NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF ARCHITECTURE AND QUANTITY SURVEYING

DEPARTMENT OF ARCHITECTURE
BACHELOR OF ARCHITECTURAL STUDIES (HONOURS) DEGREE

PART III END OF SECOND SEMESTER EXAMINATIONS – MAY 2005
AAR 3203 – BUILDING SERVICES

Instructions   *Time: 3 Hours*

Answer Question 1 and any other 2.

 QUESTION 1

(a)   Discuss briefly electric and telephone wiring within a building.   [10]

(b)   A source of light has a mean spherical intensity of 100 candela. ¼ of total flux given off from the source falls at perpendicular to the surface measuring 3m x 0,7m. Calculate

     (i)   The total luminous flux given out by the source.
     (ii)   The illuminance produced on the surface.   [5]

(c)   Calculate the number of luminaires needed to provide an office with an average illuminance of 750 lux on the working place. The dimension of the room are

length   =   12m

width   =   12m

height   =   2,85m

height of working plane = 0,70m

Reflectances of ceiling, walls and working plane are 0,70; 0,50 and 0,10 while type of

luminaire is ½ TLD 58w whose norminal luminous flux per lamp is 5300 lm.

Acceptable spacing to height ratios for 1/2 TLD58W are

Length wise   s/hm   =   1,5 and
Cross wise   s/hm is 1,8.
Use table 1 below for your calculations

Table 1. Working plane utilization factor.   [15]

| Room | Reflectances | | | | | |
Index R	751	731	711	551	531	511
0,60	0,34	0,29	0,26	0,33	0,29	0,26
0,80	0,41	0,36	0,33	0,40	0,36	0,33
1,00	0,47	0,42	0,39	0,46	0,42	0,38
1,25	0,52	0,47	0,44	0,56	0,47	0,44
1,50	0,55	0,51	0,48	0,54	0,51	0,48
2,00	0,60	0,57	0,54	0,59	0,56	0,54
2,50	0,63	0,60	0,58	0,62	0,59	0,57
3,00	0,65	0,63	0,61	0,63	0,61	0,60
4,00	0,67	0,65	0,63	0,66	0,64	0,63
5,00	0,68	0,67	0,65	0,67	0,65	0,64

(d)   The following are used for lighting purposes in a hotel room whose plan is shown on page 3: curtain lamps, bed lamp, mirror lamp, heat lamp and ceiling lamp. Decide how you can arrange these lamps in the room and indicate this on the plan using the symbols given.   [4]

Question 2

(a)   Write brief notes on fire classification.   [12]

(b)   Describe in detail the fire prevention system you would recommend for installation in a warehouse to be used as a storage and distribution depot for points and varnishes.   Sketch a typical floor layout.   [10]

(c)   A 75m tall commercial building is to be provided with fire fighting mechanism. Discuss briefly possible ways in which this can be accomplished.   [11]

Question 3

Suggest how you can protect;

(a)   a large factory in a built up area within Greater Harare. The building is assumed to be 80m by 15m wide and up to 6m high. Use the information attached for this question at the back for your calculations.

(b)   Write brief notes on methods used to provide emergency electricity   [10]

(c)   Discuss various situations that require emergency electricity and suggest ways in which this can be achieved for each case.

(d)   Conditioned air is supplied to rooms through the use of fans and ducts. If a fan absorbs 5,3 kW of power and discharges $3,5m^2/s$ when the impeller angular velocity is 1 500 revolutions per minute, then its angular velocity increased to 1500 revolutions per minute. Calculate the discharge in m^3/s and the power absorbed for this new condition.   [30]

Question 4

(a)   Determine the number of lifts in a rectangular residential building, single occupancy having ground with 10 upper floors height of 3m and main lobby that at ground floor. Cross floor area is $2\,000m^2$ for all floors. Quality of services is poor. Use tables below for your calculations if speed of the lifts is 1,5m/s and lift capacity is 8 people.

Handling Capacity

H = 10% to 15% for diversified tenancy office building

H = 15% to 25% for single occupancy office building.

H = 7,5% for residency buildings.

(b)   Discuss various ways in which acoustics of various types of rooms can be improved.

(c)   A hall has a reverberation time of 1,75 and the following dimensions:
length   80m
width   20m
height   25m

Calculate the amount of extra absorption required to obtain a reverberation time of 1 second.

[20]