# 03 Logical Functions
# Part I

**Overview**

The logical functions in spreadsheets could be used to deduce a value based on criteria. There could be two possible values that could accompany a cell based on certain criteria's validity. Also, it is possible to evaluate several criteria consecutively by nesting the conditional functions. To evaluate more than one condition it will be necessary to use additional functions with previously learned logical functions. This time the functions that evaluate "AND" and "OR" Boolean logic need to be used to arrive at results.


1. Logical functions in MS Excel
2. Logical functions in Google Sheets
3. Nesting the same logical function multiple times
4. AND and OR functions in Microsoft Excel
5. AND and OR functions in Libre Office

**Activity 03.1**

In a degree program conducted by a certain department of a faculty in a university, there are two subjects namely "Information Technology" and "Data Analytics". Based on the reflected performance of those two subjects, the students become eligible for the next subject in the next semester which is named as "Advance Data Analytics". Each subject has a practical module and a theory module where the students score separately. Based on the marks obtained for each module the pass/fail status is decided. Complete the cells according to the given task descriptions.

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | | Information Technology | | | Data Analytics | | | Eligible for Advance Data Analytics |
| 2 | Student Index | Theory Module | Practical Module | Pass/Fail | Theory Module | Practical Module | Pass/Fail | |
| 3 | 10224 | 31 | 20 | Passed | 35 | 39 | Passed | Eligible |
| 4 | 10225 | 15 | 1 | Failed | 9 | 11 | Failed | Not Eligible |
| 5 | 10226 | 56 | 27 | Passed | 40 | 38 | Passed | Eligible |
| 6 | 10227 | 51 | 27 | Passed | 33 | 22 | Passed | Eligible |
| 7 | 10228 | 14 | 30 | Failed | 39 | 20 | Passed | Not Eligible |
| 8 | 10229 | 47 | 16 | Failed | 16 | 13 | Failed | Not Eligible |
| 9 | 10230 | 39 | 17 | Failed | 58 | 14 | Passed | Not Eligible |
| 10 | 10231 | 46 | 4 | Failed | 3 | 8 | Failed | Not Eligible |
| 11 | 10232 | 53 | 21 | Passed | 53 | 10 | Passed | Eligible |
| 12 | 10233 | 49 | 36 | Passed | 32 | 29 | Passed | Eligible |

1. The subject "Information Technology" is passed if the students have obtained 30 marks or above for theory module AND 20 marks or above for practical module. Use proper logical function to fill column "Pass/Fail" under subject "Information Technology". You may indicate the passed students as "Passed" and failed students as "Failed"

2. The subject "Data Analytics" is passed if the students have obtained 30 marks or above for theory module OR 20 marks or above for practical module. Use proper logical function to fill column "Pass/Fail" under subject "Data Analytics". You may indicate the passed students as "Passed" and failed students as "Failed".
3. Mark the eligibility in "Eligible for Advanced Data Analytics" column. The students are eligible for the Advanced Data Analytics module if both subjects are passed only.

**Self-Learning Activity**

**Activity 03.2**

"SCOT sellers" is selling three types of product items to its customers. All the customers of this seller are registered and based on the past transactions performed with the shop, they have acquired some loyalty points. The customers are given discounts based on some criteria. You have to complete the following tasks to calculate the net bill amount for each customer.

| | B | C | D | E | F | G |
|---|---|---|---|---|---|---|
| 1 | Loyalty Reward Points | Product Type | Total Bill Value | Loyalty Discount | Discount on Condition | Net bill Amount |
| 2 | 250 | Type 1 | Rs. 90,000.00 | Rs. 4,500.00 | Rs. 0.00 | Rs. 85,500.00 |
| 3 | 360 | Type 2 | Rs. 70,000.00 | Rs. 0.00 | Rs. 7,000.00 | Rs. 63,000.00 |
| 4 | 120 | Type 1 | Rs. 180,000.00 | Rs. 0.00 | Rs. 18,000.00 | Rs. 162,000.00 |
| 5 | 225 | Type 1 | Rs. 80,000.00 | Rs. 4,000.00 | Rs. 0.00 | Rs. 76,000.00 |
| 6 | 365 | Type 3 | Rs. 98,000.00 | Rs. 0.00 | Rs. 0.00 | Rs. 98,000.00 |
| 7 | 480 | Type 2 | Rs. 65,000.00 | Rs. 0.00 | Rs. 6,500.00 | Rs. 58,500.00 |
| 8 | 346 | Type 3 | Rs. 168,000.00 | Rs. 0.00 | Rs. 16,800.00 | Rs. 151,200.00 |

