**Ex.1** The Electricity bill computed by the service provider has a fixed component as well as a running component. All customers are charged at a rate of $40 flat as a fixed component. In addition to this, they would be changed a running component and/or a fine, depending upon their amount of consumption or usage.

The rules for this are given below:

If the number of units consumed by the consumer is less than equal to 10 units, then the running cost is not charged for the consumer. If the number of units is between 11 and 20, then the running cost is charged at $1 per unit. If the number of units is between 21 and 40, then the running cost is charged at $2 per unit. If the number of units exceeds 40, then the running cost is charged at $5 per unit.

**Solution:**

|  |  |  |  |
| --- | --- | --- | --- |
| Class ID | Rates | Unit | Expected result |
| 1 | Less than 10 units | 5 | 40 |
| 2 | Between 11 and 20 | 15 | 45 |
| 3 | Between 21 and 40 | 23 | 86 |
| 4 | Greater than 40 | 55 | 315 |

**Ex.2** A user in a Small Savings investment bank may have fixed savings of Rs 10,000 invested over a period of 45 days to 5 years. The interest rate computed on the fixed savings is based on the duration of the investment.

The rules for this are given below:

If the duration of the investment is for 45 days, then the interest rate is 8% pa.

If the duration of investment is greater than 45 days but less than 1year, then the interest rate is 8.5% pa.

If the duration of investment is between 1 and 3 years, then the interest rate is 9.5% pa.

If the duration is greater than 3 years, then the interest rate is 10.5% pa

**Solution:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Investment | Time period | Interest rate |
| C1 | Investment 0 to 45 days | 15 | 8% |
| 30 | 8% |
| 44 | 8% |
| 1 month 25 days | 8.5% |
| C2 | Investment 45days to 1 year | 3 months | 8.5% |
| 6 months | 8.5% |
| 10 month | 8.5% |
| 1 year 1 month | 9.5% |
| C3 | Investment >1 year and < 3 year | 11 month | 8.5% |
| 1 year 9 month | 9.5% |
| 3 year | 9.5% |
| 3 year 2 months | 10.5% |
| C4 | Investment >3 years | 2 year 11 month | 9.5% |
| 3 year 1 month | 10.5% |
| 3 year 7 month | 10.5% |
| 3 year 11 month | 10.5% |

**Ex.3** The Electricity bill computed by the service provider has a fixed component as well as a running component. All customers are charged at a rate of $40 flat as a fixed component. In addition to this, they would be changed a running component and/or a fine, depending upon their amount of consumption or usage.

The rules for this are given below:

If the number of units consumed by the consumer is less than equal to 10 units, then the running cost is not charged for the consumer. If the number of units is between 11 and 20, then the running cost is charged at $1 per unit. If the number of units is between 21 and 40, then the running cost is charged at $2 per unit. If the number of units exceeds 40, then the running cost is charged at $5 per unit.

**Solution:**

|  |  |
| --- | --- |
| Range | Boundary Value |
| 1-10 | 0,1,9 |
| 11-20 | 10,11,12,19 |
| 21-40 | 20,21,22,39 |
| Above 41 | 40,41,42 |

Total Boundary Value = 14

**Ex.4** A Company A is on a campus drive. It plans to go to Tier 1, Tier 2 and Tier 3 colleges. The procedure for selecting students is as follows:

Each student has to go through a resume screening. Here the eligibility criteria of the student is checked.

If the student is eligible, then he can take up the written test. He is expected to get 80% or more marks in this.

Students clearing the written test can take up the GD

On clearing the GD, the student will go through the technical round of interview followed by HR round.

If the student get through all this successfully, then he will be selected.

In case the student is from Tier 1 College then the Resume screening can be exempted. He is directly eligible for the taking up the written test.

In case the student holds a university rank in any of the subjects, then he can meet the HR directly for a HR Interview.

**Solution:**

Condition 1 – Check eligibility criteria

Condition 2 – Attend written test and get 80% or more marks.

Condition 3 – Take GD, Technical round and HR round

Condition 4 –Tier 1 college, Resume screening can be exempted, direct to written test.

