APPENDICES

APPENDIX I

I.1 Illuminance standards for kitchen in different countries

Area / Activity Kitchen	IES America	IES London / CIBSE	IES Japan	CIE (Philips lighting manual)	SAN	LISP (America)	SAA	ISI	BSI
(1) General Sink, Cooking areas			100 lx 300 lx (1998)						
(2) General Working areas		150 lx 300 lx (1994)							
(3) General Working areas				300 lx 500 lx (1993)					
(4) General Working areas		50 lx 300 lx (1984)			300 lx (1984)				
(5) Kitchen						50-75 fc (1981)			
(6) Working areas		300 lx (1977)							
(7) Working areas							200 lx (1976)		
(8) Working areas		300 lx (1973)							
(9) General Food preparation and cleaning	50 fc 150 fc								
Serving and other critical tasks	50 fc (1972)								
(10) Kitchen								200 lx* (1966)	
(11) General Sink Range and work surface	30 fc 70 fc 50 fc (1959)								
(12) General Sink, range, food preparation	10 fc 40 fc (1954)								
(13) Cookers, sinks and tables		7 fc (1949)							
(14) Cookers, sinks and tables									7 fc (1949)
(15) Cookers, sinks and tables		7 fc (1945)							
(16) General Sink, range and food preparation	10 fc 40 fc (1945)								

IES : Illuminating Engineering Society

SAN : Standard Association of New zealand

LISP : lighting Industry Standard Practice

ISI : Bureau of Indian Standards

BSI : British Standard Institute

CIE : International Commission on Illumination

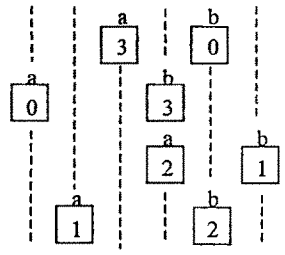
SAA : Standard Association of Australia

I.2 Artificial lighting value scale used in Pilot study

PART I

DIRECTIONS : A number of statements or questions with two alternative answers are given below. Indicate your personal preferences by writing appropriate figures in the boxes to the right of each question. Some of the alternatives may appear equally attractive or unattractive to you. Nevertheless, please attempt to choose the alternative that is relatively more acceptable to you. For each question you have three points that you may distribute in any of the following combinations.

1. If you agree with alternative (a) and disagree with (b), write 3 in the first box and 0 in the second box, thus
2. If you agree with (b) ; disagree with (a), write
3. If you have a slight preference for (a) over (b), write
4. If you have a slight preference for (b) over (a), write



Do not write any combination of numbers except one of these four. There is no time limit, but do not linger over any one question or statement, and do not leave out any of the questions unless you find it really impossible to make a decision

(1) While planning artificial lighting in kitchen would you prefer a system that,
(a) gives shadow free illumination to add comfort in work performance
(b) keeps installation and operation cost low.

(2) While watching advertisements related to lighting on television or in a magazine, you are attracted by,
(a) exciting range of new products
(b) products that would minimise accident hazards

(3) How do you define a well designed lighting system in the kitchen? A system that,
(a) enables better identification and appreciation of colours
(b) provides an atmosphere which is relaxing for the worker.

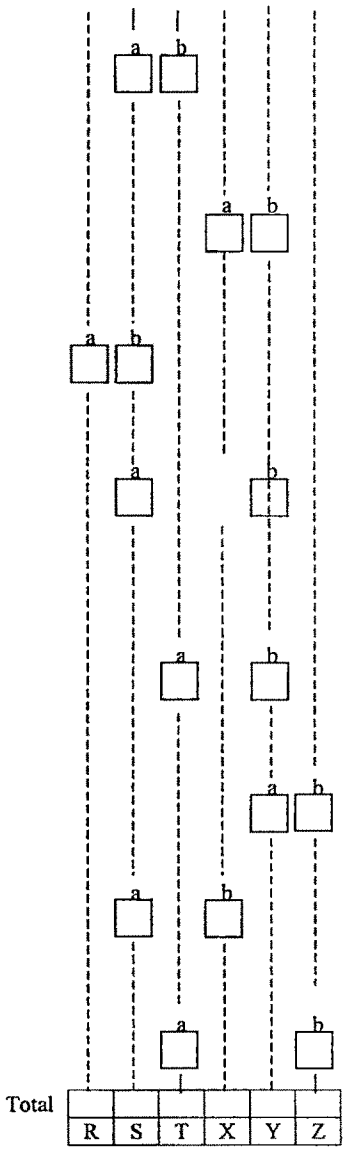
(4) Which of the following aspects of lighting mechanism do you find more important for kitchens ?
(a) one that does not lead to any physical discomfort in switching
(b) one that ensures maximum protection from accidential contacts

