UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Kedua
Sidang 1987/88

REW 224 - Perkhidmatan Kejuruteraan Bangunan
Dan Infrastruktur Fizikal I

Tarikh: 9 April 1988 Masa: 9.00 pagi - 12.00 tengahari
(3 jam)

Sila pastikan bahawa kertas peperiksaan ini mengandungi TIGA muka surat dan EMPAT muka surat Lampiran yang tercetak sebelum anda memulakan peperiksaan ini.

Jawab LIMA soalan.

1. a) Nyatakan objektif kerajaan Malaysia yang utama di dalam Perancangan Bekalan Letrik Luar Bandar di bawah Rancangan Malaysia Kelima. Apakah aspek-aspek pilihan sistem yang berhubung dengan rancangan ini?

   b) Hitungkan sumbangan pemborong untuk pembekalan letrik kepada satu sekim perumahan luar bandar di bawah Perancangan Bekalan Letrik Luar Bandar dengan maklumat-maklumat berikut:

- Jumlah harga sekim letrik	220,000.00 (MR)
- Bilangan keluarga	250
- Kegunaan kuasa letrik sebuah keluarga (dianggar)	17 unit sebulan
- Kos kuasa letrik LLN	26¢ seunit
- Kos pengeluaran kuasa letrik LLN	7¢ seunit
- Mengira bayar balik untuk LLN atas sekim-sekim Perancangan Bekalan Letrik Luar Bandar	14% setahun

(20 markah)

(2) Dengan menggunakan cara 'lumen', sediakan satu sistem pencahayaan untuk ruang jahitan di Kilang Baju berukuran 40' x 35' x 15', pencahayaannya 200 lumen kaki persegi. Gunakan alat lampu kalimantang AEG 'strip lighting' kecekapannya 92% dan penentuan-penentuan berikut:

a) Pemasangan alat-alatan digantung 7' dari siling.

b) Satah kerja 3' dari lantai.

c) Tiub kalimantang 4' panjang dan warna 'Natural' (2100 lumen).

d) Faktor senggaraan 65%.

Dengan menggunakan lakaran, tunjukkan susunan sistem alat-alat tersebut.

(Jadual faktor-faktor penggunaan sekim pencahayaan dilampirkan).

(20 markah)

(3) Apabila merancang rekabentuk pencahayaan sesuatu blok pejabat bertingkat, nyatakan semua faktor yang perlu dipertimbangkan berkenaan dengan:

a) Peranan cahaya siang.

b) Silau.

c) Sistem kecemasan pencahayaan.

(20 markah)

(4) a) Ruang jahitan di kilang baju berukuran 40' x 35' x 15' akan dilengkapkan dengan pendingin hawa. Apakah komponen muatan yang anda akan pertimbangkan di dalam taksiran anda untuk menetapkan jenis dan saiz loji pendingin hawa.

b) Sediakan satu lakaran berlebel bagi sistem pendingin hawa untuk ruang jahitan tersebut.

(20 markah)

(5) a) Menurut Akta Kilang dan Jentera 1967, di dalam fasal kelulusan untuk memasang lif, nyatakan semua butir yang diperlukan oleh Ketua Pemeriksa.

b) Apakah peraturan yang ditentukan untuk membentuk sebuah ruang mesin.

(20 markah)

6. a) Bincangkan amalan baik yang boleh diikuti di dalam pembinaan bangunan perusahaan untuk mengurangkan bahaya kebakaran.

b) Sediakan satu lakaran berlebel untuk satu sistem pemadam api yang lengkap bagi sebuah kilang baju setinggi empat tingkat.

(Jadual 14, Ordinan Perbandaran, Bahagian 6, Keperluan Api 1975 dikepilkan).

(20 markah)

7. a) Mengikut undang-undang kecil, Ordinan Perbandaran, Bahagian 6, Keperluan Api 1975, huraikan semua jenis Pintu Rintangan Api yang terdapat di Malaysia.

b) Nyatakan keperluan rekabentuk untuk Pintu Rintangan Api Dua Jam.

(20 markah)

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Lampiran

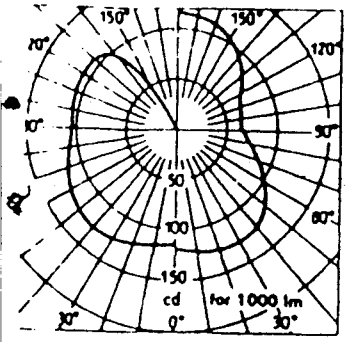
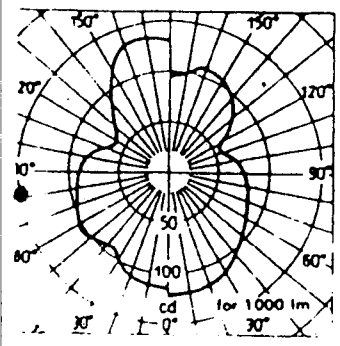


