MCE

University of Asia pacific
Department of Civil Engineering
Midterm Examination
Spring 2019
Program: M.Sc Engineering (Civil)

Course Title: Transportation Planning **Course Code: CE 6510**
Full Marks: 20 **Time: 1hour**

There are **Two** questions. Answer all of them

1. a) What are the advantages and disadvantages of saturation system? 2
   b) There are four alternative plan proposals for four regions: Plan P, Plan Q, Plan R, and Plan S with different road length, populations and productivity. The details are given in the following table: 8

Proposal	Road length (Km)	No of towns and villages served with population range				Productivity (1000 tones)
		1001-4500	4501-8000	8001-13500	>13500	
P	510	260	85	30	5	290
Q	470	340	78	52	7	310
R	830	460	110	58	11	425
S	750	320	130	75	13	378

Work out the utility per unit length for each of the road systems and indicate which of the plans yield the maximum utility based on saturation system.

Assume utility units as given below:

Population: 1001-4500 Utility unit = 0.25
4501-8000 Utility unit = 0.50
8001-12500 Utility unit = 1.00
> 13500 Utility unit = 2.50

Productivity unit 1.00 for each 1000 tons product.

2. a) Enumerate the basic attributes of Transportation systems evaluation. 2
   b) A city planner investigated that in 6 zones of a town the number of elementary schools in relation to the population. In 1000s was as follows: 8

Y	**3**	**8**	**6**	**5**	**7**	**9**
X	4	2	5	3	4	6

Set up a linear equation connecting Y in terms of X, and
Determine R^2.

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Mid Semester Examination Spring 2019
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Course Title: Hydrologic Statistics — Course Code: CE 6605
Time- 1 hour — Full marks: 60 (3*20=60)

Answer any 3 (three) among the 4 (four) questions.
Assume reasonable number for the missing values

1. (a) How do you explain stochastic nature of population and sample ? Write down an example of stochastic hydrologic process. [2+1]
   (b) The operator of a boat dock has decided to put in a new facility along a certain river. In an economic analysis of the situation he decided to have the facility designed to withstand floods up to 45,000 cfs. Furthermore, he has determined that if one flood greater than this occurs in a 5-year period, he can repair his facility and break even on its operation during the 5- year period. If more than one flow in excess of 45000 cfs is 0.25 what is the probability the operator will make money ? [9]
   (c) What is the probability that the second occurrence of a 5 year cyclone will be on the 20th year ? [8]
2. (a) How will you explain random variable? Illustrate with example ? [2+1]
   (b) For a particular set of data, the co-efficient of variation is 0.4. If the data are normally distributed, what percent of the data will be less than 0.0 ? [7]
   (c) What is the probability of selecting an observation at a random from a N (100,2500) that is (a) less than 75? (b) at least 75? [5+5]

3. (a) In a certain region there are 30 possible small watersheds suitable for a research project. Unknown to the project manager, 12 of these basins have subsurface geological features that permit large quantities of surface water to enter underground formations and leave the basin via sub-surface flow. The project manager wants to select 12 water-sheds from the 30 for study. (i) What is the probability that 1 of the basins having the above described geologic features will be selected? (ii) What is the probability that 3 of these basins will be selected ? [6+6]
   (b) What are the different types of sampling techniques ? [3]
   (c) What are the properties of normal distribution? Define normal distribution with net sketch. [5]

4. (a) What is the probability of fewer than 4 occurrences of a 12- year storm in a 100-year period? [5]
   (b) Evaluate the mean, variance, standard deviation, coefficient of variation, skewness, coefficient of skewness, kurtosis, and coefficient of kurtosis of U.1e following grouped data. [15]

Rainfall	(mm)	21	22	25	24	23
Number of days		5	4	8	5	3

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Course Title: Fecal Sludge Management (FSM) | Course Code: CE 6315
Time: 1 hour | Full Marks: 40

Answer the following questions:

1. State and explain the target 6.2 of SDG 6? What do you mean by the term 'Safely Managed Sanitation Services'? What is the status of safely managed sanitation services in Bangladesh? How would you explain this status? **[15]**