(5) Would residential kitchens benefit more from having lighting equipments that,
(a) are effective energy savers
(b) have excellent heat resistant properties

(6) In order to create an ideal working environment in the kitchen, there should be,
(a) provision of auxiliary and emergency light for safety
(b) adequate level of illumination for efficient working

(7) The aim of lighting industry should be to design,
(a) lighting to avoid strain to the workers' eye while performing any task
(b) lighting systems with new materials and technology.

(8) The lighting industry should provide the consumers with,
(a) energy saving lamps
(b) lamps for efficient functioning



(9) It is an absolute necessity that light arrangement in the kitchen should :,

(a) light the work space to prevent tripping of the worker.
(b) enrich the appearance of the kitchen space.

(10) Suppose you were in a position to help families in designing lighting for kitchens, would you prefer to influence them in having lighting system that,
(a) has latest, up-do-date design
(b) saves the user over its life on electricity bills.

(11) Which would you consider the most important function of lighting?

(a) to provide a conducive work atmosphere for maximum output
(b) to enable to do all the tasks without any hazards

(12) In relation to kitchen lighting, would you prefer to hear a series of popular lectures on,
(a) how to achieve economy in lighting kitchen
(b) how to beautify kitchen using dramatic accent light.

(13) Which of the given character trait do you desire while choosing lighting system for kitchen ?
(a) ability to see and perform visual tasks with speed and accuracy
(b) visual pleasantness and appeal of the work space.

(14) If you are engaged in a lighting industry, you would prefer to work for,

(a) developing accident-proof systems for kitchen lighting
(b) developing cost effective lighting systems.

(15) A kitchen is said to have proper lighting conditions if it,
(a) enables to perform work of the desired quantity and quality
(b) permits prolonged exposure to light without causing any discomfort in the eyes

(16) Numerous varieties of lighting products are available in the market today, you would prefer to purchase those that,
(a) provide sufficient light for optimum work performance
(b) reduce operating and maintenance cost

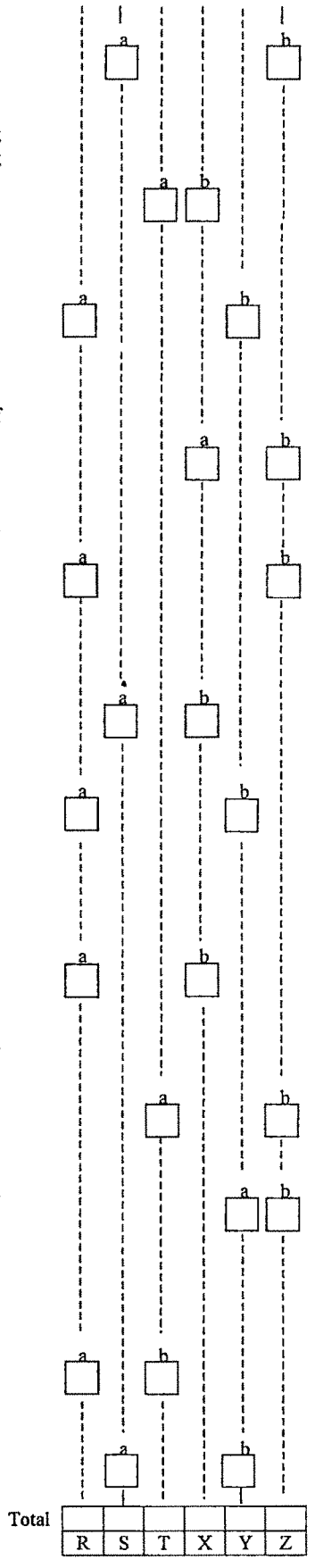
(17) If new lighting modules for kitchens were to be designed as per your requirements, what choice would you have ? Lighting modules that,

(a) are totally unique and innovative
(b) integrate elegantly with the interior space.