1. A discount of 5% is given to Type 1 customers who earn more than 200 loyalty points. Fill the "Loyalty Discount" column with the discount applicable using a logical function.
2. 10% discount is given for Type 2 customers or customers whose total bill exceeds 150000. Fill the "Discount on Condition" column with the relevant discount applicable using a logical function.
3. Calculate the net bill amount for each customer in the column "Net Bill Amount".

**Self-Learning Activity**

**Activity 03.3**

ABC company is preparing an excel worksheet to calculate the salaries of two types of employees (Clerks and Engineers). Calculate their salaries based on the given instructions below.

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | **Employee Number** | **Type** | **Basic Salary** | **Extra Hours** | **Total Payable** | **Total Salary** |
| 2 | 1001 | Engineer | 80000 | 10 | 0 | 80000 |
| 3 | 1002 | Clerk | 35000 | 55 | 12750 | 47750 |
| 4 | 1003 | Engineer | 80000 | 13 | 0 | 80000 |
| 5 | 1004 | Engineer | 80000 | 5 | 0 | 80000 |
| 6 | 1005 | Clerk | 35000 | 22.5 | 4625 | 39625 |
| 7 | 1006 | Clerk | 35000 | 34 | 7500 | 42500 |
| 8 | 1007 | Clerk | 35000 | 18 | 3600 | 38600 |
| 9 | 1008 | Engineer | 80000 | 5 | 0 | 80000 |
| 10 | 1009 | Clerk | 35000 | 26 | 5500 | 40500 |
| 11 | 1010 | Engineer | 80000 | 2 | 0 | 80000 |

1. Fill the basic salary of the employees as below
    - Clerks – 35000 LKR
    - Engineers – 80000 LKR

2. The engineers are not paid for the extra hours they work. But the clerks are paid in the following manner for the extra hours.

    - Rate for first 20 hours – 200 per hour
    - Rate for the hours above 20 hours – 250 per hour

    Based on the above rates, calculate the amount payable for the extra hours they work.

3. Calculate the total salary for each employee in the column “Total Salary”.

# Part II
# Look-Up Functions

**Overview**

Look-Up functions perform a rough match lookup either in a one-row or one-column range and return the corresponding value from another one-row or one-column range.

**V-Lookup**

Use VLOOKUP when you need to find things in a table or a range by row. For example, look up a price of an automotive part by the part number, or find an employee name based on their employee ID.

**H-Lookup**

HLOOKUP is an Excel function to lookup and which retrieves data from a specific row in a table. It searches for a value in the table's first row and returns another value in the same column from a row according to the given condition.


1. V-Lookup Function
2. H-Lookup Function
3. Index Function
4. Match Function
5. IFERROR

**Activity 03.4**

A retail store has a set of products. Each product has a product code. The owners of the store are going to maintain an excel sheet with the product data which has “Product Name”, “Stock(kg)” and “Price/kg”.

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **Product Code** | **Product Name** | **Stock (Kg)** | **Price/kg** | | | | | |
| 2 | F34 | Orange | 81 | $5.00 | | | **Product Name** | **Available Stock** | **Price(Kg)** |
| 3 | F68 | Apple | 52 | $3.00 | | | Orange | 81 | $ 5.00 |
| 4 | F70 | Banana | 121 | $8.00 | | | Potato | 39 | $ 0.80 |
| 5 | V48 | Carrot | 24 | $2.00 | | | Mutton | 32 | $ 8.00 |
| 6 | V30 | Potato | 39 | $0.80 | | | Rice | 210 | $ 0.70 |
| 7 | G31 | Wheat | 69 | $0.60 | | | Mango | Not Found | Not Found |
| 8 | G56 | Rice | 210 | $0.70 | | | | | |
| 9 | G70 | Corn | 30 | $0.60 | | | | | |
| 10 | M21 | Chicken | 73 | $3.80 | | | | | |
| 11 | M22 | Mutton | 32 | $8.00 | | | | | |
| 12 | F12 | Seer | 19 | $14.00 | | | | | |

