



University of Technology
Engineering Department of Building and Construction
Final Exam-First attempt 2013-2014



Subject: Building services

Division: Construction Engineering and Management

Examiner: Assist prof. Haider Alwash

Year: Fourth

Time: 180min.

Date: 31/5/2014

Answer **FIVE** Questions Only

Note: - All tables must be return with exam. papers

Q1): Design the cold water pipes for the public building shown in fig.(1) when the street main head (35)m, head of critical fixture (3)m, the height of critical fixture (1.8)m, , and the minor losses (25%) of the pipes length , system uses (Flash Tank) .

(20Mark)

Q2) :- A) Use the Equivalent pipe method and Design the cold water pipes shown in figure (2).

(10Mark)

B) Design the Sprinkler system for the factory of (24x50) m², ordinary hazard with standard arrangement and center with central feed.

(10Mark)

Q3):- Design the Sanitary drainage and Vent pipes System for the plumbing system shown in figure (3). (20Mark)

Q4):- Calculate the coefficient of transmission (U) of masonry wall and the rate of heat loss and temperature drop through the section of the wall and the position of dew point. The outdoor temperature (2)C, indoor temperature (22)C, the construction of the wall are tabulated below:-

Construction	Resistance(R)	Conductivity(K)
R _{so}	0.053	
Face brick (105mm)		1.2
Wood sheathing (25mm)		0.09
R _{si}	0.123	

(20Mark)

Q5) :- A) 1- Design the cable required to feed (2Kw load, 3Kw load (Pf=0.7 lead), 50Kw load (Pf=0.8 lag), 2hp load (Pf=0.7 lead)), if the nominal voltage (220V, single phase) and the distance between circuit breaker and main board is (30m) and diversity factor (0.529),the cable is clipped direct to surface.

2- Show by sketch the connection of the cable to the main board and circuit breaker .

3- Calculate the overall power factor.

(10Mark)

B) Use zonal cavity calculation and design the ceiling lightings for large office (100x60x8) ft, use luminaries type (7),(125 foot candles),reflectance of ceiling 80%,floor 30%,wall 30%,working plane (36)in., Maintenance factor (0.705),Correction factor (1.08).

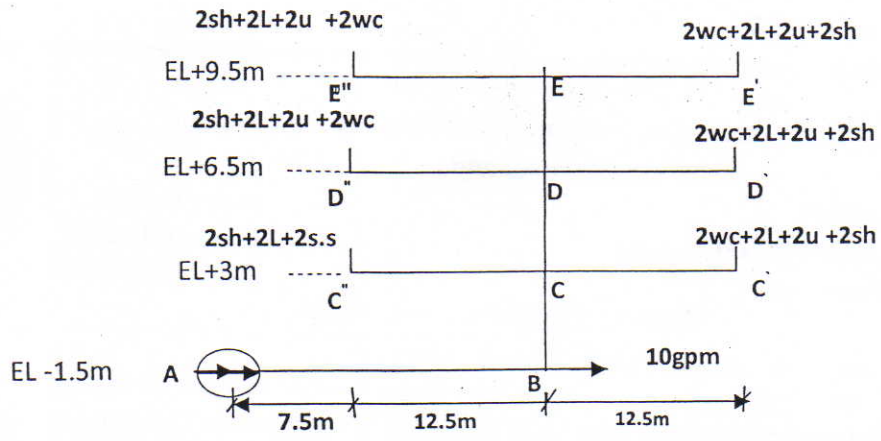
(10Mark)

Q6):- According to the data shown in fig. (4). Design the capacity of air condition knowing that:-

- 1) Windows type (regular single glass in side shading) (130 sft-W-direction)(145sft-N direction) (200 sft-E-direction).
- 2) Wood doors (88s.ft).
- 3) Walls type masonry, brick, plastered (190 sft).
- 4) Ceiling 4in Conc.Insulation,light (2848 sft).
- 5) Metal doors (44 sft)(U-value=0.42).
- 6) Temperature swing factor (0.75).