(18) In a kitchen, lighting fixtures should be positioned in such a way that they,
(a) allow light to reach the remote corners of kitchen cabinets to eliminate discomfort to the worker.
(b) appear symmetrical with the rest of the components of the kitchen.

(19) If you are at an exhibition or trade fair,would you be interested in,
(a) lighting systems for efficiency in task performance.
(b) recent trends in artificial lighting.

(20) A well lit kitchen is one that provides,
(a) safe working environment
(b) comfortable working environment



(21) If you were to deliver a speech on kitchen lighting, you would highlight mainly on,
(a) reducing cost in artificial lighting system in kitchen
(b) contemporary technologies for kitchen lighting that may or may not be cost effective.

(22) Would you consider it more essential for your kitchen to have lighting that prevents the workers from,
(a) stumbling while moving around
(b) anxiety and strain in doing visual task

(23) Lighting environment in the kitchen should be such that it,
(a) inspires your decorative flair
(b) reflects the current trends in lighting products

(24) Lighting industries and scientific developments should create lighting systems that,
(a) include several ornamental accessories and colours
(b) are cost effective and energy efficient.

(25) Which do you consider is the most essential feature of kitchen lighting ? Lighting that,
(a) would cut down on the electricity bill
(b) would enable effective performance of close visual tasks.

(26) If you were a lighting consultant, you would suggest families to choose lighting systems that,
(a) are new entrance in the market
(b) would provide soft diffused light which is soothing to the eye.

(27) Which among the given two features of light fixture do you consider more desirable for a kitchen ? Light fixture that,
(a) gives unified character to the room
(b) can withstand vibration and mechanical shock

(28) When you enter a well designed kitchen are you more impressed by the lighting fixtures that,
(a) draw your attention as attractive and beautiful
(b) provide an appropriate contrast ratio of light for efficient working

(29) Given a choice between two articles as given below to read from a magazine on interior decoration, are you more likely to select,
(a) evolving new design trends for lighting
(b) lighting : an electrical system to heighten work efficiency.

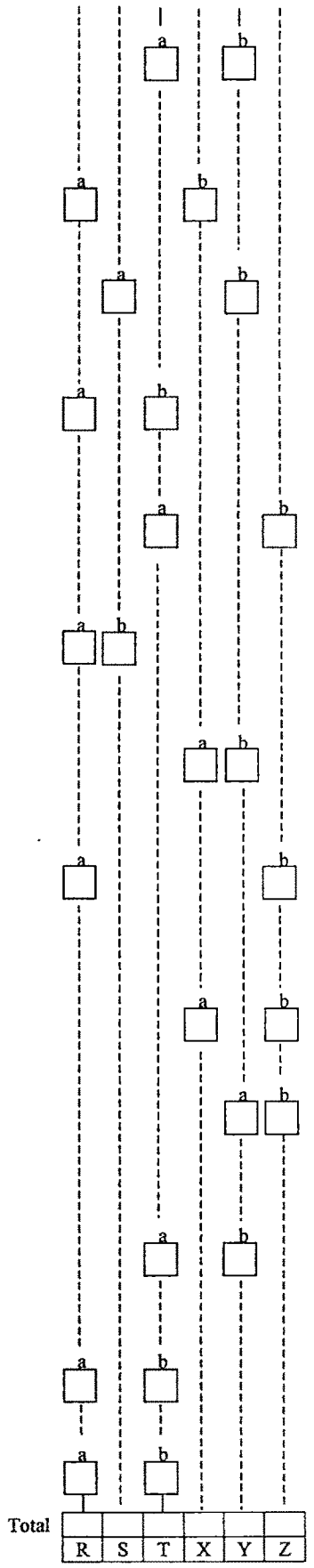
(30) The aim of the luminaires at the present time should be to,
(a) eliminate glare and reflections from glossy surfaces
(b) adequately light the room to perform the tasks efficiently.

