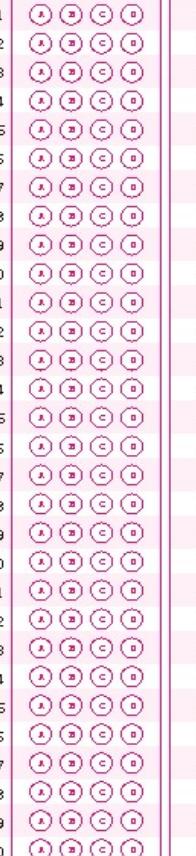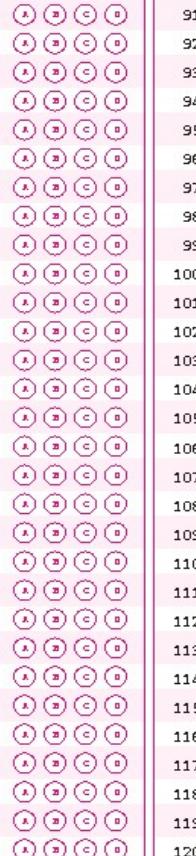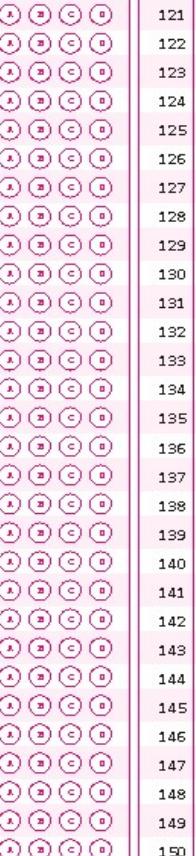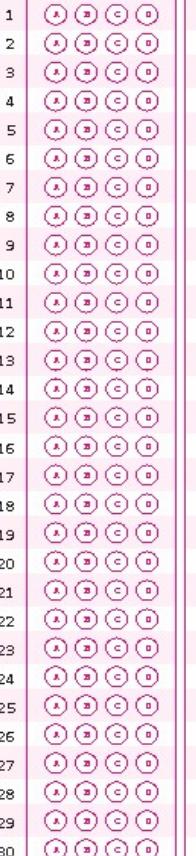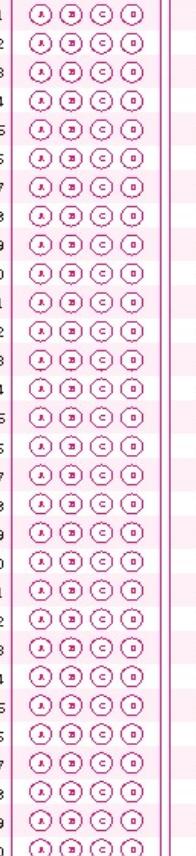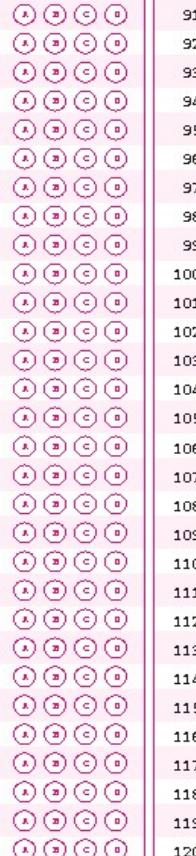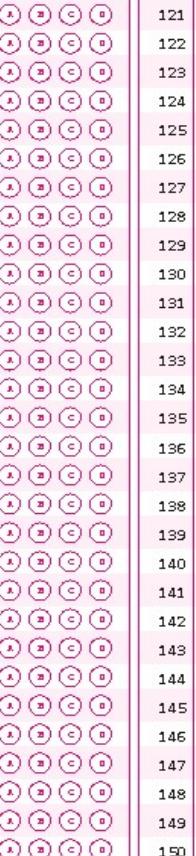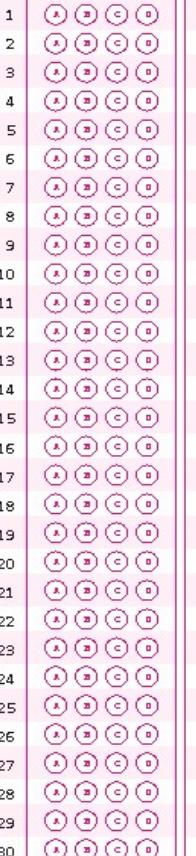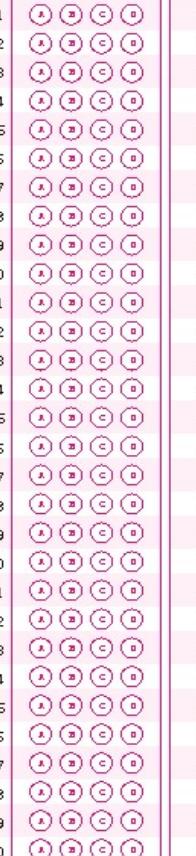