Condition 5 – Rank student from university, direct HR round

Action 1 – Selected

Action 2 – Rejected

Total number of alternatives = 25 = 32 test case

Rule 1 = C1, C2 and C4 are satisfied

Rule 2 = C1, C3 and C5 are satisfied

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Condition Entry | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | |  | |  | |  | |
|  |  | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 | R15 | R16 | R17 | R18 | R19 | R20 | R21 | R22 | R23 | R24 | R25 | R26 | R27 | R28 | | R29 | | R30 | | R31 | | R32 | |
| CONDITIONS | C1 | T | T | T | T | T | F | T | T | T | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |  | |
| C2 | T | F | T | T | T |  | F | F | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |  | |
| C3 | T | T | F | T | T |  |  |  | F |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |  | |
| C4 | T | T | T | F | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |  | |
| C5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |  | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |  | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |  | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |  | |

**Ex.5** Most tax payers have a choice of either taking a standard deduction or itemizing their deductions. The standard deduction is a dollar amount that reduces the amount of income on which you are taxed. It is a benefit that the need for many tax payers to itemize actual deductions such as medical expenses, charitable contribution and taxes. The standard deduction is higher for tax payers who are 65 years or older or blind. If you have a choice, you should use the method that gives you the lower tax.

The first factor that determines the standard deduction is the filing status. The basic standard deduction for various status are

Single: $ 4750

Married Filing a joint Return: $ 9500

Married filing a separate Return: $ 7000

An additional $1000 is allowed as standard deduction if either the filer is 65 years or older or the spouse is 65 years or older (the latter case is applicable if the filing status is 'Married' and filing is 'Joint'.

**Solution:** Conditions

C1= Single: $4750

C2=Married and filling joint: $9500

C3=married filling a separate return: $7000

C4=if husband and wife is above 65 years: $1000

C5= either husband or wife is blind: $1000

Action

A1=Tax filling single exemptions

A2=Joint no exemptions

Rules

R1=C2, C4, C5:$2000

R2=C2, C4:$1000

R3=C2, C5:$1000

Total number of alternatives = 25 = 32 test cases

**Ex.6** A user in a Small Savings investment bank may have savings between Rs 0 and Rs 10,000. If the balance is less than Rs 500, then a fine of Rs 15 would be imposed on the user. If the balance is less than Rs 250 but greater than Rs 100, then a fine of Rs 25 would be imposed on the user. If the balance is less than Rs 100, then a fine of Rs 35 would be imposed.

Use Decision tables and decide on the set of test cases for the above scenario.

**Solution**:

C1 = Deposit amount is Rs.0 and Rs.10000

C2 = Deposit is < Rs100

C3 = Deposit is greater than Rs.100 and <Rs 250

C4 = Deposit > Rs.500

A1 – Fine imposed

A2 – No fine imposed

The total no of alternatives = 24 = 16 test cases

R1= C2, C3, C4 >500 than fine

**Ex.7** Consider a Purchase Order Management System. Each purchase order which is raised by the sales team must be initially approved by the manager of the employee and the Head of Purchasing. Additionally, if the capital expenses are more than $12,000, then it needs to be approved by the Head of Finance.

Use State Transition diagram to represent the scenario and derive the number of test cases

**Solution**:

3

2

1

4

1 Purchase order 2 Approve 3 Amount is > 12000

Approval required by

Head of Finance

5

6

s

Four independent paths

P1=1, 2,3,4,5

P2=1, 2, 6

P3=1, 2,3,4,6

P4=1, 2, 3, 6

**Ex.8** A bank has created a new Data processing System. The bank offers its services to 3 kinds of customers consumers, privileged customers and corporate. The different types of accounts can be Savings, Mortgages and Loans. They operate in 5 different counties Country A, Country B, Country C, Country D and Country E.

Using All Pairs technique, find out the number of test cases

**Solution**: Using online tool

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | Countries | Customer | Account type |
| R1 | Country A | Consumer | Saving |
| R2 | Country B | Privileged | Mortgage |
| R3 | Country C | Corporate | Loan |
| R4 | Country D |  |  |
| R5 | Country E |  |  |

Generate Pairwise:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Countries | Customers | Account Types |
| 1 | Country A | Consumer | Saving |
| 2 | Country A | Privileged | Mortgages |
| 3 | Country A | corporate | Loan |
| 4 | Country B | Privileged | Loan |
| 5 | Country B | corporate | Saving |
| 6 | Country B | Consumer | Mortgages |
| 7 | Country C | corporate | Mortgages |
| 8 | Country C | Consumer | Loan |
| 9 | Country C | Privileged | Saving |
| 10 | Country D | Privileged | Loan |
| 11 | Country D | Consumer | Saving |
| 12 | Country D | Privileged | Mortgages |
| 13 | Country D | corporate | Saving |
| 14 | Country E | Privileged | Saving |
| 15 | Country E | Consumer | Mortgages |
| 16 | Country E | corporate | Mortgages |
| 17 | Country E | Consumer | Loan |