Fig. 19/18 Single-tube fluorescent-lamp fitting, 20 to 120 W, eff 92%

Light distribution curve

left:	right:
1 lamp	2 lamps
mainly	direct
direct	



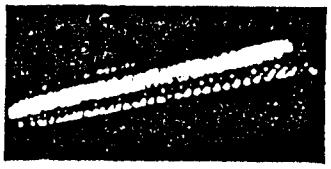


Fig. 19/19. Twin-tube fluorescent-lamp fitting with glass louvre, 40 to 120 W, eff 84%, lamps arranged side by side

Light distribution curve

left	right
2 lamps	3 lamps

Uniform upward and downward radiation

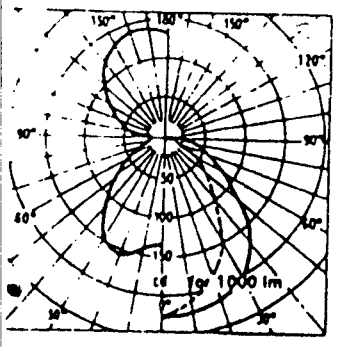


Fig. 19/20a. Rectangular fluorescent-lamp fitting with metal louvre, 40 to 120 W

Light distribution curve

left:	right:
Pendant lamp, upw. and downw radiation, eff. 84%	Ceiling-mounted, downward radiation, eff 65%

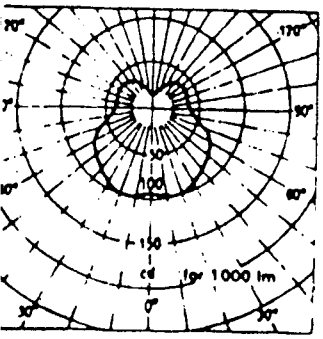


Fig. 19/20b. Ceiling fixture with acrylic trough for 20 to 85 W fluorescent lamps eff. 80%

Light distribution curve mainly direct

Table 19/11. FAKTOR-FAKTOR PENGGUNAAN SEKIM PENCAHAYAA

Room index k	Reflection factor Ceiling 70%	Wall 50%	Ceiling 50%	Wall 30%	Ceiling 30%	Wall 10%
AEG reflector fittings, direct narrow angle, Fig. 19/18 (efficiency 80%), for h.p.m.v., mixed-light and incandescent lamps						
5	0.72		0.66		0.66	
3	0.66		0.66		0.61	
2	0.59		0.61		0.56	
1.25	0.52		0.53		0.48	
0.8	0.42		0.44		0.40	
AEG strip lighting fittings, mainly with direct free radiation, Fig. 19/18 (efficiency 92%)						
5	0.65		0.58		0.60	
3	0.59		0.52		0.44	
2	0.52		0.50		0.40	
1.25	0.44		0.41		0.32	
0.8	0.36		0.32		0.26	
AEG lighting fittings with uniform upward and downward distribution, glass louvre, Fig. 19/19 (efficiency 84%)						
5	0.60		0.53		0.45	
3	0.54		0.48		0.40	
2	0.48		0.45		0.36	
1.25	0.40		0.38		0.28	
0.8	0.32		0.29		0.23	
AEG strip lighting fittings with metal louvre, uniform upward and downward distribution, Fig. 19/20a (efficiency 70%)						
5	0.50		0.44		0.38	
3	0.45		0.40		0.34	
2	0.40		0.38		0.30	
1.25	0.34		0.32		0.25	
0.8	0.27		0.26		0.19	
AEG Acrylic-trough ceiling fittings, mainly direct radiation, Fig. 19/20b (efficiency 80%)						
5	0.46		0.44		0.40	
3	0.42		0.41		0.36	
2	0.38		0.38		0.32	
1.25	0.33		0.32		0.27	
0.8	0.26		0.26		0.21	

Direct illumination through louvres

Room index	Matt-white louvre	Glossy-white louvre	
5	0.30	0.40	An even illumination requires a distance between light source and louvre equal to two-thirds of the distance between two lamps.
2	0.25	0.35	
0.8	0.20	0.25	