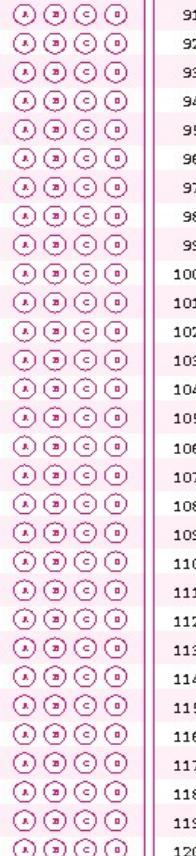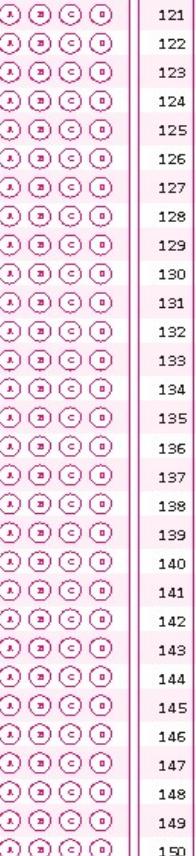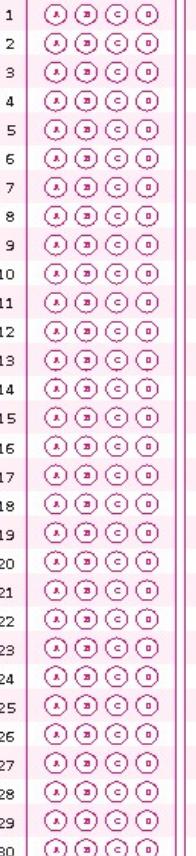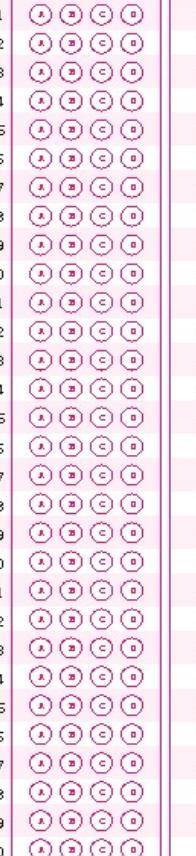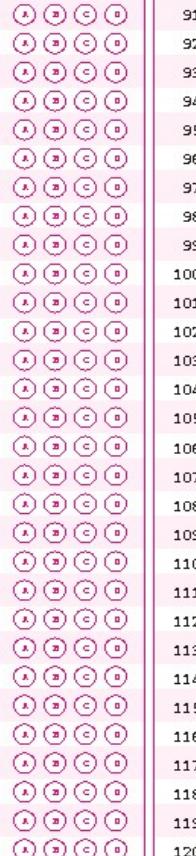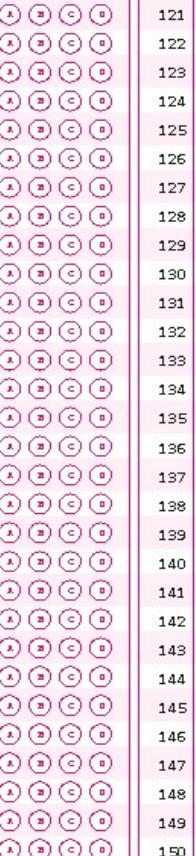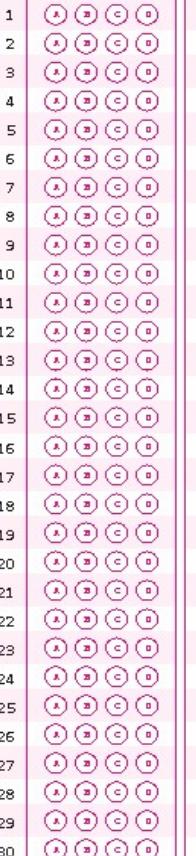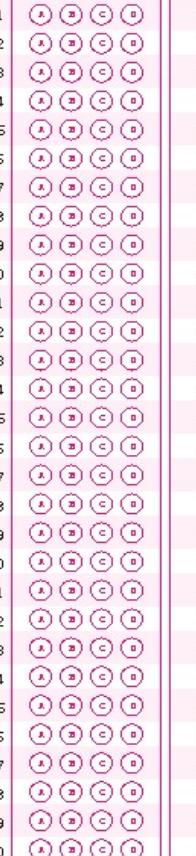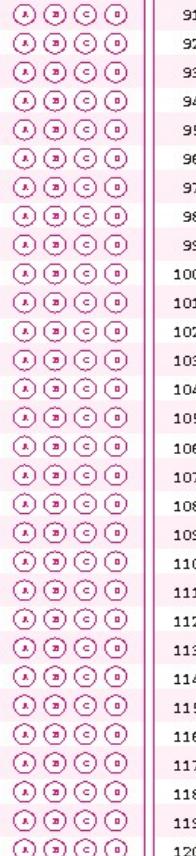