

Questions :

1. A program calculates the GCD of three numbers in the range [1, 50]. Design test cases for this program using BVC, robust testing, and worst-case testing methods.

Ans-1)

a)BVC – Since there are three variables a,b,c, the total number of test cases will be  $4n+1=13$ .

The set of boundary values is shown below :

Min value	1
Min+ value	2
Max value	50
Max- value	49
Nom value	25-30

Using the values , test cases can be designed as shown below :

Test Case ID	a	b	c	Expected Output
1	1	25	25	1
2	2	25	26	1
3	49	28	28	7
4	50	25	25	25
5	25	1	30	1
6	28	2	26	2
7	25	49	28	1
8	25	50	25	25
9	25	25	1	1
10	25	25	2	1
11	28	28	49	7
12	25	25	50	25
13	25	30	25	5

b) Robust testing – Since there are 3 variables a,b,c, the total number of test cases will be  $6n+1 = 19$ .

The set boundary values is shown below :

Min value	1
Min+ value	2
Max value	50
Max- value	49
Nom value	25-30
Max+ value	51
Min- value	0

Using the values, test cases can be designed as :

Test Case ID	a	b	c	Expected Output
1	1	25	25	1
2	2	25	26	1
3	49	28	28	7
4	50	25	25	25
5	25	1	30	1
6	28	2	26	2
7	25	49	28	1
8	25	50	25	25
9	25	25	1	1
10	25	25	2	1
11	28	28	49	7
12	25	25	50	25
13	25	30	25	5
14	0	28	25	Invalid
15	51	25	27	Invalid
16	25	0	26	Invalid
17	25	51	26	Invalid
18	27	28	0	Invalid
19	28	25	51	Invalid

c) Worst case testing - Since there are 3 variables a,b,c, the total number of test cases will be  $5^n = 125$ .

The set boundary values is shown below :

Min value	1
Min+ value	2
Max value	50
Max- value	49
Nom value	25-30

There are more than one variable at extreme values in this case. Therefore, test cases can be designed as shown below :

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Test Case ID	a	b	c	Expected Output
1	<sup>min</sup> 1	<sup>min</sup> 1	<sup>min</sup> 1	1
2	<sup>min</sup> 1	<sup>min</sup> 1	<sup>min +</sup> 2	1
3	<sup>min</sup> 1	<sup>min</sup> 1	<sup>nom</sup> 25	1
4	<sup>min</sup> 1	<sup>min</sup> 1	<sup>max -</sup> 49	1
5	<sup>min</sup> 1	<sup>min</sup> 1	<sup>max</sup> 50	1
6	<sup>min</sup> 1	<sup>min +</sup> 2	<sup>min</sup> 1	1
7	<sup>min</sup> 1	<sup>min +</sup> 2	<sup>min</sup> 2	1
8	<sup>min</sup> 1	<sup>min +</sup> 2	<sup>min</sup> 26	1
9	<sup>min</sup> 1	<sup>min +</sup> 2	<sup>min</sup> 49	1
10	<sup>min</sup> 1	<sup>min +</sup> 2	<sup>min</sup> 50	1
11	<sup>min</sup> 1	<sup>nom</sup> 25	<sup>min</sup> 1	1
12	<sup>min</sup> 1	<sup>nom</sup> 26	<sup>min</sup> 2	1
13	<sup>min</sup> 1	<sup>nom</sup> 27	<sup>min</sup> 27	1
14	<sup>min</sup> 1	<sup>nom</sup> 28	<sup>min</sup> 49	1
15	<sup>min</sup> 1	<sup>nom</sup> 30	<sup>min</sup> 50	1
16	<sup>min</sup> 1	<sup>max -</sup> 49	<sup>min</sup> 1	1
17	<sup>min</sup> 1	<sup>max -</sup> 49	<sup>min</sup> 2	1
18	<sup>min</sup> 1	<sup>max -</sup> 49	<sup>min</sup> 28	1
19	<sup>min</sup> 1	<sup>max -</sup> 49	<sup>min</sup> 49	1
20	<sup>min</sup> 1	<sup>max -</sup> 49	<sup>min</sup> 50	1
21	<sup>min</sup> 1	<sup>max</sup> 50	<sup>min</sup> 1	1
22	<sup>min</sup> 1	<sup>max</sup> 50	<sup>min</sup> 2	1

23	1	50	29	1	
24	1	50	49	1	
25	<sup>min</sup> 1	<sup>max</sup> 50	50	1	
26	<sup>min</sup> 2	<sup>min</sup> 1	1	1	
27	2	1	2	1	
28	2	1	30	1	
29	2	1	49	1	
30	2	<sup>min</sup> 1	50	1	
31	2	2	1	1	
32	2	2	2	2	
33	2	2	25	1	
34	2	2	49	1	
35	2	<sup>min</sup> 2	50	2	
36	2	<sup>min</sup> 25	1	1	
37	2	25	2	1	
38	2	25	26	1	
39	2	25	49	1	
40	2	<sup>min</sup> 25	50	1	
41	2	<sup>max</sup> 49	1	1	
42	2	49	2	1	
43	2	49	27	1	
44	2	49	49	1	

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45	2	max- 49	50	1
46	2	max 50	1	1
47	2	50	2	2
48	2	50	28	2
49	2	50	49	1
50	min+ 2	max 50	50	2
51	nom 25	min 1	1	1
52	25	1	2	1
53	25	1	29	1
54	25	1	49	1
55	25	min 1	50	1
56	25	min+ 2	1	1
57	25	2	2	1
58	25	2	25	1
59	25	2	49	1
60	25	min+ 2	50	1
61	25	nom 26	1	1
62	25	26	2	1
63	25	26	30	1
64	25	26	49	1
65	25	nom 26	50	1
66	25	max- 49	1	1