1. Using Lookup function, retrieve the available stock and price for Orange, Potato, Mutton, Rice and mango.
2. If the product is not in the table, you can mark it as "Not Found" using the appropriate function.

**Activity 03.5**

The interest rate is varying so fast in a certain country and if a person gets a loan in a certain month, he is granted the loan with an available interest rate in the given month as a fixed interest rate for the entire loan repayment period. The interest rates that were effective from January to May are indicated in the table shown below.

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | Month | January | February | March | April | May |
| 4 | Rate | 20% | 30% | 35% | 40% | 25% |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | **Month** | **Rate** | **Loan** | **Interest for the month** | | |
| 8 | January | 20% | 25000 | 5000 | | |

1. Using data validation setup, create a drop-down list to the cell A8 to select the month given.
2. Once the month is selected the applicable interest rate should be shown in B8 cell using a look-up function.
3. Then in the D8 cell calculate the interest for the month using a suitable formula.

**Activity 03.6**

The marks obtained for four subjects by nine students is indicated in the below screenshot. Perform the given tasks by referring to it.

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | Subject | | | | | | |
| 3 | Name | Accounting | Business Studies | Economics | English | | | Accounting |
| 4 | Kevin | 38 | 58 | 66 | 49 | | Jeevani | 82 |
| 5 | Nimesha | 88 | 92 | 74 | 90 | | | |
| 6 | Haris | 57 | 77 | 91 | 91 | | | 82 |
| 7 | Jeevani | 82 | 56 | 45 | 95 | | | |
| 8 | Nihal | 55 | 55 | 65 | 75 | | | |
| 9 | Jevon | 44 | 69 | 80 | 90 | | | |
| 10 | Ayomi | 75 | 51 | 57 | 84 | | | |
| 11 | Josh | 38 | 37 | 51 | 56 | | | |
| 12 | Maria | 52 | 58 | 96 | 57 | | | |

1. In cell G4 create a data validation list to select the name of a student
2. In cell H3 create a data validation list to select a subject

3. Using the V-Lookup function, get the marks into cell H4 for a particular student in cell G4 for a subject selected in cell H3 respectively.
4. Using the H-Lookup function, get the marks into cell H6 for a particular student in cell G4 for a subject selected in cell H3 respectively.

**Self-Learning Activity**

**Activity 03.7**

Given below is a set of items in an inventory of a certain department of a company. You are required to perform the following tasks.

**Inventory**

| Code | G4241P | G4246 | G4230 | G4225 | G4233 | G4240P |
|---|---|---|---|---|---|---|
| Name | TV | TV | TV | TV | TV | TV |
| Supplier | DSE | JVC | SAMSUNG | SONY | FUJITSU | DSE |
| Specifics | 106cm Plasm | 106cm Plasm | 106cm Plasm | 106cm Plasm | 106cm Plasm | 109cm |
| Sale Price | Rs 150,000.00 | Rs 170,000.00 | Rs 180,000.00 | Rs 185,000.00 | Rs 120,000.00 | Rs 125,000.00 |
| Quantity on Hand | 10 | 12 | 15 | 12 | 5 | 6 |
| Description | Bright Picture | HDTV capability | Built-in TV | Built-in TV | 1024x10 | Surround |

| | |
|---|---|
| Enter Code | G4241P |
| Name | TV |
| Supplier | DSE |
| Specifics | 106cm Plasm |
| Sale Price | Rs 150,000.00 |
| Description | Bright Picture |

1. Create a data validation list in the cell C13 to select the codes of the items in the inventory
2. Then using look-up functions, retrieve the “Name”, “Supplier”, “Specifics”, “Sale Price”, “Description” into the respective cells.