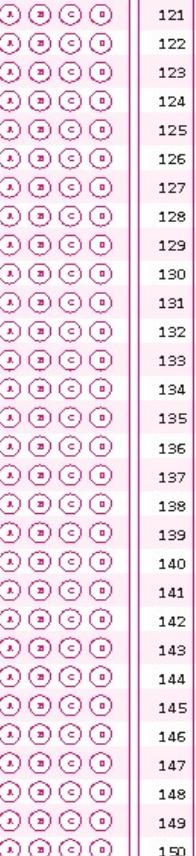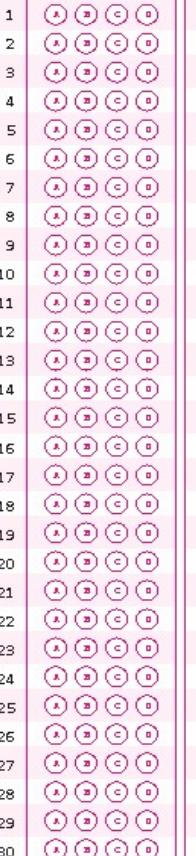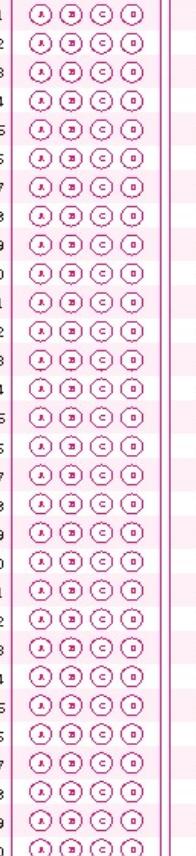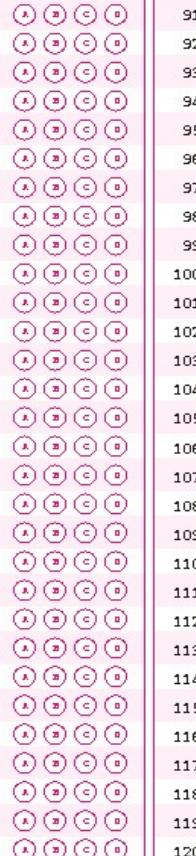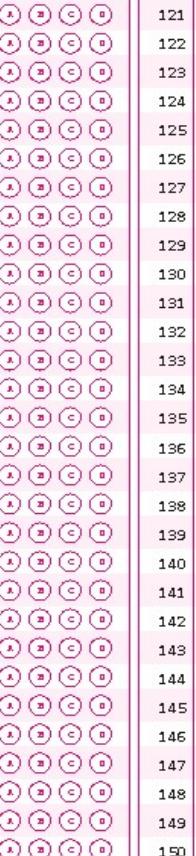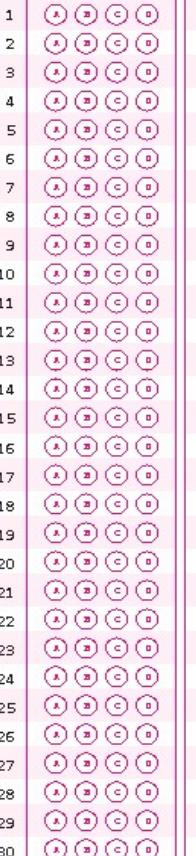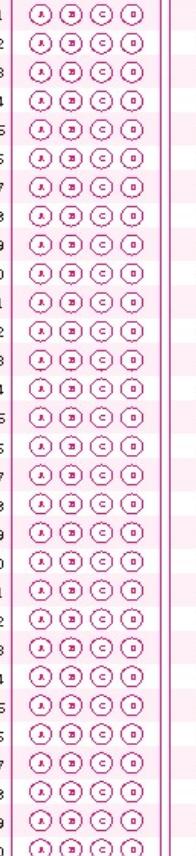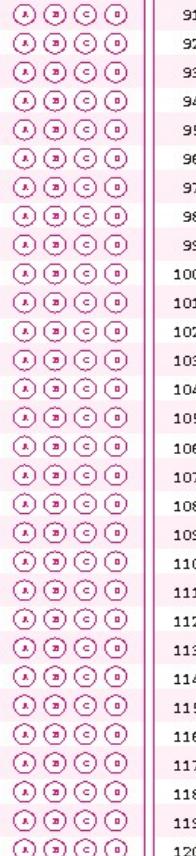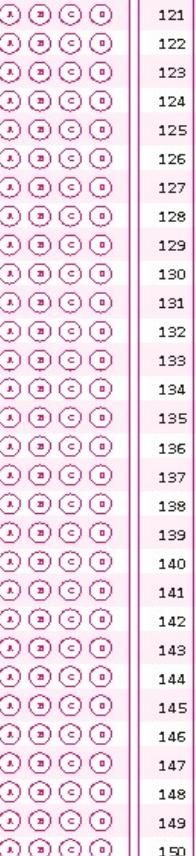