OR

2. What is 'Fecal Sludge'? What are the adverse impacts of poor management of fecal sludge? What is 'Fecal Sludge Management (FSM)'? What is the status of FSM in Bangladesh? What are the immediate challenges/constraints in implementing FSM in Bangladesh? **[15]**

3. Ensuring safe containment of fecal sludge at onsite sanitation facilities such as septic tanks is a critical challenge for implementing FSM in Bangladesh. How would you explain this challenge? How this challenge could be addressed? **[10]**

4. Design a septic tank to serve a multistoried building having 5 apartments, and on an average 5 people living in each apartment. The wastewater flow rate into the septic tank is 100 lpcd. The tank is to be desludged every year. Assume average temperature within the septic tank to be 25°C. **[15]**

Use the following equations:
Volume required for Sedimentation, $V_h = 10^{-3}\ P.q.t_h$
where, $t_h = 1.5 - 0.3 \log (P.q)$
Volume required for Sludge Digestion, $V_d = 0.5 \times 10^{-3} \times P \times t_d$
where, $t_d = 30\ (1.035)^{35-T}$
Volume required for Sludge Storage, $V_{sl} = C.P.N$
Volume required for Scum Storage, $V_{sc} = 0.4 \times V_{sl}$

Show with neat sketches the positions of inlet and outlet devices in a septic tank?

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Mid-Term Examination Spring 2019
MCE/M.Eng Program

Course Code: CE 6111 Time: 1 (one) Hour
Course Title: Analysis and Design of Tall Buildings Full Marks:(6+8+6)=20

$[Use\ f_c'\ is\ 24\ MPa, f_y\ is\ 420\ MPa\ for\ all\ design]$

QUESTION 1 [6 MARKS]

State the design considerations and structural systems of tall building. The structural models of SEARS (Willis) and Kingdom towers are shown in **Figure 1** and **2** respectively. Review conceptual structural models of those towers and justify the structural systems through analysis based on design criteria / considerations of tall building. [6 Marks]

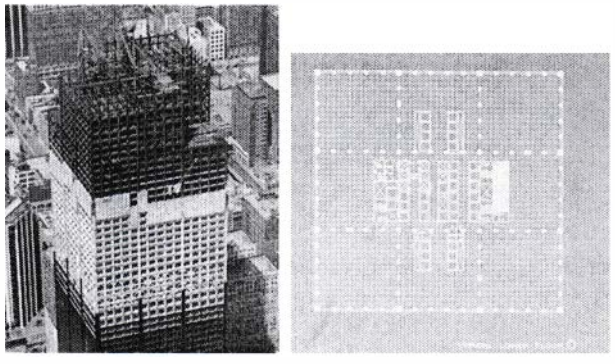

Figure 1. Sears Tower

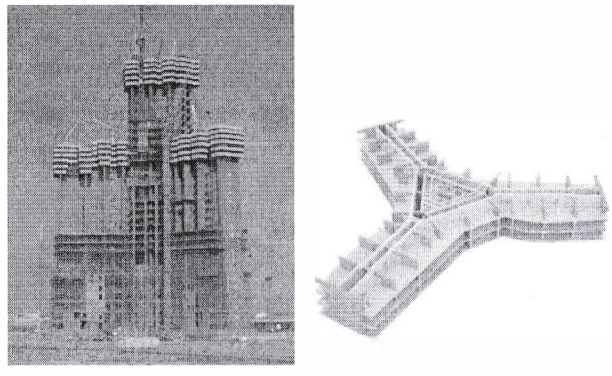

Figure 2. Kingdom Tower

QUESTION 2 [8 MARKS]

The floor system of a tall office building (live load 2.4 kN/m^2) is constructed with flat slab as shown in **Figure 3**. The panels are supported with columns (700 mm x 700 mm) and walls. The floor carries 5 kN/m^2 dead load due to partition walls and finishes (excluding self-weight of slab). Design the panel "A" for **long span of column strip** with the optimal thickness of the floor. Justify your design to obtain the optimal thickness of the slab considering all the critical design parameters. As per ACI 318, the minimum thicknesses of exterior and interior panels of flat slab are $l_n/30$ and $l_n/33$ respectively to control deflection Assume required data to design the slab. [8 Marks]