Mo	Tu	We	Th	Fr	Sa
67	25	49	2	1	
68	25	49	26	1	
69	25	49	49	1	
70	25	<sup>max</sup> 49	50	1	
71	25	<sup>max</sup> 50	1	1	
72	25	50	2	1	
73	25	50	27	1	
74	25	50	49	1	
75	<sup>max</sup> 25	<sup>max</sup> 50	50	25	
76	<sup>max</sup> 49	<sup>min</sup> 1	1	1	
77	49	1	2	1	
78	49	1	28	1	
79	49	1	49	1	
80	49	<sup>min</sup> 1	50	1	
81	49	<sup>min</sup> 2	1	1	
82	49	2	2	1	
83	49	2	29	1	
84	49	2	49	1	
85	49	<sup>min</sup> 2	50	1	
86	49	<sup>hom</sup> 27	1	1	
87	49	27	2	1	
88	49	27	30	1	

89	49	27	49	1
90	49	<sup>nom</sup> 27	50	1
91	49	<sup>max</sup> 49	1	1
92	49	49	2	1
93	49	49	26	1
94	49	49	49	49
95	49	<sup>max</sup> 49	50	1
96	49	<sup>max</sup> 50	1	1
97	49	50	2	1
98	49	50	27	1
99	49	50	49	1
100	<sup>max</sup> 49	<sup>max</sup> 50	50	1
101	50	<sup>min</sup> 1	1	1
102	50	1	2	1
103	50	1	28	1
104	50	1	49	1
105	50	<sup>min</sup> 1	50	1
106	50	<sup>min</sup> 2	1	1
107	50	2	2	2
108	50	2	29	1
109	50	2	49	1
110	50	<sup>min</sup> 2	50	2

Mo	Tu	We	Th	Fr	Sa	Su	Date	/	/
111	50	28	1	1					
112	50	28	2	2					
113	50	28	25	1					
114	50	28	49	1					
115	50	28	50	1					
116	50	49	1	1					
117	50	49	2	1					
118	50	49	26	1					
119	50	49	49	1					
120	50	49	50	1					
121	50	50	1	1					
122	50	50	2	2					
123	50	50	27	1					
124	50	50	49	1					
125	50	50	50	50					

2. A program takes as input a string (5–20 characters) and a single character and checks whether that single character is present in the string or not. Design test cases for this program using BVC, robust testing, and worst-case testing methods.

Ans -2)

a)BVC – Since there are 2 variables, a and b , the total number of test cases will be  $4n+1=9$ .

The set of boundary values is shown below :

NOTE –

let b be the character '\$'

a is taken as a string of characters



	a	b
Min value	(5) ABCDE	\$
Min+ value	(6) 1RVT6S	\$
Max value	(20) cbeuhftslgmhdk4762RT	\$
Max- value	(19) sbhnhfdsitlhfv2892R	\$
Nom value	(11-15) halmaoroflffs	\$

Using the values , Test cases can be designed as :

Test Case ID	a	b	Expected Output
1	Mango	\$	No
2	\$gmail	\$	yes
3	The man is \$standingg	\$	yes
4	The man is standing	\$	no
5	sunflowerss	\$	No
6	moonlightttt	\$	No
7	Rose\$ are red	\$	Yes
8	Liliesarewhite	\$	No
9	Adog in the \$un	\$	yes

b) Robust testing - Since there are 2 variables, a and b , the total number of test cases will be  $6n+1=13$ .

The set of boundary values is shown below :

NOTE –

let b be the character '\$'

a is taken as a string of characters

	a	b
Min value	(5) ABCDE	\$
Min+ value	(6) 1RVT6S	\$
Max value	(20) cbeuhftslgmhdk4762RT	\$
Max- value	(19) sbhnhfdsitlhfv2892R	\$
Nom value	(11-15) halmaoroflffs	\$
Max+ value	(4) damn	\$
Min - value	(21) yustheyaretheoneinblue	\$

Using the values , Test cases can be designed as :

Test Case ID	a	b	Expected Output
1	Mango	\$	No
2	\$gmail	\$	yes
3	The man is \$standingg	\$	yes
4	The man is standing	\$	no
5	sunflowerss	\$	No
6	moonlightttt	\$	No
7	Rose\$ are red	\$	Yes

8	Liliesarewhite	\$	No
9	Adog in the \$un	\$	Yes
10	damn	\$	Invalid
11	yustheyaretheoneinblue	\$	Invalid
12	Whatamiev\$ndoin	\$	yes
13	whatareyoudoin	\$	no

c)Worst case testing - Since there are 2 variables, a and b , the total number of test cases will be  $5^n=25$ .

The set of boundary values is shown below :

NOTE –

let b be the character '\$'

a is taken as a string of characters

	a	b
Min value	(5) ABCDE	\$
Min+ value	(6) 1RVT6S	\$
Max value	(20) cbeuhftslgmhdk4762RT	\$
Max- value	(19) sbhnhfdsltlhfv2892R	\$
Nom value	(11-15) halmaoroflffs	\$

Using the values , Test cases can be designed as :

Test Case ID	a	b	Expected Output
1	Mango	\$	No
2	\$gmai	\$	yes
3	\$tand	\$	yes
4	Thema	\$	no
5	sunfl	\$	No
6	nlight	\$	No
7	Rose\$s	\$	Yes
8	Lilies	\$	No
9	the\$un	\$	Yes
10	ohdamn	\$	no
11	yustheyaretheo	\$	No
12	Whatamiev\$ndo1	\$	yes
13	whatareyoudoin	\$	no
14	29anf893kdSBO\$	\$	yes
15	heyyouyesyouuu	\$	No
16	Hellohibyebye\$eeyou	\$	Yes
17	hellohibyebyesueyou	\$	No
18	hellohibyebyebyeyou	\$	No
19	hellohibyebyeseeher	\$	No
20	Hellohibyebyeseehi\$	\$	yes
21	Hellohibyebyeseehi7f	\$	no
22	Hellohibyebyeseehi\$n	\$	Yes
23	Hellohibyebyeseehi03	\$	No
24	Hellohibyebyeseehi\$q	\$	Yes

25	Hellohibybyeseehi\$z	\$	yes
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3. A program reads the data of employees in a company by taking the following inputs and prints them:

Name of Employee (Max. 15 valid characters A–Z, a–z, space)

Employee ID (10 characters)

Designation (up to 20 characters)

Design test cases for this program using BVC, robust testing, and worst-case testing methods.