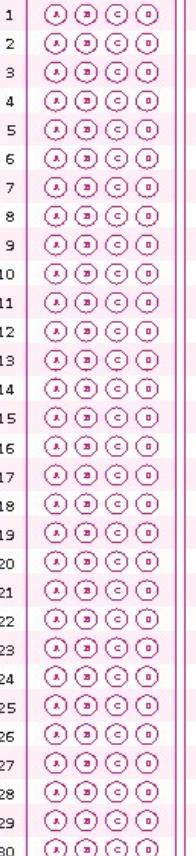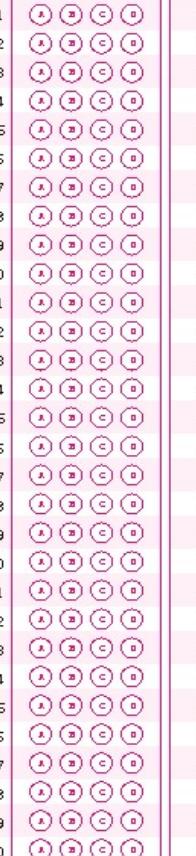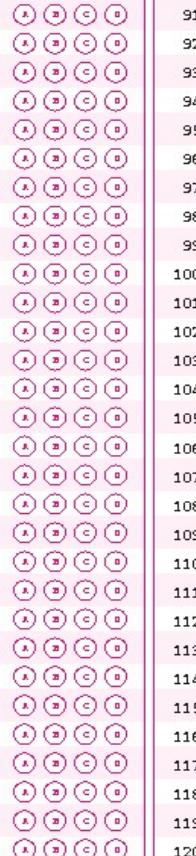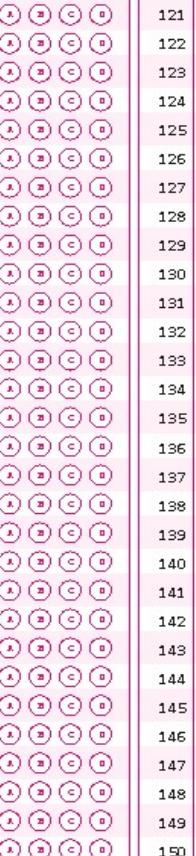
1. There is almost no space between two questions. Sufficient vertical in-between space is required, to avoid any misreads due to tilt or overlapping-overfilling by candidates.