(31) Assuming that you are a lighting designer with sufficient abilities, what aspect of kitchen lighting would you stress ? Lighting system that,

(a) has long service life
(b) provides glare-free light

(32) What fundamental change would you like to have in the existing lighting equipments,
(a) introducing dynamic component of safety
(b) introduce latest state-of-the-art in technology

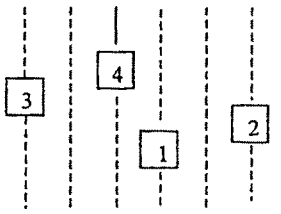
(33) Lighting in a kitchen should cater to the need of ,
(a) aesthetics
(b) technological upgradation



PART II

Each of the following situations or questions is followed by four possible attitudes or answers. Arrange these answers in the order of your personal preference by writing, in the appropriate box at the right, a score of 4, 3, 2, or 1. To the statement you prefer most give 4, to the statement that is second most attractive 3, and so on.

Example : If this were a question and the following statements were alternative choices you would place :
4 in the box if this statement appeals to you most.
3 in the box if this statement appeals to you second best.
2 in the box if this statement appeals to you third best.
1 in the box if this statement represents your interest or preference least of all.



You may think of answers which would be preferable from your point of view to any of those listed. It is necessary, however, that you make your selection from the alternatives presented, and arrange all four in order of their desirability, guessing when your preferences are not distinct. If you find it really impossible to state your preference, you may omit the question. Be sure not to assign more than one 4, one 3, etc., for each question.

(1) Do you think that good lighting for kitchen should aim chiefly at,
- (a) low electrical energy consumption
- (b) enriched appearance of the room
- (c) satisfactory performance of work
- (d) minimum strain on the eye

(2) In your opinion an ideal light environment in kitchen can be created by having lighting system that,
- (a) enhances the look
- (b) adds modernity
- (c) provides safety
- (d) enables you to work efficiently

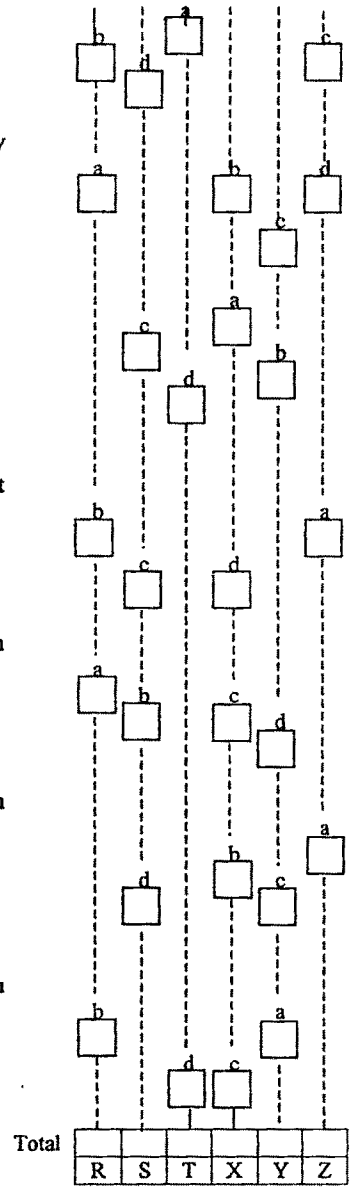
(3) Do you prefer kitchen lights that,
- (a) would update your kitchen to bring in the latest development
- (b) create an work space that ensures the safety of the worker
- (c) offer maximum convenience at work
- (d) minimise power consumption

(4) Whether you visit a kitchen, you are fascinated by lighting system that create,
- (a) functionally efficient work centres
- (b) visually pleasant atmosphere
- (c) soothing environment
- (d) an up-to-date look

(5) If you had sufficient knowledge and money, would you prefer kitchen lighting
- (a) with appealing styles
- (b) with no distractions and discomfort
- (c) that exhibit the newest trends
- (d) that would enable a safe traffic flow in the kitchen.