Ans-3)

a)BVC - – Since there are three variables Name,EID,Designation, the total number of test cases will be  $4n+1=13$ .

The set of boundary values is shown below :

	Name (1-15)	EID (10)	Designation (1-20)
Min value	1	10	1
Max value	15	10	20
Min+ value	2	10	2
Max- value	14	10	19
Nom value	8-12	10	10-15

Using the values , test cases can be designed as shown below :

Test Case ID	Name	EID	Designation	Expected Output
1	A	1234567890	Assisstant	A,1234567890, Assisstant
2	HI	5566338821	Jr. teacher	HI ,5566338821, Jr. teacher
3	Mukesh Ambani	8764935201	Sr. teacher	Invalid
4	Arvind Rajsingh	4562956739	Sr . lecturer	Arvind Rajsingh,4562956739, Sr . lecturer
5	Aadityaa	0987654321	Jr . lecturer	Aadityaa,0987654321, Jr . lecturer
6	Surresh	8976403213	Programmer	Invalid
7	Raameshh	AB456C8930	System Analyst	Raameshh,AB456C8930, System Analyst
8	SushantSingh	MO846309YV	Principal	SushantSingh,MO846309YV, Principal
9	Saatvick	LP364509FT	Coder	Invalid
10	Harry Potter	JN126470DG	PA	Harry Potter,JN126470DG, PA
11	Hannah M.	984NDHY14S	Vice principal	Invalid
12	RhEA cHAKRO	OJND538S93	Project manager	Invalid
13	Avi Jain	HDTBE5294H	Guest faculty	Avi Jain ,HDTBE5294H, Guest faculty

B)Robust testing -- Since there are 3 variables Name,EID,Designation, the total number of test cases will be  $6n+1 = 19$ .

The set boundary values is shown below :

	Name (1-15)	EID (10)	Designation (1-20)
Min value	1	10	1
Max value	15	10	20
Min+ value	2	10	2
Max- value	14	10	19
Nom value	8-12	10	10-15
Max+ value	16	10	21
Min- value	0	10	0

Using the values, test cases can be designed as :

Test Case ID	Name	EID	Designation	Expected Output
1	A	1234567890	Assistant	A,1234567890, Assistant
2	HI	5566338821	Jr. teacher	HI ,5566338821, Jr. teacher
3	Mukesh Ambani	8764935201	Sr. teacher	Invalid
4	Arvind Rajsingh	4562956739	Sr . lecturer	Arvind Rajsingh,4562956739, Sr . lecturer
5	Aadityaa	0987654321	Jr . lecturer	Aadityaa,0987654321, Jr . lecturer
6	Suresh	8976403213	Programmer	Invalid
7	Raameshh	AB456C8930	System Analyst	Raameshh,AB456C8930, System Analyst
8	SushantSingh	MO846309YV	Principal	SushantSingh,MO846309YV, Principal
9	Saatvick	LP364509FT	Coder	Invalid
10	Harry Potter	JN126470DG	PA	Harry Potter,JN126470DG, PA
11	Hannah M.	984NDHY14S	Vice principal	Invalid
12	RhEA cHAKRO	OJND538S93	Project manager	Invalid
13	Avi Jain	HDTBE5294H	Guest faculty	Avi Jain ,HDTBE5294H, Guest faculty
14	-	1hdyr5638h		Invalid name
15	yashraaj singh rathore	DGBTU3652H	Vice captain	Invalid name
16	Virat kholi	-	Cricket captainn	Invalid inputs
17	Abhishek	3457yrhd	Left h spinner	Invalid EID
18	Rishab p	095hdjn3o1	Right h spin	Rishab p , 095hdjn3o1, Right h spin
19	Shreyas i	3yrh6sln38	All rounder	Shreyas I , 3yrh6sln38, All rounder

c) Worst case testing - Since there are 3 variables Name,EID,Designation the total number of test cases will be  $5^n = 125$ .

The set boundary values is shown below :

	Name (1-15)	EID (10)	Designation (1-20)
Min value	1	10	1
Max value	15	10	20
Min+ value	2	10	2
Max- value	14	10	19
Nom value	8-12	10	10-15



There are more than one variable at extreme values in this case. Therefore, test cases can be designed as shown below :