2. The sizes of bubbles are different in Questions and Rollno fields. This makes it evident that it is not a mature design and standard directions have not been followed while designing this. So it might have been created by some specific team for use by self, but it is not a generally acceptable design.

3. Correspondingly there is difference in the timeline vertical increment gap (different gap for Rollno block and different gap for Question blocks) while in any correct sheet it should ideally be uniform throughout. It seems this sheet was arranged to make suitable for some specific machine. Not a correct sheet generally.

4. Lot of space has been wasted in unimportant parameters while the actual technical components of critical concern have been crammed up. See that the handwriting are space could have been optimized to create more free space for the OMR bubbles which are almost sticking to each other. Such negligence in sheet design are the root cause of inaccurate results.

These alerts are for the good of the user. If still they insist, they/we can calibrate it, but user will have to be extra careful about proper size absolute straight scanning and reading of sheets and the software would not be responsible for any inaccuracies.

If this is the first sheet that the user is going to read, it is definitely not suggested, because it will make their experience cumbersome.

We would suggest the right approach is to talk to the user and explain him these issues and immediately create a correct design (replica of the existing layout) and discard the printed lot.

Following is a technically correct design replica created for the above defective sheet:

Specific Requirements of Calibrated Sheets

Even if some technically incorrect layouts are calibrated in dire circumstances, it is important to know that some sheet layouts need some specific type of filling to work correctly.

For example, in the below given sheet,

1. the outline of the circle and the letter written inside the circle both are printed with black and are so thick, that they would create a sufficient black impression to conflict with the filled mark, if the filled mark is very light or rarified.

2. The circles are placed so congested that the outline of the adjacent circles add up, to increase the thickness of the outline or correspondingly, the density of pre-printed blackness.

Thus in order to detect the filled mark accurately, it is required that the marks made on this sheet are made big and solid black in this case to create sufficient contrast in size for accurate identification. So only blue or black pen should be used.

Pencil filling and rubbing should not be allowed on the above sheet.

Steps for Calibration of a Pre-Printed Design

1. Use either Flatbed or ADF scanner to scan one printed sheet in colour mode, 100 DPI, BMP Format. Scan it absolutely straight.

2. Count the total rows and columns of all the questions including the gap between questions to calculate the number of blocks that can be placed horizontally and vertically between index points.

3. Start a NEW Template design and create a design with all the suitable blocks for desired output placed at tentatively correct location. Then save the Template by a name.

4. Then export-print-scan-read and check that you are getting the desired output. This step is somewhat similar to creating a fresh design from the software without any text labels or ornamentation. This step is done to ensure that other than exact alignment of OMR blocks to pre-printed sheet, everything else is OK.

5. Browse and Set the image as a background by clicking on the image icon near NEW button and LOAD the template to be calibrated, that you just created. Now we have to perform the task of alignment.

6. Match the location of the index point by dragging the top left index in the template to overlap the top left index of the background image.

7. Match the size of the index points by adjusting index point size in the 'Redefine' panel.

8. Set the number of calculated blocks and adjust grid that is distance between the bubbles & size of the bubbles by REDEFINE.

9. Further all adjustments of the grid size and the number of blocks are based on human judgement and experience. These adjustments have to be made manually and tested empirically to reach to final settings that exactly overlap the required design. In between the design will have to be saved and tested various times in the read sheet panel by trying to read the image used as background.

10. Set the value of setting 'Display Read Indicator'=2 so that the software will show the location of bubble it is reading as yellow. If the calibrated design is able to exactly read the BMP image then your sheet calibration is done.

11. **If Addmen technical support team has to do the calibration,** we will require you to send about 5 to 10 images of the sheet scanned perfectly straight, in color mode, in 100% size with no scaling and saved as BMP/JPG/TIFF.

More details can be found at: http://www.admengroup.com/

Please do not confuse that Standard Designer can only make ABCDE type of blocks. It can also make all type of blocks. So long as you are making new sheets, systematically as per OMR guidelines, standard designer is sufficient.
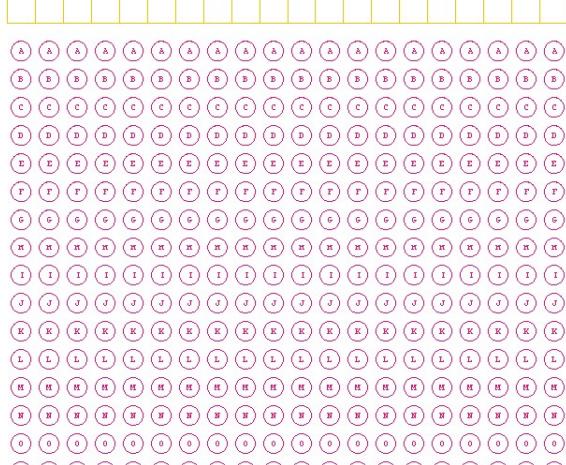
Advanced Designer is required if you have to calibrate and read a externally designed or preprinted lot of sheets which was originally not created according to OMR guidelines and had misplaced/misaligned bubbles or index points of different sizes in same sheet.

