4.11 LIST Options

Meaning of LIST Option

The LIST option displays cross-tabulation results in a list format instead of a matrix format.

It is useful when there are many categories.

Syntax

```sas
proc freq data=dataset;
   tables variable1*variable2 / list;
run;
```

Example

```sas
proc freq data=students;
   tables Gender*Department / list;
run;
```

Output Concept

Gender	Department	Frequency	Percent
F	CS	1	16.67
F	IT	2	33.33
M	CS	3	50.00
M	IT	0	0.00

Useful PROC FREQ Options

Option	Meaning
LIST	Displays table in list format
NOCOL	Removes column percentages
NOROW	Removes row percentages
NOPERCENT	Removes percentages
MISSING	Includes missing values
CHISQ	Performs chi-square test
OUT=	Saves frequency output to a dataset

Example with Options

```sas
```

```
proc freq data=students;
   tables Gender*Department / norow nocol nopercent;
run;
```

This displays only frequencies.

4.12 Output Delivery System, ODS

Definition

The **Output Delivery System**, or **ODS**, is a SAS system used to control the format and destination of output.

ODS allows SAS output to be saved as:

- HTML
- PDF
- RTF
- Excel
- PowerPoint
- Listing output

Why Use ODS?

ODS is useful because it allows us to:

- Create professional reports
- Export results to different file formats
- Customize output style
- Share results with others
- Automate report generation

General Syntax

```
sas

ods destination file="file-path";

proc procedure-name data=dataset;
   statements;
run;

ods destination close;
```

ODS Flow Diagram

```
SAS Procedure
      |
      v
```

```
ODS System
    |
    +---- HTML Output
    |
    +---- PDF Output
    |
    +---- RTF Output
    |
    +---- Excel Output
```

4.13 HTML Outputs

Definition

HTML output is used to create web-viewable SAS reports.

HTML files can be opened in a browser such as Chrome, Edge, or Firefox.

Syntax

```sas
ods html file="C:\SASOutput\report.html";

proc means data=class;
   var Marks;
run;

ods html close;
```

Example

```sas
ods html file="C:\Reports\marks_report.html" style=statistical;

proc means data=class n mean min max maxdec=2;
   var Marks;
run;

proc freq data=class;
   tables Gender;
run;

ods html close;
```

Advantages of HTML Output

- Opens in web browsers
- Easy to share
- Supports tables and styles

- Useful for online reports

4.14 PDF Outputs

Definition

PDF output is used to create fixed-format reports.

PDF files are commonly used for official reports, assignments, and submissions.

Syntax

```sas
ods pdf file="C:\Reports\report.pdf";

proc means data=class;
   var Marks;
run;

ods pdf close;
```

Example

```sas
ods pdf file="C:\Reports\student_analysis.pdf" style=journal;

title "Student Marks Analysis";

proc means data=class n mean std min max maxdec=2;
   var Marks;
run;

proc freq data=class;
   tables Gender*Grade;
run;

title;

ods pdf close;
```

Advantages of PDF Output

- Professional appearance
- Layout remains fixed
- Suitable for printing
- Good for formal reports

4.15 RTF Outputs

Definition

RTF stands for **Rich Text Format**.

RTF output can be opened in Microsoft Word or other word processors.

Syntax

```sas
ods rtf file="C:\Reports\report.rtf";

proc means data=class;
   var Marks;
run;

ods rtf close;
```

Example

```sas
ods rtf file="C:\Reports\student_report.rtf" style=journal;

title "Student Performance Report";

proc means data=class n mean median std min max maxdec=2;
   var Marks;
run;

proc freq data=class;
   tables Department Grade;
run;

title;

ods rtf close;
```

Advantages of RTF Output

- Can be edited in Word
- Useful for assignments and documentation
- Supports formatted tables
- Good for draft reports

4.16 EXCEL Outputs

Definition

ODS Excel creates Excel workbook files directly from SAS output.

It is useful for business reports, dashboards, and tabular analysis.