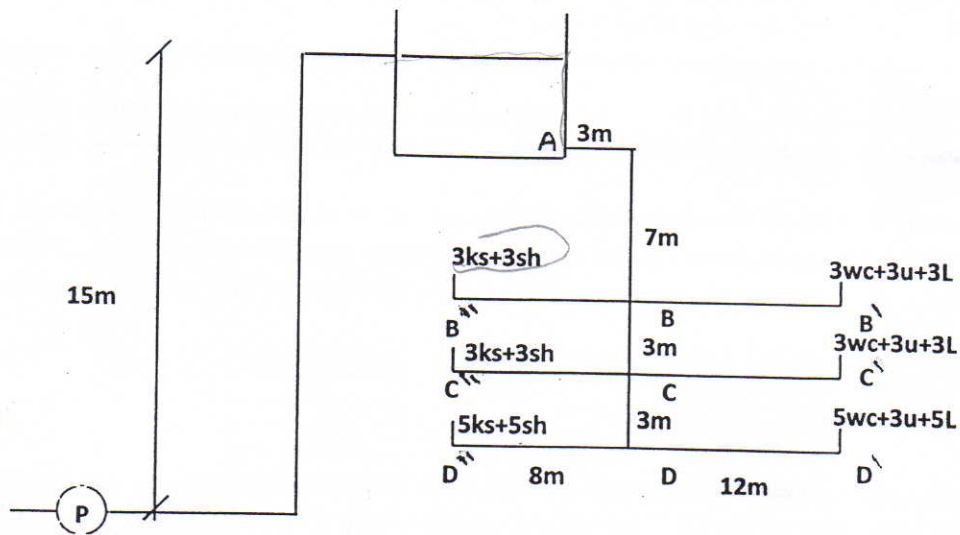
Good Luck

(20Mark)