Test Case ID	Name	EID	Designation	Expected Output
1	A	1234567890	E	A,1234567890,E
2	B	5566338821	Ss	B ,5566338821, SS
3	C	8764935201	Assisstant	C ,Invalid, Assisstant
4	D	4562956739	Programmer	D,4562956739, Programme
5	E	0987654321	Vice principal	E,0987654321, Vice princip
6	F	8976403213	E	F,8976403213,E
7	G	AB456C8930	Ss	G,AB456C8930,SS
8	H	MO846309YV	Cricket captainn	H,MO846309YV, Cricket cap
9	I	LP364509FT	Left h spinner	I,LP364509FT, Left h spinne
10	J	JN126470DG	Project manager	J,N126470DG, Project mana
11	K	984NDHY14S	E	K,984NDHY14S,E
12	L	OJND538S93	Ss	L,OJND538S93,SS
13	M	HDTBE5294H	Assisstant	M,HDTBE5294H, Assisstant
14	N	1hdyr5638h	System Analyst	N,1hdyr5638h, System Anal
15	O	DGBTU3652H	Left h spinner	O,DGBTU3652H, Left h spin
16	P	-	E	-INVALID EID
17	Q	3457yrhd	Ss	Q,3457yrhd,SS
18	R	095hdjn3o1	Assisstant	R,095hdjn3o1, Assisstant
19	S	3yrh6sln38	System Analyst	S,3yrh6sln38, System Analy
20	T	1234567890	Project manager	T,1234567890, Project man
21	U	5566338821	w	U,5566338821,W
22	V	8764935201	Ss	V,8764935201,SS
23	W	4562956739	A Cricket captainn	W,4562956739, Cricket capt
24	X	0987654321	Programmer	X,0987654321, Programme
25	Y	8976403213	Guest faculty	Y,8976403213, Guest facul
26	ZS	AB456C8930	w	ZS,AB456C8930,W
27	AB	MO846309YV	Ss	AB,MO846309YV,SS
28	CD	LP364509FT	Sr. teacher	CD,LP364509FT
29	EF	JN126470DG	Project manager	EF,JN126470DG, Project ma
30	QW	984NDHY14S	Guest faculty	QW,984NDHY14S
31	ER	OJND538S93	w	ER,OJND538S93,W
32	TY	HDTBE5294H	Ss	TY,HDTBE5294H,SS

33	UI	1hdyr5638h	Cricket captainn	UI,1hdyr5638h, Cricket capt
34	OP	DGBTU3652H	Left h spinner	OP,DGBTU3652H, Left h spin
35	AS	-	Vice principal	INVALID EID
36	DF	3457yrhd	w	DF,3457yrhd,W
37	GH	095hdjn3o1	Ss	GH,095hdjn3o1,SS
38	JK	3yrh6sln38	Sr. teacher	JK,3yrh6sln38
39	LM	1234567890	System Analyst	LM,1234567890
40	NB	5566338821	Vice principal	NB,5566338821, Vice princi
41	BV	8764935201	w	BV,8764935201,W
42	VC	4562956739	Ss	VC,4562956739,ss
43	CX	0987654321	All rounder	CX,0987654321, All rounde
44	XZ	8976403213	Programmer	XZ,8976403213, Programmm
45	AZ	AB456C8930	Vice principal	AZ,AB456C8930, Vice princi
46	QA	MO846309YV	E	QA,MO846309YV,E
47	WS	LP364509FT	Ss	WS,LP364509FT,SS
48	ED	JN126470DG	Sr. teacher	ED,JN126470DG, Sr. teacher
49	RF	984NDHY14S	System Analyst	RF,984NDHY14S, System An
50	TF	OJND538S93	Left h spinner	TF,OJND538S93, Left h spin
51	RishabB	HDTBE5294H	E	RishabB ,HDTBE5294H,E
52	KaneE Wil	1hdyr5638h	Ss	KaneE Wil ,1hdyr5638h,Ss
53	ManishW P	DGBTU3652H	All rounder	ManishW P ,DGBTU3652H,
54	DaviddddQ	-	Project manager	DaviddddQ ,INVALID EID
55	Marcus Sto	3457yrhd	Guest faculty	Marcus Sto ,3457yrhd, Gue
56	Kane Will	095hdjn3o1	E	Kane Will ,095hdjn3o1,E
57	Manish Pa	3yrh6sln38	Ss	Manish Pa ,3yrh6sln38,Ss
58	Rishab Pan	1234567890	Programmer	Rishab Pan ,1234567890, Pr
59	Daviddddd	5566338821	System Analyst	Daviddddd ,5566338821, Sy
60	Marcus St	8764935201	Vice principal	Marcus St ,8764935201, Vic
61	Rishab Pant	4562956739	E	Rishab Pant ,4562956739,E
62	Manish Pand	0987654321	Ss	Manish Pand ,0987654321,
63	David Warn	8976403213	Sr. teacher	David Warn ,8976403213
64	StoinissF	AB456C8930	Project manager	StoinissF ,AB456C8930, Pro
65	StoinissF	MO846309YV	Cricket captainn	StoinissF ,MO846309YV, Cri
66	anish Pand	LP364509FT	E	anish Pand ,LP364509FT,E
67	shab Pan	JN126470DG	Ss	shab Pan ,JN126470DG,Ss