CERTIFIED ISO 27001 & 9001

VARIABLE DATA PRINTING (VDP MODULE)

VDP STAGE I- Blank Sheet Template to be used for Variable Data Printing
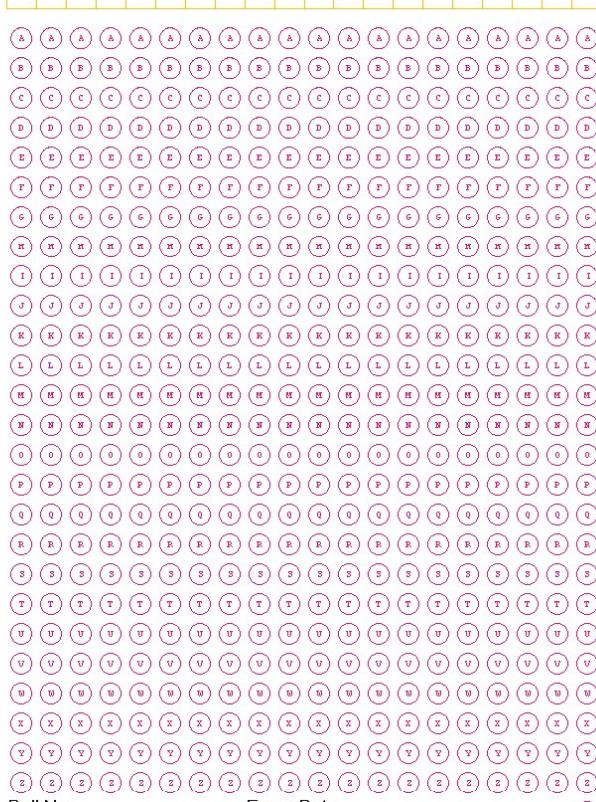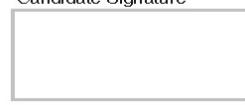
In this template design different type of fields have been depicted with different colors.
OCR fields used for reading printed numbers is depicted in Green color. Barcode fields are depicted with Blue color. ICR fields used for reading hand written text are depicted in Orange color. Image fields used for capturing photo or snapshot of portion of form are depicted in Grey color.

VDP STAGE 2- Sheet Template inlayed with Variable Data Parameters

The template is added with variable data parameters, which accepts data from Variable Data Printing module using input given in Excel or Access. Reading of various type of data blocks like **OMR, OCR, ICR, Image, Barcode or Lithocode** may need different modules added together to achieve the purpose.

VDP STAGE 3- Print Sheet with Variable Data Values

The template is printed with variable values using Variable Data Printing module. VDP module is not essential for variable data printing. Variable values can also be printed using third party arrangements like regular Mail merging process using Word-Excel combination. However the use of VDP module helps in accurate positioning of values which is very important for accurate reading of dynamic data fields to be read by OMR software.

- Can accept input from Access or Excel. There is no specific format. The Access or Excel may contain as many tables or worksheets. Each worksheet may contain as many fields.

- The variable data input may be created manually or from a third party software.