(6) While watching the variety of lighting products in the market, do you enjoy the most,
- (a) light fixtures that provide adequate task lighting
- (b) the latest innovations
- (c) lamps that meet all safety standards
- (d) lamps that provide quality light without causing any irritation to the worker

(7) If you could substitute the light fixtures in your existing kitchen, you would choose one that,
- (a) is able to resist all hazards
- (b) suits the décor of the room
- (c) exhibits technological innovations
- (d) saves on the cost of electricity and installation



Total						
	R	S	T	X	Y	Z

(8) With reference to kitchen lighting, you strongly hold an opinion that lighting should,
(a) provide comfortable environment to the worker
(b) be energy efficient
(c) heighten work performance
(d) not activate accidents

(9) Which among the following aspects of kitchen lighting interest you ? Lighting,
(a) to achieve economy
(b) as an aid for efficient working
(c) for shadow proof environment
(d) to create a modernised look in the room

(10) Viewing the lighting of a properly designed kitchen would you tend to think of it in terms of provision for,
(a) visual appeal
(b) visual comfort
(c) visual safety
(d) work efficiency

(11) Today, the lighting needs of families can be fulfilled by,
(a) reflector lamps to give shadow free environment
(b) innovative lamps to fulfill the desire for modernity
(c) energy saving lamps to reduce power consumption
(d) decorative lamps to enrich the room environment

(12) The real skill in designing lighting for a kitchen is to,
(a) create pleasing and dramatic visual effects
(b) permit safe movements at work place
(c) provide diffused light
(d) suit the varying needs of the worker economically

(13) The best lighting design schemes for kitchen should provide the following characteristics,
(a) every nook and corner being well-lighted to avoid accidents
(b) reduction in installation cost and electricity bill
(c) provision of adequate illumination to perform general and specific tasks
(d) utilization of lighting products that are in line with the latest trend

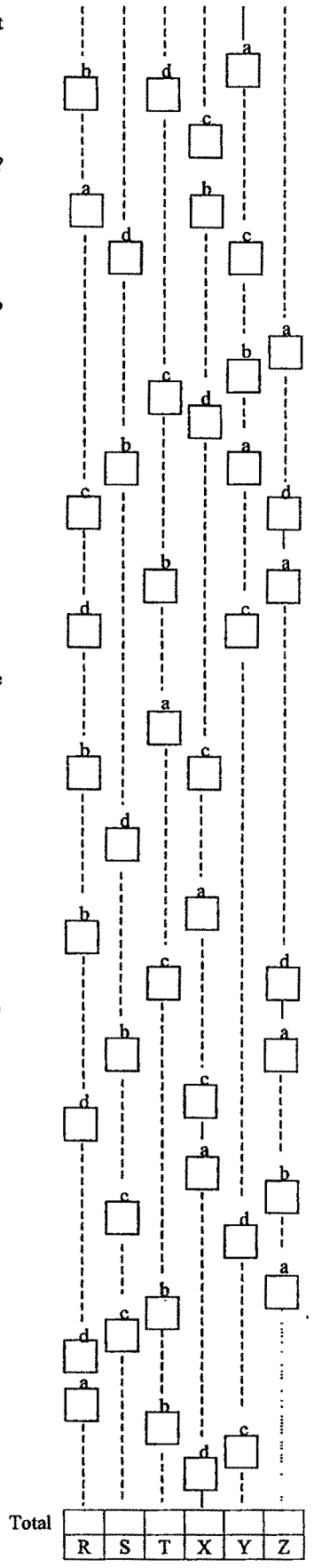
(14) Do you think a good lighting system for kitchen should aim at,
(a) having precise beam control at work surfaces
(b) reducing consumption of electric power
(c) provision of rudimentary safety to the worker
(d) evoking a sense of elegance in the room

(15) If you could influence the academicians in your local universities to make revisions in curriculum, would you emphasise upon,
(a) creation of dramatic patterns with light
(b) new exciting varieties of light products
(c) functional efficiency through lighting
(d) low cost lighting designs

(16) Kitchen lighting should be,
(a) functional
(b) decorative
(c) modern
(d) comfortable

(17) the lighting in your dream kitchen would ,
(a) exhibit your decorative flair
(b) offer safe environment
(c) technologically up-to-date
(d) provide for economy

(18) If you were to renovate your existing kitchen lighting, you would lay stress upon,
(a) energy conservation
(b) safety features
(c) providing comfortable environment
(d) functional work centres