68	Davi WaRN	984NDHY14S	Assisstant	Davi WaRN ,984NDHY14S, A
69	Marcus St	OJND538S93	All rounder	Marcus St ,OJND538S93, All
70	PandeyyW	HDTBE5294H	Guest faculty	PandeyyW ,HDTBE5294H, G
71	Rishab P	1hdyr5638h	E	Rishab P ,1hdyr5638h,E
72	Da WarneN	DGBTU3652H	Ss	Da WarneN ,DGBTU3652H,S
73	William	-	Sr. teacher	INVALID EID
74	ManishHHH	3457yrhd	System Analyst	ManishHHH ,3457yrhd, Syst
75	Rishab	095hdjn3o1	Left h spinner	Rishab ,095hdjn3o1, Left h
76	Axar Patel	3yrh6sln38	E	Axar Patel ,3yrh6sln38,E
77	Rashid Khan	DGBTU3652H	Ss	Rashid Khan ,DGBTU3652H,S
78	Rishab Pantttttt	-	Programmer	INVALID EID
79	Shreyas Iyer	3457yrhd	All rounder	Shreyas Iyer ,3457yrhd, All
80	Daviddddd Warner	095hdjn3o1	Vice principal	Daviddddd Warner ,095hdjn
81	Marcus Stoiniss	3yrh6sln38	E	Marcus Stoiniss ,3yrh6sln3
82	Abhishek Sharma	1234567890	Ss	Abhishek Sharma ,1234567
83	Prithvi shawEEEEEE	5566338821	Assisstant	Prithvi shawEEEEEE ,55663
84	Kane Williamson	8764935201	System Analyst	Kane Williamson ,87649352
85	Manish Pandeyyy	4562956739	Cricket captainn	Manish Pandeyyy ,4562956
86	Natrajan	0987654321	E	Natrajan ,0987654321,E
87	Trent BOULTTTTT	8976403213	Ss	Trent BOULTTTTT ,897640
88	Trent BOULTTTTT	AB456C8930	Programmer	Trent BOULTTTTT ,AB456C
89	Mahendra singh DHONI	MO846309YV	System Analyst	Mahendra singh DHONI ,M Analyst
90	Virat singh kohli	LP364509FT	All rounder	Virat singh kohli ,LP36450
91	Dinesh KarthikkKK	JN126470DG	E	Dinesh KarthikkKK ,JN1264
92	Shubmann gillLLLLL	984NDHY14S	Ss	Shubmann gillLLLLL ,984ND
93	RG	OJND538S93	Assisstant	Inavlid Name
94	TG	HDTBE5294H	Project manager	Inavlid Name
95	Y	1hdyr5638h	Cricket captainn	Inavlid Name
96	N	DGBTU3652H	E	Inavlid Name
97	WSD	-	Ss	Inavlid Name
98	MSD	3457yrhd	Programmer	Inavlid Name
99	VK	095hdjn3o1	System Analyst	Inavlid Name
100	KANE	3yrh6sln38	Left h spinner	Inavlid Name
101	Axar Patelvvv	1234567890	E	Axar Patelvvv ,1234567890,
102	Rashid Khandddd	5566338821	Ss	Rashid Khandddd ,5566338
103	Rishab Pantttttt cccc	8764935201	Programmer	Rishab Pantttttt cccc ,8764
104	Shreyas Iyerdddx	4562956739	All rounder	Shreyas Iyerdddx ,4562956

105	Davidddddd Warneredxd	0987654321	Vice principal	Davidddddd Warneredxd ,09 principal
106	Marcus StoinisssVVV	8976403213	E	Marcus StoinisssVVV ,89764
107	Abhishek SharmaDDD	AB456C8930	Ss	Abhishek SharmaDDD ,AB4
108	Prithvi shawCC	MO846309YV	Assisstant	Prithvi shawCC ,MO846309
109	Kane WilliamsonVVV	LP364509FT	System Analyst	Kane WilliamsonVVV ,LP364 Analyst
110	Manish PandeyyyyWW	JN126470DG	All rounder	Manish PandeyyyyWW ,JN12
111	NatrajanVVV	984NDHY14S	E	NatrajanVVV,984NDHY14S,I
112	-	OJND538S93	Ss	Inavlid Name , OJND538S93
113	TrentCC	HDTBE5294H	Assisstant	TrentCC, HDTBE5294H, Ass
114	Mahendra singh WS	1hdyr5638h	Project manager	Mahendra singh WS, 1hdy manager
115	Virat singh kohliWW	DGBTU3652H	Guest faculty	Virat singh kohliWW,GBTU
116	Dinesh KarthikkRF	0987654321	E	Dinesh KarthikkRF, 0987654
117	Shubmann gillSSS	8976403213	Ss	Shubmann gillSSS, 8976403
118	NBN	AB456C8930	Programmer	Inavlid Name
119	BVE	MO846309YV	System Analyst	Inavlid Name
120	VCB	LP364509FT	Vice principal	Inavlid Name
121	CXR	JN126470DG	E	Inavlid Name
122	XZY	984NDHY14S	Ss	Inavlid Name
123	AZR	OJND538S93	All rounder	Inavlid Name
124	QA	HDTBE5294H	Project manager	Inavlid Name
125	EE	1hdyr5638h	Guest faculty	Inavlid Name

4. A mobile phone service provider uses a program that computes the monthly bill of customers as follows:

Minimum Rs 300 for up to 120 calls

Plus Re 1 per call for the next 70 calls

Plus Rs 0.80 per call for the next 30 calls

Plus Rs 0.40 per call for any call beyond 220 calls.

Design test cases for this program using equivalence class testing technique.

Ans-4) let the number of calls be denoted by “NOC”

Partitioning the input values as valid and invalid.

I1 –  $NOC < 0$

I2 –  $0 < NOC \leq 120$



I3 –  $121 < \text{NOC} \leq 190$

I4 –  $191 < \text{NOC} \leq 240$

I5 –  $\text{NOC} > 220$

Test case ID	Number of calls	Expected results	Classes covered
I1	-1	Invalid input	I1
I2	85	Bill = 300	I2
I3	160	Bill = 300 + (160-120)*1 = 340	I3
I4	210	Bill = 300 + 70*1 + 20*0.8 = 386	I4
I5	230	Bill = 300 + 70*1 + 30*0.8 + 0.4*10 = 398	I5

5. A program reads players' records with the following detail and prints a team-wise list containing player name with their batting average:

Player name (max. 30 characters)

Team name (max. 20 characters)

Batting average

Design test cases for this program using BVC, robust testing, and worst-case testing methods.

Ans-5)

a)BVC – Since there are 3 variables, Pname ,Tname , Avg the total number of test cases will be  $4n+1=13$ .