Syntax

```sas
ods excel file="C:\Reports\report.xlsx";

proc means data=class;
   var Marks;
run;

ods excel close;
```

Example

```sas
ods excel file="C:\Reports\student_report.xlsx"
   options(sheet_name="Marks Summary");

proc means data=class n mean std min max maxdec=2;
   var Marks;
run;

ods excel options(sheet_name="Gender Frequency");

proc freq data=class;
   tables Gender Department;
run;

ods excel close;
```

Advantages of Excel Output

- Easy to analyze further
- Can contain multiple sheets
- Useful for business users
- Supports charts and pivot tables after export

Integrated Worked Example

Problem

A college wants to analyze student marks. The dataset contains:

- Student name
- Gender
- Department
- Date of admission
- Marks

Tasks:

1. Read admission date correctly.
2. Display date in readable format.
3. Calculate descriptive statistics for marks.
4. Create frequency tables for gender and department.
5. Export results to PDF and Excel.

SAS Code

```sas
data college;
   input Name $ Gender $ Department $ AdmissionDate :date9. Marks;
   format AdmissionDate worddate.;
   datalines;
Arun M CS 15JUL2022 78
Meena F IT 20AUG2022 85
Ravi M CS 10JUL2022 67
Divya F IT 05SEP2022 92
Kumar M CS 01AUG2022 74
Latha F CS 12JUL2022 88
;
run;

proc print data=college;
   title "College Student Data";
run;

proc means data=college n mean median std min max maxdec=2;
   var Marks;
   title "Descriptive Statistics for Marks";
run;

proc freq data=college;
   tables Gender Department Gender*Department / norow nocol;
   title "Frequency Analysis";
run;

ods pdf file="C:\Reports\college_report.pdf" style=journal;

proc print data=college;
   title "College Student Data";
run;
```

```
proc means data=college n mean median std min max maxdec=2;
   var Marks;
   title "Descriptive Statistics for Marks";
run;

proc freq data=college;
   tables Gender Department Gender*Department / norow nocol;
   title "Frequency Analysis";
run;

ods pdf close;

ods excel file="C:\Reports\college_report.xlsx";

ods excel options(sheet_name="Student Data");
proc print data=college;
run;

ods excel options(sheet_name="Marks Summary");
proc means data=college n mean median std min max maxdec=2;
   var Marks;
run;

ods excel options(sheet_name="Frequency Tables");
proc freq data=college;
   tables Gender Department Gender*Department / norow nocol;
run;

ods excel close;

title;
```

Worked Example: Manual Descriptive Statistics

Suppose marks are:

> 78, 85, 67, 92, 74

Step 1: Mean

$$Mean = \frac{78 + 85 + 67 + 92 + 74}{5}$$

$$Mean = \frac{396}{5} = 79.2$$

Step 2: Minimum and Maximum

> Minimum = 67
> Maximum = 92

Step 3: Range

$$Range = 92 - 67 = 25$$

So, PROC MEANS will report:

> N = 5
> Mean = 79.20
> Minimum = 67
> Maximum = 92
> Range = 25

Important SAS Code Summary

Reading Dates

```sas
input DOB :date9.;
format DOB date9.;
```

Reading Time

```sas
input StartTime :time8.;
format StartTime time8.;
```

Reading Datetime

```sas
input LoginTime :datetime20.;
format LoginTime datetime20.;
```

Using Functions

```sas
Total = sum(Mark1, Mark2, Mark3);
Average = mean(Mark1, Mark2, Mark3);
UpperName = upcase(Name);
YearValue = year(DOB);
```

Character to Numeric

```sas
NumValue = input(CharValue, 8.);
```

Numeric to Character

```sas
CharValue = put(NumValue, 8.);
```

PROC MEANS

```sas
proc means data=mydata n mean std min max maxdec=2;
   var Score;
run;
```

PROC FREQ

```sas
proc freq data=mydata;
   tables Gender Department Gender*Department / list;
run;
```

ODS PDF

```sas
ods pdf file="C:\Reports\report.pdf";
proc means data=mydata;
run;
ods pdf close;
```

ODS Excel

```sas
ods excel file="C:\Reports\report.xlsx";
proc freq data=mydata;
run;
ods excel close;
```

Quick Revision Points

- An **informat** reads raw data into SAS.
- A **format** controls how values are displayed.
- SAS stores dates as the number of days from 01 January 1960.
- SAS stores time as the number of seconds from midnight.
- DATE9. reads or displays dates like 20JUL2026 .
- TIME8. displays time like 14:30:00 .
- DATETIME20. handles both date and time.