Total						
	R	S	T	X	Y	Z

Reliability of items on ALVS

Part - I				Part - II			
Item no		'r' value	Value	Item no		'r' value	Value
1	(a)	52*	C	1	(a)	.37*	E
	(b)	30*	E		(b)	76*	A
2	(a)	28*	M		(c)	.44*	WE
	(b)	59*	S		(d)	.45*	C
3	(a)	35*	A	2	(a)	68*	A
	(b)	30*	A		(b)	72*	M
4	(a)	08	C		(c)	.71*	S
	(b)	30*	S		(d)	61*	WE
5	(a)	53*	E	3	(a)	79*	M
	(b)	45*	S		(b)	61*	S
6	(a)	47*	S		(c)	51*	C
	(b)	10	WE		(d)	.55*	E
7	(a)	48*	C	4	(a)	62*	WE
	(b)	17**	M		(b)	.26*	A
8	(a)	18	E		(c)	.08	C
	(b)	28*	WE		(d)	80*	M
9	(a)	35*	S	5	(a)	.56*	A
	(b)	19**	A		(b)	.49*	C
10	(a)	48*	M		(c)	75*	M
	(b)	34*	E		(d)	.66*	S
11	(a)	26*	WE	6	(a)	04	WE
	(b)	24*	S		(b)	77*	M
12	(a)	28*	E		(c)	.69*	S
	(b)	24*	A		(d)	42*	C
13	(a)	35*	WE	7	(a)	59*	S
	(b)	27*	A		(b)	64*	A
14	(a)	20*	S		(c)	.64*	M
	(b)	58	E		(d)	.70*	E
15	(a)	19**	WE	8	(a)	45*	C
	(b)	07**	C		(b)	.30*	E
16	(a)	29*	WE		(c)	.09	WE
	(b)	60*	E		(d)	53*	S
17	(a)	16	M	9.	(a)	.63*	E
	(b)	16	A		(b)	71*	WE
18	(a)	35*	C		(c)	40*	C
	(b)	26*	A		(d)	.62*	M
19	(a)	55*	WE	10	(a)	73*	A
	(b)	24*	M		(b)	.54*	C
20	(a)	18	S		(c)	69*	S
	(b)	36*	C		(d)	.37*	E
21	(a)	52*	E	11	(a)	.77*	C
	(b)	23*	M		(b)	59*	M
22	(a)	03	S		(c)	56*	C
	(b)	07	C		(d)	70*	A
23	(a)	17**	A	12	(a)	.70*	A
	(b)	38*	M		(b)	74*	S
24	(a)	10	A		(c)	.26*	C
	(b)	01	E		(d)	.45*	WE
25	(a)	57*	A	13	(a)	59*	S
	(b)	55*	WE		(b)	70*	E
26	(a)	46*	M		(c)	36*	WE
	(b)	42*	C		(d)	66*	M
27.	(a)	37*	A	14	(a)	55*	WE
	(b)	34*	S		(b)	.54*	E
28	(a)	47*	A		(c)	.66*	S
	(b)	15**	WE		(d)	63*	A
29	(a)	20*	M	15	(a)	56*	A
	(b)	10**	WE		(b)	63*	M
30	(a)	21*	C		(c)	73*	WE
	(b)	14**	WE		(d)	.45*	E
31	(a)	48*	E	16	(a)	.35*	WE
	(b)	.37*	C		(b)	.27*	A
32	(a)	47*	S		(c)	.16	M
	(b)	41*	M		(d)	.53*	C
33	(a)	35*	A	17	(a)	15	A
	(b)	27*	M		(b)	.16	S
					(c)	.19	M
					(d)	.16	E
				18.	(a)	30*	E
					(b)	.42*	S
					(c)	.37*	C
					(d)	.42*	WE

* Items included in the final scale.
** Items improved in the final scale

I 3 Artificial Lighting Knowledge Test used in Pilot study

Q.I Choose the most appropriate answer among the given options.

1. As the distance between workplace and the source of light increases, the amount of available light, ☐
☐ (a) increases
☐ (b) decreases
☐ (c) remains the same

2 Dimmers are mainly used to alter, ☐
☐ (a) colour of the light
☐ (b) direction of light
☐ (c) intensity of the light

3. Glare is caused by, ☐
☐ (a) highly polished surfaces
☐ (b) matte surfaces
☐ (c) dull coloured surface

4 Among the following lamps, which one is the most cost effective in a long run, ☐
☐ (a) incandescent lamp
☐ (b) linear fluorescent lamp
☐ (c) compact fluorescent lamp