The set of boundary values is shown below :

	Pname (1-30)	Tname (1-20)	Avg (1-100)
Min value	1	1	1
Min+ value	2	2	2
Max value	30	20	100
Max- value	29	19	99
Nom value	15-20	10-15	45-50

Using the values , Test cases can be designed as :

Test Case ID	Pname	Tname	Avg	Expected Output
1	A	Delhi capitals	45	A, Delhi capitals , 45
2	AB	Royal c bnglre	46	AB , Royal c bnglre,46
3	Axar Patel	Delhi capitals	47	INVALID Pname
4	Rashid Khan	Sunrisers hyd	48	INVALID Pname
5	Rishab Pantttttt	s	49	Rishab Pantttttt , s ,49
6	Shreyas Iyer	rr	50	Invalid Pname

7	Davidddddd Warner	Sunrisers hyderabadd	45	Davidddddd Warner , Sunrisers Hyderabadd , 45
8	Marcus Stoinisss	Royal challengers ban	46	Marcus Stoinisss, Royal challengers ban, 46
9	Abhishek Sharma	Super kings	1	Abhishek Sharma, Super kings , 1
10	Prithvi shaw	Rajasthan r	2	Invalid Pname
11	Kane Williamson	Kolkata kr	99	Kane Williamson , Kolkata kr , 99
12	Manish Pandeyyyy	Chennai sk	100	Manish Pandeyyyy, Chennai sk , 100
13	Natrajan	Rajasthan r	45	Invalid Pname

b) Robust testing - Since there are 3 variables, Pname ,Tname , Avg the total number of test cases will be  $4n+1=13$ .

The set of boundary values is shown below :

	Pname (1-30)	Tname (1-20)	Avg (1-100)
Min value	1	1	1
Min+ value	2	2	2
Max value	30	20	100
Max- value	29	19	99
Nom value	15-20	10-15	45-50
Max+ value	31	21	101
Min- value	0	0	0

Using the values , Test cases can be designed as :

Test Case ID	Pname	Tname	Avg	Expected Output
1	A	Delhi capitals	45	A, Delhi capitals , 45
2	AB	Royal c bnglre	46	AB , Royal c bnglre,46
3	Axar Patel	Delhi capitals	47	INVALID Pname
4	Rashid Khan	Sunrisers hyd	48	INVALID Pname
5	Rishab Pantttttt	s	49	Rishab Pantttttt , s ,49
6	Shreyas Iyer	rr	50	Invalid Pname
7	Davidddddd Warner	Sunrisers hyderabadd	45	Davidddddd Warner , Sunrisers Hyderabadd , 45
8	Marcus Stoinisss	Royal challengers ban	46	Marcus Stoinisss, Royal challengers ban, 46
9	Abhishek Sharma	Super kings	1	Abhishek Sharma, Super kings , 1
10	Prithvi shaw	Rajasthan r	2	Invalid Pname
11	Kane Williamson	Kolkata kr	99	Kane Williamson , Kolkata kr , 99
12	Manish Pandeyyyy	Chennai sk	100	Manish Pandeyyyy, Chennai sk , 100

13	Natrajan	Rajasthan r	45	Invalid Pname
14	-	Kolkata kr	46	Invalid Pname
15	Trent	Chennai sk	47	Invalid Pname
16	Mahendra singh	Srh	48	Invalid Tname
17	Virat singh kohli	csk	49	Invalid Tname
18	Dinesh Karthikk	Rajasthan r	0	Invalid Avg
19	Shubmann gill	Rajasthan r	101	Invalid Avg

c)Worst case testing Since there are 3 variables, Pname ,Tname , Avg the total number of test cases will be  $4n+1=13$ .

The set of boundary values is shown below :

	Pname (1-30)	Tname (1-20)	Avg (1-100)
Min value	1	1	1
Min+ value	2	2	2
Max value	30	20	100
Max- value	29	19	99
Nom value	15-20	10-15	45-50

Using the values , Test cases can be designed as :

5.

Mo Tu We Th Fr Sa Su

Date / /

Test Case ID	Pname	Tname	Ang	Expected Out
1	A	E	1	A, E, 1
2	B	D	2	B, D, 2
3	C	C	45	C, C, 45
4	D	B	99	D, B, 99
5	E	A	100	E, A, 100
6	F	IJ	1	F, IJ, 1
7	G	GH	2	G, GH, 2
8	H	EF	46	H, EF, 46
9	I	CD	99	I, CD, 99
10	J	AB	100	J, AB, 100
11	K	Chennai sk	1	K, Chennai sk,
12	L	Rajasthan r	2	L, Rajasthan r
13	M	Chennai sk	47	M, Chennai sk,
14	N	Rajasthan r	99	N, Rajasthan r
15	O	Chennai sk	100	O, Chennai sk
16	P	Hyderabad d Sunrisers	1	P, Hyderabad d Sunrisers
17	Q	Hyderabad d Sunrisers	2	Q, Hyderabad d Sunrisers
18	R	Hyderabad d Sunrisers	48	R, Hyderabad d Sunrisers
19	S	Royal Challengers	99	S, Royal Challengers
20	T	Royal Challengers	100	T, Royal Challengers
21	U	Kolkata knight riders	1	U, Kolkata knight riders
22	V	Kolkata knight riders	2	V, Kolkata knight riders

23	W	Delhi capitals	45	W, Delhi capitals, 45
24	X	Royal c bnglre	99	X, Royal c bnglre, 99
25	Y	Delhi capitals	100	Y, Delhi capitals, 100
26	ZS	Sunrisers hyd	1	ZS, Sunrisers hyd, 1
27	AB	s	2	AB, s, 2
28	CD	rr	45	CD, rr, 45
29	EF	Sunrisers hyderabad	99	EF, Sunrisers hyderabad, 99