- SAS functions return values after performing operations.
- INPUT converts character data to numeric data.
- PUT converts numeric data to character data.
- PROC MEANS summarizes numeric variables.
- PROC FREQ summarizes categorical variables.
- MAXDEC= limits decimal places in PROC MEANS .
- Two-way tables use variable1*variable2 .
- N-way tables use more than two variables.
- The LIST option displays frequency output in list form.
- ODS exports SAS output to formats such as HTML, PDF, RTF, and Excel.
- Always close ODS destinations using ods destination close; .

Common Mistakes to Avoid

Mistake	Correction
Using format instead of informat while reading raw dates	Use informat in input statement
Forgetting to apply date format	Use format datevar date9.;
Using PUT for character-to-numeric conversion	Use INPUT
Using INPUT for numeric-to-character conversion	Use PUT
Applying PROC MEANS to character variables	Use only numeric variables in VAR
Forgetting to close ODS	Use ods pdf close; , ods excel close; , etc.
Writing file path incorrectly	Use valid path and filename
Confusing one-way and two-way frequency tables	One variable = one-way; two variables = two-way

---

10 Exam Questions with Answers

Question 1

Define informat and format in SAS.

Answer

An **informat** tells SAS how to read raw data values. A **format** tells SAS how to display stored values.

Example:

```sas
input DOB :date9.;
format DOB date9.;
```

Here, date9. in the input statement reads the date, and date9. in the format statement displays it.

Question 2

How does SAS store date and time values internally?

Answer

SAS stores:

- Date values as the number of days from 01 January 1960.
- Time values as the number of seconds from midnight.
- Datetime values as the number of seconds from 01 January 1960 midnight.

Question 3

Write SAS code to read the date value 20JUL2026 .

Answer

```sas
data example;
   input EventDate :date9.;
   format EventDate date9.;
   datalines;
20JUL2026
;
run;

proc print data=example;
run;
```

Question 4

What is the difference between INPUT and PUT functions?

Answer

Function	Use
INPUT	Converts character value to numeric value
PUT	Converts numeric value to character value

Example:

```sas
NumAge = input(CharAge, 8.);
CharID = put(NumID, 5.);
```

Question 5

Write SAS code to calculate mean, minimum, maximum, and standard deviation for a variable called Marks .

Answer

```sas
proc means data=students mean min max std maxdec=2;
  var Marks;
run;
```

Question 6

What is the use of MAXDEC= in PROC MEANS ?

Answer

MAXDEC= limits the number of decimal places displayed in the output.

Example:

```sas
proc means data=students mean std maxdec=2;
  var Marks;
run;
```

This displays statistics with two decimal places.

Question 7

Write SAS code to create a frequency table for Gender .

Answer

```sas
proc freq data=students;
  tables Gender;
run;
```

Question 8

Write SAS code to create a two-way table for Gender and Department .

Answer

```sas
proc freq data=students;
   tables Gender*Department;
run;
```

Question 9

What is the purpose of the LIST option in PROC FREQ ?

Answer

The LIST option displays cross-tabulation results in list format instead of table format.

Example:

```sas
proc freq data=students;
   tables Gender*Department / list;
run;
```

Question 10

Write SAS code to export PROC MEANS output to PDF and Excel.

Answer

PDF output:

```sas
ods pdf file="C:\Reports\means_report.pdf";

proc means data=students mean min max std maxdec=2;
   var Marks;
run;

ods pdf close;
```

Excel output:

```sas
ods excel file="C:\Reports\means_report.xlsx";
```

```
proc means data=students mean min max std maxdec=2;
   var Marks;
run;

ods excel close;
```

Final Summary

Unit 4 focuses on practical SAS programming skills used in statistical reporting and automation. The most important concepts are:

> Informats read data.
> Formats display data.
> Functions transform data.
> PROC MEANS summarizes numeric data.
> PROC FREQ summarizes categorical data.
> ODS exports output to HTML, PDF, RTF, and Excel.