5. A mercury lamp emits, ☐
☐ (a) white light
☐ (b) yellow light
☐ (c) orange light

6. The unit of Illumination is,, ☐
☐ (a) candela
☐ (b) watt
☐ (c) lux

7. As compared to a yellow coloured wall, light reflected from white wall is, ☐
☐ (a) more
☐ (b) less
☐ (c) same

8. Strong shadows are casted in a room by, ☐
☐ (a) diffused light
☐ (b) direct light
☐ (c) indirect light

9. Dirt and dust accumulation on the lamp, ☐
☐ (a) decreases the light output
☐ (b) changes the colour of the light
☐ (c) makes no differences in the light output

10. If socket wattage is more than the lamp wattage, the life of the lamp, ☐
☐ (a) increases
☐ (b) decreases
☐ (c) remains the same.

11 The light output from 60 watt bulb compared to 13 watt compact fluorescent lamp is, ☐
☐ (a) more
☐ (b) less
☐ (c) same

12. The spread of light through a shade is determined by, ☐

- [ ] (a) shape of the shade
- [ ] (b) transparency of the shade
- [ ] (c) both the above

13. Which of the following material should be used for diffusion of light, ☐

- [ ] (a) wood
- [ ] (b) glass
- [ ] (c) metal

14. The contrast ratio of light between the work place and surrounding area should, be ☐

- [ ] (a) 1:3
- [ ] (b) 3:1
- [ ] (c) 3:2

15. For a study area ideally the lamp should be installed, ☐

- [ ] (a) right-hand side to the reader
- [ ] (b) left-hand side to the reader
- [ ] (c) in front side of the reader

16. Lighting in kitchen should be composed of, ☐

- [ ] (a) general lighting
- [ ] (b) local lighting
- [ ] (c) combination of general and local lighting

17. Number of lamps required to achieve a desirable quantity of light in a room can determined by, ☐

- [ ] (a) size of the room
- [ ] (b) number of people using the room
- [ ] (c) number of hours of operation of the lamps

18. Ideally, the mirror area in a bathroom or dressing area should be lit, ☐

- [ ] (a) both from above and from the sides
- [ ] (b) from below
- [ ] (c) both from below and from the sides

19. An elongated electric socket which enables several luminaries to be attached along its length is called, ☐

- [ ] (a) recessed fixtures
- [ ] (b) lighting track
- [ ] (c) cove lighting

20. To create a warm and cosy interior which lamps can be used, ☐

- [ ] (a) tungsten lamps
- [ ] (b) fluorescent lamps
- [ ] (c) sodium lamps

21. To create a cool, brisk and business like environment in an interiors, which lamps can be used, ☐

- [ ] (a) tungsten lamps
- [ ] (b) fluorescent lamps
- [ ] (c) sodium lamps

22. Recessed light fixtures are built into, ☐

- [ ] (a) the wall
- [ ] (b) the palmets
- [ ] (c) the ceiling

23. Among the lamps available in the market, which lamp is ideal for viewing television, ☐

- ☐ (a) clear incandescent bulbs
- ☐ (b) bowl reflector lamp
- ☐ (c) milky lamp

24. The rated life of a fluorescent lamp is, ☐

- ☐ (a) 5000 hours of burning
- ☐ (b) 4000 hours of burning
- ☐ (c) 3000 hours of burning

25. If you have obscured when you purchase a fluorescent tube, from the market, it gives the following information : e.g. cool day light 6500 K, 40W ☐

(i) cool day light indicates,

- ☐ (a) colour of light
- ☐ (b) colour temperature
- ☐ (c) it's a fancy trade name

(ii) 6500 K indicates,

- ☐ (a) colour of the light
- ☐ (b) colour temperature
- ☐ (c) power consumption

(iii) 40 W indicates,

- ☐ (a) colour temperature
- ☐ (b) power consumption
- ☐ (c) lamp voltage.