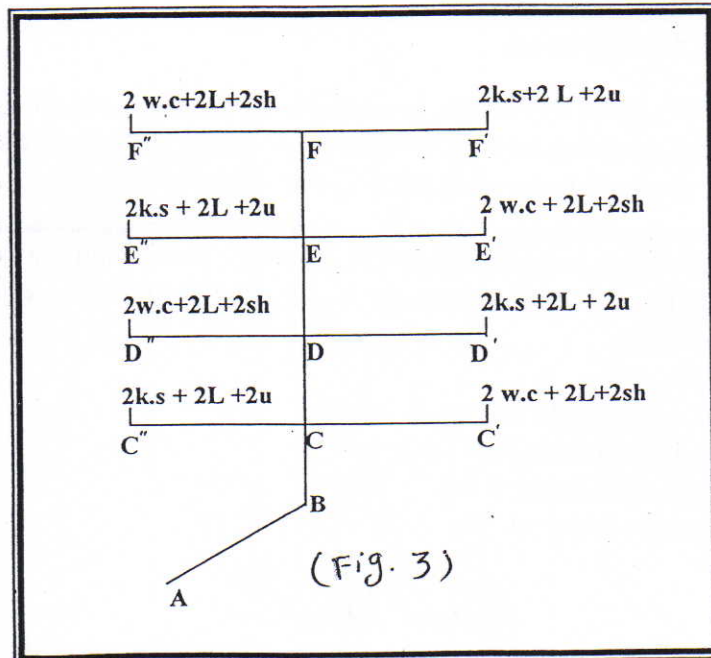


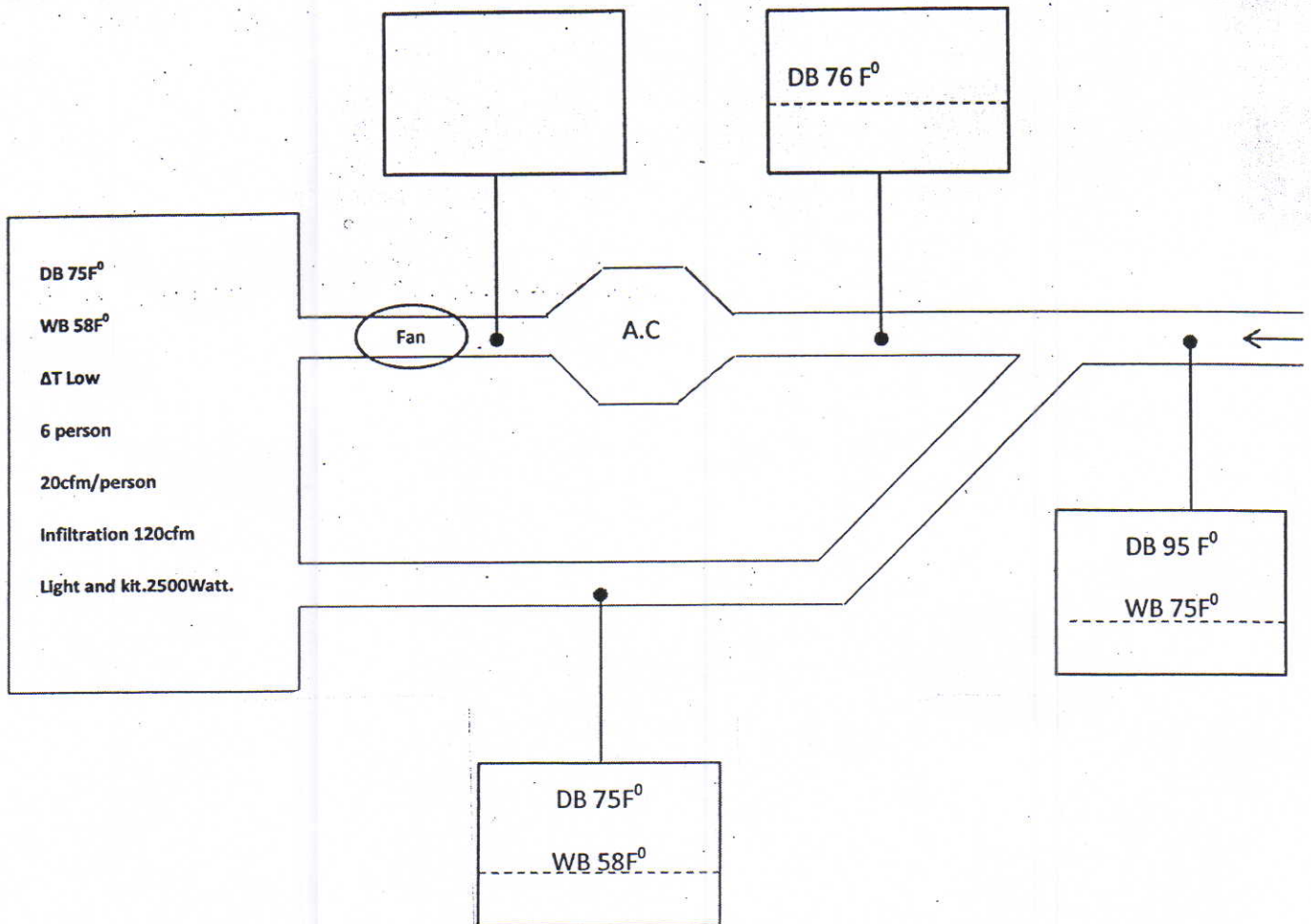
s.s= Service sink

Fig. 1



(Fig. 2)

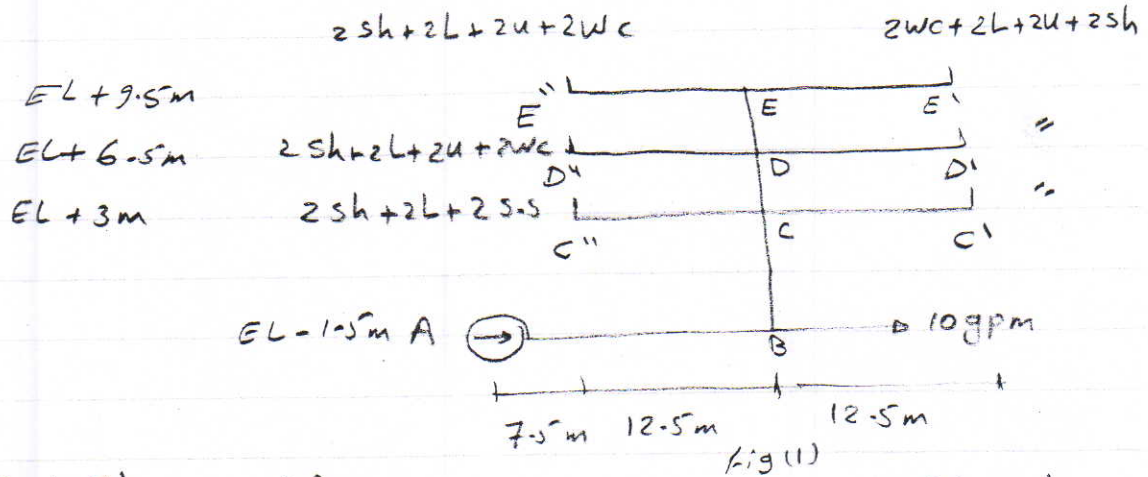




(Fig. 4)

موضوع (1)
2014 - 2013

Q1



$$F = \frac{35 - ((9.5 + 1.5) + 3 + 1.8)}{(7.5 + 12.5 + 11 + 12.5 + 1.8) \cdot 1.25} * 0.434 * 100 = 14.7 \text{ Psi/100'}$$

Use table (2-6)

Fixture	F _u	Σ F _u
W.c	5	2 × 5 = 10
L	2	2 × 2 × 0.75 = 3
U	3	2 × 3 = 6
Sh	4	2 × 4 × 0.75 = 6
S.S	3	2 × 3 × 0.75 = 4.5

$$\Sigma F_u = EE' = 6 + 3 + 6 + 10 = 25$$

$$\Sigma F_u CC'' = 6 + 3 + 4.5 = 13.5$$

Use Fig 2-23 and Fig 2-22

line	Σ F _u	Q gpm	F Psi/100'	Dia. "	line	Σ F _u	Q gpm	F	Dia. "
AB	138.5	55 + 10 = 65	14.7	2"	EE'	25	17.5	14.7	1"
BC	138.5	55	=	2"	EE''	25	17.5	14.7	1"
CD	100	45	=	1 1/2"					
DE	50	30	=	1 1/4"					
CC'	25	17.5	=	1 1/4"					
CC''	13.5	10	=	1"					
DD'	25	17.5	=	1"					
DD''	25	17.5	=	1"					