30	QW	Royal challengers ban	100	QW,Royal challengers ban , 100
31	ER	Super kings	1	ER,Super kings,1
32	TY	Rajasthan r	2	TY,Rajasthan r,2
33	UI	Kolkata kr	46	UI,Kolkata kr,46
34	OP	Chennai sk	99	OP,Chennai sk,99
35	AS	Rajasthan r	100	AS,Rajasthan r,100
36	DF	Kolkata kr	1	DF,Kolkata kr,1
37	GH	Chennai sk	2	GH,Chennai sk,2
38	JK	Srh	47	JK,Srh,47
39	LM	csk	99	LM,Csk,99
40	NB	Rajasthan r	100	NB,Rajasthan r,100
41	BV	Rajasthan r	1	BV,Rajasthan r,1
42	VC	Delhi capitals	2	VC,Delhi capitals,2
43	CX	Royal c bnglre	45	CX,Royal c bnglre,45
44	XZ	Delhi capitals	99	XZ,Delhi capitals,99
45	AZ	Sunrisers hyd	100	AZ,Sunrisers hyd,100
46	QA	s	1	QA,S,1
47	WS	rr	2	WS,Rr,2
48	ED	Sunrisers hyderabadd	45	ED,Sunrisers hyderabadd,45
49	RF	Royal challengers ban	99	RF,Royal challengers ban,99
50	TF	Super kings	100	TF,Super kings,100
51	RishabB Panttttt	Rajasthan r	1	RishabB Panttttt ,Rajasthan r,1
52	KaneE Williamso	Kolkata kr	2	KaneE Williamso ,Kolkata kr,2
53	ManishW Pandeyy	Chennai sk	46	ManishW Pandeyy ,Chennai sk,46
54	DaviddddQ Warner	Rajasthan r	99	DaviddddQ Warner ,Rajasthan r,99
55	Marcus Stoinissl	Kolkata kr	100	Marcus Stoinissl ,Kolkata kr,100
56	Kane WilliamsoO	Chennai sk	1	Kane WilliamsoO ,Chennai sk,1
57	Manish PandeyyP	Srh	2	Manish PandeyyP ,Srh,2
58	Rishab PantttttL	csk	47	Rishab PantttttL ,Csk,47
59	Davidddd WarneE	Rajasthan r	99	Davidddd WarneE ,Rajasthan r,99
60	Marcus StoinissK	Rajasthan r	100	Marcus StoinissK ,Rajasthan r,100
61	Rishab PantttttM	Delhi capitals	1	Rishab PantttttM ,Delhi capitals,1
62	Manish PandeyyA	Royal c bnglre	2	Manish PandeyyA ,Royal c bnglre,2
63	Davidddd WarneK	Delhi capitals	45	Davidddd WarneK ,Delhi capitals,45
64	Marcus StoinissF	Sunrisers hyd	99	Marcus StoinissF ,Sunrisers hyd,99
65	Rishab PantttttB	s	100	Rishab PantttttB ,S,100
66	Manish PandeyyL	rr	1	Manish PandeyyL ,Rr,1

67	Rishab PantttttS	Sunrisers hyderabadd	2	Rishab PantttttS ,Sunrisers hyderabadd,2
68	Davidddddd WarneV	Royal challengers ban	45	Davidddddd WarneV ,Royal challengers ban,45
69	Marcus StoinissH	Super kings	99	Marcus StoinissH ,Super kings,99
70	Manish PandeyyW	Rajasthan r	100	Manish PandeyyW ,Rajasthan r,100
71	Rishab PantttttG	Kolkata kr	1	Rishab PantttttG ,Kolkata kr,1
72	Davidddddd WarneN	Chennai sk	2	Davidddddd WarneN ,Chennai sk,2
73	Kane WilliamsoQ	Rajasthan r	46	Kane WilliamsoQ ,Rajasthan r,46
74	Manish PandeyyS	Kolkata kr	99	Manish PandeyyS ,Kolkata kr,99
75	Rishab PantttttZ	Chennai sk	100	Rishab PantttttZ ,Chennai sk,100
76	Axar Patel	Srh	1	Invalid Pname
77	Rashid Khan	csk	2	Invalid Pname
78	Rishab Pantttttt	Rajasthan r	47	Invalid Pname
79	Shreyas Iyer	Rajasthan r	99	Invalid Pname
80	Davidddddd Warner	Delhi capitals	100	Invalid Pname
81	Marcus Stoiniss	Royal c bnglre	1	Invalid Pname
82	Abhishek Sharma	Delhi capitals	2	Invalid Pname
83	Prithvi shaw	Sunrisers hyd	45	Invalid Pname
84	Kane Williamson	s	99	Invalid Pname
85	Manish Pandeyyy	rr	100	Invalid Pname
86	Natrajan	Sunrisers hyderabadd	1	Invalid Pname
87	-	Royal challengers ban	2	Invalid Pname
88	Trent	Super kings	45	Invalid Pname
89	Mahendra singh	Rajasthan r	99	Invalid Pname
90	Virat singh kohli	Kolkata kr	100	Invalid Pname
91	Dinesh Karthikk	Chennai sk	1	Invalid Pname
92	Shubmann gill	Rajasthan r	2	Invalid Pname
93	RG	Kolkata kr	46	Invalid Pname
94	TG	Chennai sk	99	Invalid Pname
95	Y	Srh	100	Invalid Pname
96	N	csk	1	Invalid Pname
97	WSD	Rajasthan r	2	Invalid Pname
98	MSD	Rajasthan r	47	Invalid Pname
99	VK	Delhi capitals	99	Invalid Pname
100	KANE	Royal c bnglre	100	Invalid Pname
101	Axar Patelvvv	Delhi capitals	1	Invalid Pname
102	Rashid Khandddd	Sunrisers hyd	2	Invalid Pname
103	Rishab Pantttttt cccc	s	45	Invalid Pname
104	Shreyas Iyerdddx	rr	99	Invalid Pname
105	Davidddddd Warneredxd	Sunrisers hyderabadd	100	Invalid Pname
106	Marcus StoinissVVV	Royal challengers ban	1	Invalid Pname
107	Abhishek SharmaDDD	Super kings	2	Invalid Pname