26. The electromagnetic energy radiation that produces the sensation of sight in the human eye have wavelengths ranging from ☐

- ☐ (a) 1,800 to 5,800 A
- ☐ (b) 3,800 to 7,800 A
- ☐ (c) 5,800 to 9,800 A

27. In an incandescent lamp the filament that emits light when electric current passes through it, is made up of, ☐

- ☐ (a) nichrome
- ☐ (b) lead
- ☐ (c) tungsten

28. In a tube light the internal tube walls are coated with, ☐

- ☐ (a) fluorescent powder
- ☐ (b) mercury drops
- ☐ (c) sodium coating

29. As per ISI the recommended illumination-level for human range between, ☐

- ☐ (a) 150-300 lux
- ☐ (b) 250-400 lux
- ☐ (c) 350-500 lux

30. The current flowing in a conductor is, ☐

- ☐ (a) indirectly proportional to the voltage
- ☐ (b) directly proportional to be voltage
- ☐ (c) not related to the voltage

31. The unit of current is, ☐

- ☐ (a) ampere
- ☐ (b) volt
- ☐ (c) ohms

32. The device used to alter voltage is called a,

- [ ] (a) alternator
- [ ] (b) generator
- [ ] (c) transformer

33. The electricity supplied to all domestic units in the whole country is fed with,

- [ ] (a) alternating current
- [ ] (b) direct current
- [ ] (c) Eddy current

34. The unit cost of electricity as today is,

- [ ] (a) Rs. 2.50
- [ ] (b) Rs. 3.00
- [ ] (c) Rs. 3.50

35. List down the names of any five companies that manufacture lighting fixtures in India,

(a)
(b)
(c)
(d)
(e)

Q. II Match the following columns. Column A consist of list of various types of lamps available in the market and Column B indicates the uses for those lamps. Choose the correct answer from column B and write it in the space provided against column A.

A		B
1. Pygmy lamp	(a)	for stadiums
2. Sodium lamp	(b)	for viewing television
3. Neon lamp	(c)	for street lighting
4 Halogen lamp	(d)	in refrigerators
5. Bowl reflector	(e)	in electric ovens, irons, geysers

Q. III According to you what are the various points that should be considered while planning lighting in the kitchen. Please answer in points

1.
2.
3.

Q. IV Can you suggest some ways through which one can minimize power consumption of lamps in the kitchen.

1.
2.
3.

Reliability of items on ALKT

Item No.	Homemakers			Husbands		
	Reliability	Difficulty index	Validity index	Reliability	Difficulty index	Validity index
Q. I 1	.30	82.20	-	.09	77.25	14
2*	.39	59.85	48	.61	54.55	56
3*	.46	77.25	66	.68	72.75	70
4	.15	12.90	12	.33	45.45	37
5*	.52	68.20	74	.57	41.40	46
6*	.58	46.2	71	.61	59.10	65
7*	.28	77.65	38	.67	72.75	70
8*	.18	73.45	25	.40	59.10	29
9	.08	78.00	13	.32	81.80	-
10	-.04	47.75	04	-.22	54.55	00
11*	.20	21.20	34	.31	27.30	30
12	.22	51.90	12	.38	31.80	51
13*	.42	68.60	51	.28	72.70	30
14	.20	21.20	-	.30	27.30	23
15*	.30	42.80	33	.24	31.85	22
16*	.43	51.15	48	.46	54.55	35
17	.36	81.80	-	.61	77.25	-
18*	.39	73.10	45	.49	72.70	45
19*	.38	20.85	63	.28	31.85	22
20	.04	43.60	00	-.20	50.00	00
21*	.54	50.75	63	.50	77.25	66
22*	.29	25.40	41	.37	31.80	51
23*	.31	29.55	48	.25	36.40	22
24	-.12	22.0	00	-.17	40.95	00
25 (i)	.18	30.30	09	.20	54.55	17
25 (ii)	.54	25.00	68	.57	40.90	64
25 (iii)	.33	34.10	36	.24	59.10	28
26*	.28	21.20	34	.25	50.00	31
27*	.65	46.20	71	.60	54.55	71
28	.19	34.50	18	.44	54.55	56
29	-.36	18.20	-	-.11	45.50	00
30*	.34	55.70	39	.25	54.55	27
31*	.55	63.65	79	.50	68.20	74
32	.54	46.20	71	.61	63.65	79
33*	.70	46.20	71	.76	54.55	86
34*	.34	42.60	31	.29	45.55	27
Q.II 1 *	.57	25.00	68	.56	27.25	70
2*	.71	33.35	75	.62	36.35	78
3	.48	16.65	-	.53	18.20	60
4*	.67	46.20	71	.44	36.35	57
5*	.69	46.20	71	.25	45.45	29

* Items included in the final scale.