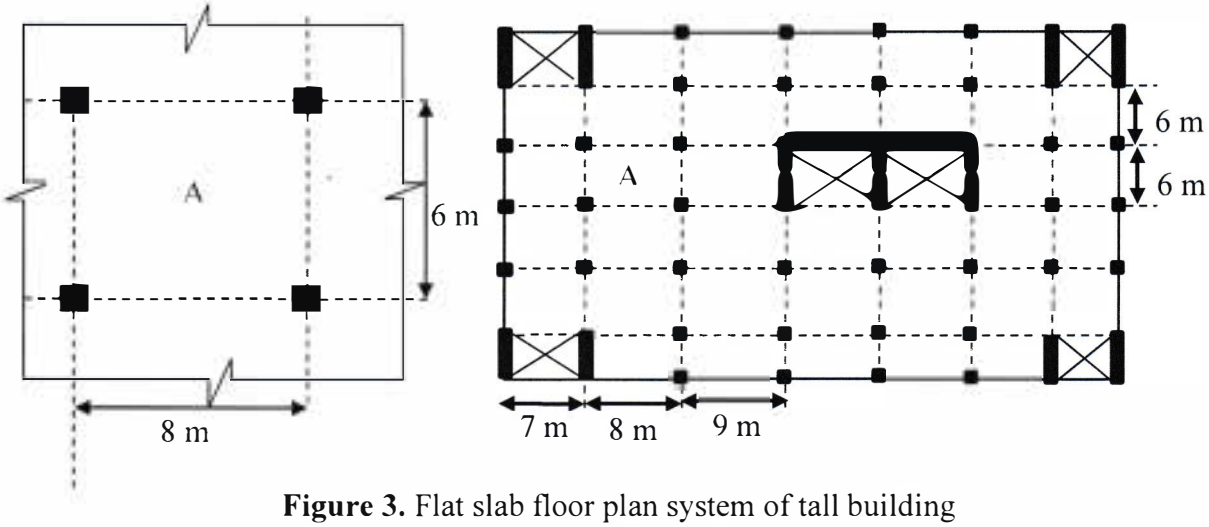

Figure 3. Flat slab floor plan system of tall building

QUESTION 3 [6 MARKS]

The floor layout plan of Burj Khalifa is shown in **Figure 4**. The spacing of the wing walls is about 9 m. The slabs supported by wing walls could be designed as one way joist slab, design the interior **joist (slab only)** of panel "A" (Figure 4) for bending moment. Assume required data to design the slab, the weight of random wall could be considered as 4 kN/m^2 and live load is 2.4 kN/m^2. As per ACI 318, the minimum thicknesses of end span and interior span of one way slabs are $l_n/24$ and $l_n/28$ respectively to control deflection. [6 Marks]

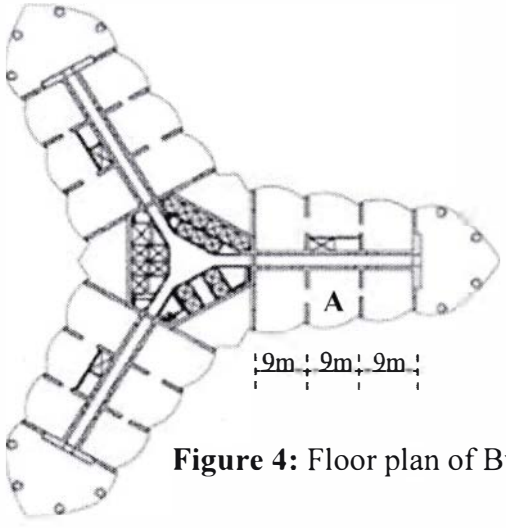

Figure 4: Floor plan of Burj Khalifa

Moments of interior panel for one way slab and beam:

$$Positive\ moment: \frac{wl^2}{16}$$

$$Negative\ moment: \frac{wl^2}{11}$$