Generated all combinations:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Countries | Customers | Account Types |
| 1 | Country A | Consumer | Saving |
| 2 | Country A | Consumer | Mortgages |
| 3 | Country A | Consumer | Loan |
| 4 | Country A | Privileged | Saving |
| 5 | Country A | Privileged | Mortgages |
| 6 | Country A | Privileged | Loan |
| 7 | Country A | corporate | Saving |
| 8 | Country A | corporate | Mortgages |
| 9 | Country A | corporate | Loan |
| 10 | Country B | Consumer | Saving |
| 11 | Country B | Consumer | Mortgages |
| 12 | Country B | Consumer | Loan |
| 13 | Country B | Privileged | Saving |
| 14 | Country B | Privileged | Mortgages |
| 15 | Country B | Privileged | Loan |
| 16 | Country B | corporate | Saving |
| 17 | Country B | corporate | Mortgages |
| 18 | Country B | corporate | Loan |
| 19 | Country C | Consumer | Saving |
| 20 | Country C | Consumer | Mortgages |
| 21 | Country C | Consumer | Loan |
| 22 | Country C | Privileged | Saving |
| 23 | Country C | Privileged | Mortgages |
| 24 | Country C | Privileged | Loan |
| 25 | Country C | corporate | Saving |
| 26 | Country C | corporate | Mortgages |
| 27 | Country C | corporate | Loan |
| 28 | Country D | Consumer | Saving |
| 29 | Country D | Consumer | Mortgages |
| 30 | Country D | Consumer | Loan |
| 31 | Country D | Privileged | Saving |
| 32 | Country D | Privileged | Mortgages |
| 33 | Country D | Privileged | Loan |
| 34 | Country D | corporate | Saving |
| 35 | Country D | corporate | Mortgages |
| 36 | Country D | corporate | Loan |
| 37 | Country E | Consumer | Saving |
| 38 | Country E | Consumer | Mortgages |
| 39 | Country E | Consumer | Loan |
| 40 | Country E | Privileged | Saving |
| 41 | Country E | Privileged | Mortgages |
| 42 | Country E | Privileged | Loan |
| 43 | Country E | corporate | Saving |
| 44 | Country E | corporate | Mortgages |
| 45 | Country E | corporate | Loan |

**Ex.9** Company A has designed a web page with three distinct sections (Top, Middle, and Bottom). These sections can be individually shown or hidden by the user. The browsers on which the webpage can be viewed with are Internet Explorer and Firefox. The server used for launching the application can be IIS, Apache and WebLogic. Create an Orthogonal array to test the interactions of the different sections.

Use orthogonal array technique to select the Test Conditions that would be required to test this scenario.

**Solution**: Without using Online tool

|  |  |  |  |
| --- | --- | --- | --- |
| Section | Server | Browser | Visibility |
| Top | IIS | IE | Shown |
| Middle | Apache | Firefox | Hidden |
| Bottom | WebLogic |  |  |

Pairwise Combination

|  |  |  |  |
| --- | --- | --- | --- |
| Section | Server | Browser | Visibility |
| Top | IIS | IE | Shown |
| Top | Apache | Firefox | Hidden |
| Top | WebLogic | IE | Shown |
| Middle | IIS | Firefox | Hidden |
| Middle | Apache | IE | Shown |
| Middle | WebLogic | Firefox | Hidden |
| Bottom | IIS | IE | Shown |
| Bottom | Apache | Firefox | Hidden |
| Bottom | WebLogic | IE | Shown |

**Ex.10** A web based product X which has been developed in your organization is compatible with 2 Operating Systems - Windows, XP, Unix and Linux. The product can be opened up using Internet Explorer, Netscape or Google Chrome. The product can be operated in Admin mode or in user mode.

Use orthogonal array technique to select the Test Conditions that would be required to test this scenario.