- Lithocode can be generated for any given field. Lithocode fields are added to the same excel sheet.
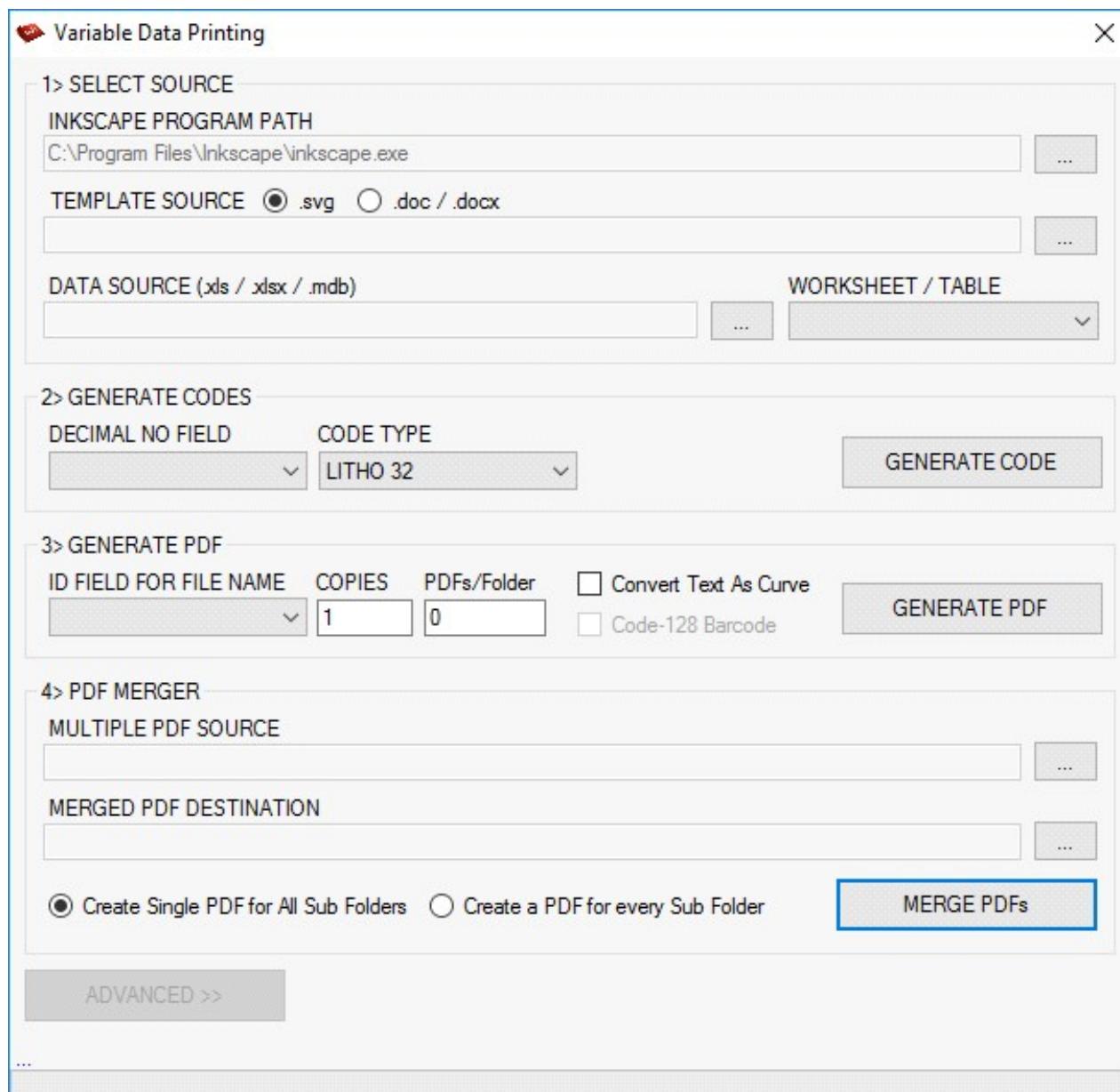
SHEETNO	PRINTNO	SECURITY	SR	CANDIDATE NAME	EXAM	SUBJECT	SCHOOL	CENTER
12055	56721	16012001	1	DEMO STUDENT 1	Jun-16	ENGLISH	GANDHI VIDYALAYA, PARBHANI	APJ KALAM SCHOOL, PARBHANI
12056	56722	16013001	2	DEMO STUDENT 2	Jun-16	ENGLISH	DNYANSADHANA PUBLILC SCHOOL	APJ KALAM SCHOOL, PARBHANI
12057	56723	16013002	3	DEMO STUDENT 3	Jun-16	ENGLISH	DNYANSADHANA PUBLILC SCHOOL	APJ KALAM SCHOOL, PARBHANI
12058	56724	16013003	4	DEMO STUDENT 4	Jun-16	ENGLISH	DNYANSADHANA PUBLILC SCHOOL	APJ KALAM SCHOOL, PARBHANI
12059	56725	16014001	5	DEMO STUDENT 5	Jun-16	ENGLISH	BHARTIYA BALVIDYAMANDIR	APJ KALAM SCHOOL, PARBHANI