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FOURTEENTH SCHEDULE

TABLE OF REQUIREMENTS FOR FIRE EXTINGUISHMENT SYSTEM, ALARM SYSTEMS AND ILLUMINATION OF MEANS OF EGRESS

	Occupancy Hazard	Extinguishing System Note 2	Fire Alarm System Note 3	Illumination of Means of Egress Control Unit	
				Voltage	Lamp Wattage
1.	PLACES OF ASSEMBLY				
1.1	Class A and B below the level of exit discharge	A and G	2	normal	25
1.2	Stage with fly galleries gridirons and riggings for moveable theatre-type scenery	A and G	2	normal	25
1.3	Hazardous Areas	A, B, C, D, E or F	—	—	—
2.	UNDERGROUND STRUCTURES AND WINDOWLESS BUILDINGS	G and H	1 and 2	—	—
3.	EDUCATIONAL OCCUPANCIES	G	4	normal	40
4.	INDUSTRIAL BUILDINGS				
4.1	Single storey exceeding 7,500 sq. ft.	G and H	2	—	—
4.2	Two storeys where the first floor exceeds 5,000 sq. ft	G and H	2	normal	40
4.3	More than two storeys or exceeding 250,000 cubic feet	A and G	2	—	—
4.4	Hazardous processes or storage	A, B, C, D, E or F	2	—	—
5.	MERCANTILE OCCUPANCIES				
5.1	Class A and B	A and G	2 and 3	normal	40
5.2	Combined Mercantile and Hotel Occupancies	A and G	2 and 3	24	25
5.3	Mercantile Occupancies below Hotel Occupancies	A and G	2 and 3	normal	40
5.4	Shopping malls	A and G	2	normal	40
6.	OFFICES AND BANKS EXCEEDING 60 FEET IN HEIGHT OR 100,000 SQUARE FEET GROSS AREA	G	1 and 2	24	8 flourescent
7.	HOSPITAL OVER 4 STOREYS	—	—	—	—
7.1	Hospitals and Nursing Homes	G and H	1, 2 and 3	normal	40
7.2	Residential and/or Custodial Care	G and H	1, 2 and 3	24	8 flourescent
8.	HOTELS				
8.1	Hotels exceeding 50 rooms—				
	rooms and general area	G	1, 2 and 3	24	25
	public areas	A and G	2 and 3	normal	25
8.2	Hotels exceeding 60 feet in height	A and G	2 and 3	24	25

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	Occupancy Hazard	Extinguishing System Note 2	Fire Alarm System Note 3	Illumination of Means of Egress Control Unit	
				Voltage	Lamp Wattage
8.3	Hotels above Mercantile or Office Occupancies	G	1	normal	40
9.	Multi-Storey Flats Exceeding 60 Feet in Height Other than Balcony-Approach Type			24	8 flourescent
10.	Storage Areas				
10.1	Basements and underground garages	G	2	—	—
10.2	Basement garages and carparks exceeding 5,000 square feet	A and G	2	normal	40
10.3	Multi-storeyed carparks	G and H	2	normal	40
10.4	Automated Warehouses and high stack warehouses	A, B, C or F	2	—	—
10.5	Godowns and Warehouses over 2 storeys in height	A, C or F	2	normal	40
10.6	Basements in non-residential building (except strong rooms, safe deposits of banks) exceeding 5,000 sq. ft.	A	2		
11.	Laboratories	D, F or I	1 and 2	normal	40
12.	Computers and Electronic Equipment Susceptible to Damage by Fire, Heat or Smoke	I	I		—
13.	Air Conditioning Systems (Returns Air Duct, Lift Shafts, Service Shafts, Linen Chutes)			—	—
	For buildings exceeding 60 feet	A	1	—	—

Note 1. The hazardous areas and processes within any building are the following areas:-

(a) Boiler Room and Associated Fuel Storage spaces.

(b) Laundries.

(c) Repair Shops

(d) Room or spaces used for storage in quantities materials deemed hazardous.

(e) Kitchen.

(f) Soiled Linen Room.

(g) Transformers and sub-stations.

(h) Plant Room.

(i) Flammable liquid processing or refining operations.

(j) Indoor Storage of Flammable liquids.

(k) Chemical plants, solvent extraction plants, distillation plants, refineries

(l) Process equipment, pump rooms, open tanks, diptanks, mixing tanks

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NOTE 2. The letters in the second column of this Appendix refer to the types of fixed extinguishing system, as follows:

A—Automatic Sprinklers.

B—Water spray system.

C—High Expansion Foam System.

D—Carbon-dioxide system.

E—Approved Halogenated Extinguishing System.

F—Other Automatic Extinguishing System.

G—Hose Reel.

H—Hydrant System.

NOTE 3. The figures in the third column of this Appendix refer to the types of fire alarm, as follows:

1—Automatic Fire Detectors System.

2—Manual Electrical Fire Alarm System.

3—Signal Indicator Alarm System.

4—Manual Alarm System.

NOTE 4. Types of Emergency Illumination:

(*a*) Signal point units.

(*b*) Central Battery.

(*c*) Generators.

In all cases the duration of emergency illumination in the event of failure of normal supply shall not be less than 1 hour.

FIFTEENTH SCHEDULE

STANDARD SCALE FOR MAINS WATER SUPPLY FOR INSTALLATION OF FIRE HYDRANTS

ALL NEW AND RESITED FIRE HYDRANTS SHALL BE DOUBLE-OUTLET STAND POST TYPE

Risk Category	Average Output per Fire Hydrant	Spacing of Fire Hydrants	Total number of Fire Hydrants in area of risk likely to be employed simultaneously in major fires
Class A	300/400 gpm	300 feet	4—6
Class B	250/300 gpm	400 feet	3—5
Class C	250/300 gpm	450 feet	3—4
Class D	180/220 gpm	450 feet	1—2
Class E	180/220 gpm	600 feet	1
Special High Risk	300/400 gpm	300 feet Max	6