**Solution**: Using online tool

|  |  |  |  |
| --- | --- | --- | --- |
| OS | Browser | Mode |  |
| Window XP | IE | Admin |  |
| Unix | Netscape | User |  |
| Linux | Google chrome |  |  |

Generated Pairwise:

|  |  |  |  |
| --- | --- | --- | --- |
|  | OS | Browser | Mode |
| 1 | Windows XP | Google chrome | Admin |
| 2 | Windows XP | IE | User |
| 3 | Windows XP | Netscape | Admin |
| 4 | Unix | Netscape | Admin |
| 5 | Unix | Google chrome | User |
| 6 | Unix | IE | User |
| 7 | Linux | Google chrome | Admin |
| 8 | Linux | IE | Admin |
| 9 | Linux | Netscape | User |
| 10 | Unix | Netscape | User |

Generate All combination:

|  |  |  |  |
| --- | --- | --- | --- |
|  | OS | Browser | Mode |
| 1 | Windows XP | IE | Admin |
| 2 | Windows XP | IE | User |
| 3 | Windows XP | Netscape | Admin |
| 4 | Windows XP | Netscape | User |
| 5 | Windows XP | Google chrome | Admin |
| 6 | Windows XP | Google chrome | User |
| 7 | Unix | IE | Admin |
| 8 | Unix | IE | User |
| 9 | Unix | Netscape | Admin |
| 10 | Unix | Netscape | User |
| 11 | Unix | Google chrome | Admin |
| 12 | Unix | Google chrome | User |
| 13 | Linux | IE | Admin |
| 14 | Linux | IE | User |
| 15 | Linux | Netscape | Admin |
| 16 | Linux | Netscape | User |
| 17 | Linux | Google chrome | Admin |
| 18 | Linux | Google chrome | User |

**Ex.11** Company A has designed a web page with three distinct sections (Top, Middle, and Bottom). These sections can be individually shown or hidden by the user. The browsers on which the webpage can be viewed with are Internet Explorer and Firefox. The server used for launching the application can be IIS, Apache and WebLogic. Create an Orthogonal array to test the interactions of the different sections.

Use orthogonal array technique to select the Test Conditions that would be required to test this scenario.

**Solution**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Section | Server | Browser | Visibility |
|  | Top | IIS | IE | Shown |
|  | Middle | Apache | Firefox | Hidden |
|  | Bottom | WebLogic |  |  |

L9 (34)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Levels | Section | Server | Browser | Visibility |  |
| 1 | Top | IIS | IE | Shown |  |
| 2 | Top | Apache | Firefox | Hidden |  |
| 3 | Top | WebLogic | IE | Shown |  |
| 4 | Middle | IIS | Firefox | Hidden |  |
| 5 | Middle | Apache | IE | Shown |  |
| 6 | Middle | WebLogic | Firefox | Hidden |  |
| 7 | Bottom | IIS | IE | Shown |  |
| 8 | Bottom | Apache | Firefox | Hidden |  |
| 9 | Bottom | WebLogic | IE | Shown |  |

**Ex 12** .Generate flow chart, flow graph and basic path testing for Largest of three number?

1

Start

2

Int A, B, C

3

If A>B

5

4

If A>C

If B>C

8

7

6

Print B is Largest

Print C is Largest

Print A is Largest

9

Flow graph:

1,2

3

5

4

7

9

8

6

Four Independent Paths

1. 1,2,3,4,6,9
2. 1,2,3,5,,8,9
3. 1,2,3,4,7,9
4. 1,2,3,4,7,9

**Ex.13** Generate Flow graph on ATM

Choose the valid account

Enter the right pin number, if it’s wrong after three attempts card will be blocked

Reject

Select saving or current

Enter the pin

Enter the card

**Solution**:

Flow chart:

Pass

First attempt

Fail

Homepage

Pass

Second

Attempt

Pass

Fail

Third attempt

Fail

A/c locked

Independent path = 4

**EX.14** 1. Do while records remain  
      read record  
2. If record field 1=0  
3. Then process record;  
     store in buffer,  
     increment counter,  
4. Elsif record field 2=0  
5. Then reset record;  
6. Else process record;  
     store in file,  
7a endif  
     endif  
7b.enddo  
8. End **Solution**:

Stop

Store in file

Process

Record

Stop

If 2=0

Increment Counter

Store in buffer

Process record

If 1=0

Start

Reset record

Do while

1

2

If

3

Else if

4

6

5

7

8

End

Basic Path testing: 10(No of edges) - 8(no of nodes) + 2 = 4 Independent Path