SHEETNO	PRINTNO	SECURITY	BINARY NO	L09	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29	L30	L31	L32
12055	56721	16012001	0000000011110100010100101011100001	X	X	X	X		X				X		X			X		X	X	X					X
12056	56722	16013001	0000000011110100010101011011001001	X	X	X	X		X				X		X		X	X		X	X			X			X
12057	56723	16013002	0000000011110100010101011011001010	X	X	X	X		X				X		X		X	X		X	X			X		X	
12058	56724	16013003	0000000011110100010101011011001011	X	X	X	X		X				X		X		X	X		X	X			X		X	X
12059	56725	16014001	0000000011110100010110101011001	X	X	X	X		X				X		X	X		X		X		X	X				X
12060	56726	16014002	0000000011110100010110101011001	X	X	X	X		X				X		X	X		X		X		X	X			X	
12061	56727	16014003	0000000011110100010110101011001	X	X	X	X		X				X		X	X		X		X		X	X			X	X
12062	56728	16014004	0000000011110100010110101011010100	X	X	X	X		X				X		X	X		X		X		X	X		X		
12063	56729	16015003	0000000011110100010111101001011	X	X	X	X		X				X		X	X	X	X		X			X	X		X	X
12064	56730	16015005	0000000011110100010111101001111101	X	X	X	X		X				X		X	X	X	X		X			X	X	X		X

- The OMR template to be printed is saved in SVG format with the fields written on the page as *FIELD*. There should be '*' on both side of the field name.

- The field name should be written in capital on the input SVG file and in the input data source file.

- The Barcode field must be named *BARCODE*. In case there are more than one barcodes to be placed, then the fields should be named as*BARCODE1*, *BARCODE2*….and so on..

- The VDP module can also accept input layout as Word file, in case you need to create multiple copies of question papers with uniquely printed Question Booklet No., then this is the option.

- The VDP module can be used to generate Lithocode out of numerical values given in any field.

- Output PDF Files can be named according to any Unique ID field in the data sheet.

- COPIES lets you create multiple copies of each data merged template, the copies are generated as FILENAME+COPYNO. For Example: AAA01, AAA02, AAA03…..

- PDF/FOLDER lets you automatically create subfolders containing specific number of files in a folder.

- Several single page PDFs can be merged together to make on single multi-page file.

- Sometimes OMR forms are large and extend to multiple pages. VDP module can be used to generate multi-page forms, by joining various variable printed templates in sequence.

- The combined PDF is created for all the files in a folder. If several PDFs are required containing a desired series of pages, then the PDF/FOLDER option should be used while creating PDF. It forms several PDF folders with respective series of PDFs, which when merged, after selecting [Merge by Sub Folder] option then a single PDF for each folder is created.

- Still if it is desired to have one single file for all the files in all the sub folders, then chose the [Merge Sub Folder] option.

<h2 style="text-align:center; color:#C55A11;">Screenshot of the Variable Data Printing Module</h2>

This sheet is now merged with variable data and ready as PDF to be printed and distributed for filling.

Your Institute Name & Logo

CANDIDATE INFORMATION

Sheet Serial No.

12055

Print No.

`* 5 6 7 2 1 *`

Candidate Name (In BLOCK Letters)

Roll No.

Exam Date

Enter Subject Code

Re-enter Subject Code

School: GANDHI VIDYALAYA, PARBHANI
Exam Center: APJ KALAM SCHOOL, PARBHANI
Subject Group: ENGLISH
Examination No.: JUN-16

Candidate Signature

OMR ANSWER SHEET

INSTRUCTIONS FOR FILLING THE SHEET
1. This sheet should not be folded or crushed.
2. Use only blue/black ball point pen to fill the circles.
3. Use of pencil is strictly prohibited.
4. Circles should be darkened completely and properly.
5. Cutting and erasing on this sheet is not allowed.
6. Do not use any stray marks on the sheet.
7. Do not use marker or white fluid to hide the mark.

WRONG METHODS   **CORRECT METHOD**

Test Paper Set   A (A)
                      B (B)

	A B C D		A B C D
1	A B C D	26	A B C D
2	A B C D	27	A B C D
3	A B C D	28	A B C D
4	A B C D	29	A B C D
5	A B C D	30	A B C D
6	A B C D	31	A B C D
7	A B C D	32	A B C D
8	A B C D	33	A B C D
9	A B C D	34	A B C D
10	A B C D	35	A B C D
11	A B C D	36	A B C D
12	A B C D	37	A B C D
13	A B C D	38	A B C D
14	A B C D	39	A B C D
15	A B C D	40	A B C D
16	A B C D	41	A B C D
17	A B C D	42	A B C D
18	A B C D	43	A B C D
19	A B C D	44	A B C D
20	A B C D	45	A B C D
21	A B C D	46	A B C D
22	A B C D	47	A B C D
23	A B C D	48	A B C D
24	A B C D	49	A B C D
25	A B C D	50	A B C D

Sheet No.

12055

Print No.

`* 5 6 7 2 1 *`

Invigilator Signature

VDP STAGE 4- Sheet Scan ready for reading