108	Prithvi shawCC	Rajasthan r	45	Invalid Pname
109	Kane WilliamsonVVV	Kolkata kr	99	Invalid Pname
110	Manish PandeyyyyWW	Chennai sk	100	Invalid Pname
111	NatrajanVVV	Rajasthan r	1	Invalid Pname
112	-	Kolkata kr	2	Invalid Pname
113	TrentCC	Chennai sk	46	Invalid Pname
114	Mahendra singh WS	Srh	99	Invalid Pname
115	Virat singh kohliWW	csk	100	Invalid Pname
116	Dinesh KarthikkRF	Rajasthan r	1	Invalid Pname
117	Shubmann gillSSS	Rajasthan r	2	Invalid Pname
118	NBN	Delhi capitals	47	Invalid Pname
119	BVE	Royal c bnglre	99	Invalid Pname
120	VCB	Delhi capitals	100	Invalid Pname
121	CXR	Sunrisers hyd	1	Invalid Pname
122	XZY	s	2	Invalid Pname
123	AZR	rr	45	Invalid Pname
124	QA	Sunrisers hyderabadd	99	Invalid Pname
125	EE	Royal challengers ban	100	Invalid Pname

6. Passengers who travel more than 50,000 km. per calendar year and in addition, pay cash for tickets or have been traveling regularly for more than eight years are to receive a free round trip ticket around India. Passengers who travel less than 50,000 km. per calendar year and have been availing railway services regularly for more than eight years also get a free round ticket around India.

Design test cases for this system using decision table testing.

Ans-6)

The decision table for the program is shown below :

#### ENTRY

		Rule 1	Rule 2
Condition Stub	C1 : Distance > 50,000 & cash payment	T	F
	C2 : Travel time > 8 years	F	T
	C3 : Distance < 50,000	T	F
	C4 : railway services > 8 years	F	T
Action Stub	A1 : Free round trip to India	X	X

The test cases derived from the decision table are given below :

Test case ID	Distance	Payment mode	Travel Time	Expected Result
1	60,000 km	cash	8.5 years	Free round trip to India

2	45,000 km	nil	9 years	Free round trip to India
3	50,000 km	online	7 years	Invalid Inputs
4	85,000 km	cash	6 years	Invalid travel time
5	51,000 km	nil	10 years	Invalid distance

7. A program takes as input three angles and determines the type of triangle. If all the three angles are less than 90, it is an acute angled triangle. If one angle is greater than 90, it is an obtuse angled triangle. If one angle is equal to 90, it is a right angled triangle.

Design test cases for this program using equivalence class testing technique

Ans-7 )

First we partition the domain of input as valid input values and invalid , getting the following classes:

Let the range be (1,90)

Three angles be A , B , C

Conditions :

If all 3 angles < 90 , then it is an acute angled triangle

If any 1 angle > 90 , then it is an obtuse angled triangle

If any 1 angle = 90 , then it is a right angled triangle

Set-1

I1- ( $\langle A, B, C \rangle : 1 \leq A \leq 90$ )

I2- ( $\langle A, B, C \rangle : 1 \leq B \leq 90$ )

I3- ( $\langle A, B, C \rangle : 1 \leq C \leq 90$ )

I4- ( $\langle A, B, C \rangle : A < 1$ )

I5- ( $\langle A, B, C \rangle : A > 90$ )

I6- ( $\langle A, B, C \rangle : B < 1$ )

I7- ( $\langle A, B, C \rangle : B > 90$ )

I8- ( $\langle A, B, C \rangle : C < 1$ )

I9- ( $\langle A, B, C \rangle : C > 90$ )

Now the test cases can be designed from the above derived classes , taking one test case from each class such that the test case covers max. valid input classes and separate the test cases for each invalid class.

The test cases are shown below :

TEST CASE ID	A	B	C	EXPECTED RESULT	CLASS COVERED
1	60	90	80	Right angled	I1
2	55	45	65	Acute	I2
3	80	90	85	Right angled	I3
4	0	45	60	Acute	I4
5	180	90	50	Right angled, Obtuse	I5
6	90	0	45	Right angled	I6
7	80	100	90	Right angled, Obtuse	I7

8	90	60	0	Right angled	I8
9	180	90	140	Right angled, Obtuse	I9

We can also derive another set of equivalence classes based on some possibilities for three angles , A, B , C. These are given below :

#### Set-2

- I1- ( $\langle A, B, C \rangle : A > B, A < C$  )
- I2- ( $\langle A, B, C \rangle : B > A, B < C$  )
- I3- ( $\langle A, B, C \rangle : C > A, C < B$  )
- I4- ( $\langle A, B, C \rangle : A = B, A \neq C$  )
- I5- ( $\langle A, B, C \rangle : B = C, B \neq A$  )
- I6- ( $\langle A, B, C \rangle : C = A, C \neq B$  )
- I7- ( $\langle A, B, C \rangle : A = B = C$  )

TEST CASE ID	A	B	C	EXPECTED RESULT	CLASS COVERED
1	90	50	30	Right angled	I1
2	30	45	40	Acute	I2
3	70	80	100	Obtuse	I3
4	60	60	90	Right angled	I4
5	60	45	45	Acute	I5
6	180	80	180	Obtuse	I6
7	45	45	45	Acute	I7