

L-3/T-2/ARCH

Date : 18/10/2023

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-2 B. Arch. Examinations 2021-2022

Sub : **ARCH 335** (Architecture of Bengal)

Full Marks : 140

Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

**SECTION – A**

There are **FOUR** questions in this section. Answer **Q. No. 1** and any **TWO** from the rest.

1. Briefly describe the architectural features of the following: (15×2=30)
  - (a) Lakshindarer Medh, Gokul
  - (b) Jagdda la vihara
  
2. Trace the possible environmental factors for the development of habitation and, later on, urbanization in Wari – Bateshwar. (20)
  
3. Explain the role of Indo – Aryan villages as modules for developing a township in terms of their characteristics and types. (20)
  
4. Analyze the evolution of Buddhist Viharas in Bengal in terms of the composition of the corridors and arrangement of the Shrines within the residential chambers. (20)

**SECTION – B**

There are **FOUR** questions in this section. Answer **Q. No. 5** and any **TWO (2)** from the rest.

5. Briefly describe the architectural features of the following (15×2=30)
    - (a) Bengali dome with squinches
    - (b) Khan Mohammad Mridha Mosques
  
  6. Explain the local and non-local influences on the Adina mosque's architectural design and elaborate on the discontinuation of its design scheme in Bengal in light of socio political and geo-climatic aspects. (20)
  
  7. Recognize the role of Khan Jahan Ali as a patron for developing a distinguished architectural style in the remote coastal context of Bagerhat and interpret the appropriateness of the construction technique for that region. (20)
  
  8. Categorize the various types of Hindu temples in Bengal from the Hindu revival period by analyzing their architectural attributes with necessary examples and illustrations. (20)
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**SECTION – A**

There are **FOUR** questions in this section. Answer Q. No. **One (01)** and any **TWO (02)** from the rest.

1. Write short Notes with sketches on any FOUR (04) of the followings: **(4×5=20)**
  - (a) Order in Urban Design
  - (b) Volumetric Space in Urban Design
  - (c) Greek Colonial Towns
  - (d) Define Urban Design and discuss its Objectives
  - (e) Explain why Urban Design is considered as a multidimensional interdisciplinary interface.
  
2. (a) Discuss the scope and limitations of Urban Design. **(10+15=25)**  
(b) Distinguish the role of Urban Designer from that of an Urban Planner.
  
3. Explain with sketches the spatial characteristics of ‘Republican and Imperial’ Forums of Rome from Urban Design perspectives. **(25)**
  
4. Discuss the nature-biased ideas in designing cities which were resulted from Garden City Movement. **(25)**

**SECTION – B**

There are **FOUR** questions in this section. Answer Q. No. 5 and any **TWO** from the rest.

5. Write short notes on any **TWO** of the following: **(10×2=20)**
  - (a) Unity in Urban Design
  - (b) Types of Urban space
  - (c) The image of the city
  
6. (a) Define “Scale” in Urban Design. **(5+15+5=25)**  
(b) Discuss scale in terms of human vision and interactive space. Explain with sketches.  
(c) How circulation is considered in determining “Scale” in Urban Design?

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7. (a) Describe the design factors of Urban square. **(10+15=25)**  
(b) Discuss the principles of Height-Distance Relationship between Urban space and Urban Mass with necessary sketches.
8. (a) Define the “principles of Urban Design” briefly. **(5+20=25)**  
(b) Discuss the impact of -“Extracted form, Deference, Entrance, Color and Urbanity” on establishing harmonious relationship between the city and natural environment with necessary sketches.
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**SECTION – A**

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Write short notes on- (9)
- (i) Full Facility
- (ii) Back Siphonage
- (iii) Water Main
- (b) Describe the components of house water connection with diagram. (6)
- (c) A proposed seven-storied residential hall is to be constructed in BUET. The design for the load bearing structure has been approved and incorporates the use of shear walls. The fresh water for the building will be obtained from BUET's central reservoir, which supplies water at 30 psi pressure. A up-feed system will supply the water into the fixtures from the water main. Both the water supply risers and drainage stacks will be embedded into the walls as per the established layout. A single stack installed with S-traps will convey both black and grey water to an attached septic tank. Identify the inconsistencies in the proposed plumbing design and discuss the potential consequences of implementing such designs. (8<sup>1/3</sup>)
2. (a) A new residential colony of Dasherbandi Sewerage Treatment Plant is under construction. The colony includes 4 moderate apartment buildings of 1800 sft accommodating 500 people and 15 small apartment buildings of 1450 sft accommodating 1500 people. Annual growth rate of the colony population is 0.8%. Determine the total future water demand (in L/day) of the colony after 10 years and 20 years for restricted facility. Also determine the type of the buildings in terms of fire hazard. (Use the tables attached) (8<sup>1/3</sup>)
- (b) Determine the size and volume of an overhead water reservoir for an 8 storied apartment building (floor area > 2500 sft). The building has 2 residential units in each floor and each unit can accommodate a family of 8. Water will be pumped to the tank twice a day (consider daily consumption only). The dimension of the staircase is 16ft × 8ft. Assume 8" bottom slab, 6" top slab, 6" side wall, and restricted facility. Draw a cross sectional view of the tank. (Use the tables attached). (15)

**CE 271(ARCH)**

3. (a) Write short notes on: (9)
- (i) Direct Pumping
  - (ii) Pressure Relief valve
  - (iii) Check Valve
- (b) Discuss the advantages of flush valve system over flush tank system. (6)
- (c) An 11 storied building has 4 flush valve water closets on each floor. The minimum fixture pressure for flush valve closet and flush tank closet are 25 psi and 8 psi respectively. Water is supplied from an overhead tank elevated at 7 ft above the roof level. If the building uses downfeed system, determine the highest floor where flush valve closet can be practically used. (8<sup>1/3</sup>)
4. (a) Briefly explain the mechanism of Hydro-pneumatic supply system. (5<sup>1/3</sup>)
- (b) A plumbing design of a 12 storied commercial building includes an upfeed system up to 8 floors and a downfeed system for the top 4 floors. In the upfeed system, water will be supplied by riser pipes with 4 inch diameter. Pressure losses at pipe joints and water meter are measured to be 7 psi and 4 psi respectively. The building is installed with 4 water closets, 3 pedestal urinals, and 2 Lavatories on each floor. Minimum fixture pressures for water closet, urinal, and lavatory are 25 psi, 15 psi, and 8 psi respectively. The probable maximum water demand is estimated to be 200 gpm (predominantly flush valve system) and the pressure at the public main is 65 psi. Check if the design of the upfeed system is adequate. (Use the chart attached) (18)

**SECTION – B**

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) Classify 'Traps' according to their shapes with neat sketch. Mention qualities of a good trap. (8)
- (b) Define Sewage, Sullage and Sludge. Compare One pipe system with Single Stack System based on their advantages and disadvantages. What are the functions of manholes? (10)
- (c) Determine the number of rainwater pipes (4 in Diameter) for a roof area of 3000 sft. The average intensity of rainfall is 3 inch/hr. Assume 100% runoff of the precipitation. (5<sup>1/3</sup>)

**CE 271(ARCH)**

6. (a) What are the purpose of a Septic Tank? Discuss the processes involved in a Septic Tank. What is the function of a soak pit? **(8)**
- (b) Design a septic tank to serve a household of 10 people, who produce 70 lpcd of wastewater. The tank is needed to be desludged every 4 years. Assume an average temperature of 25°C. Draw a cross sectional view of the tank. **(15<sup>1/3</sup>)**
7. (a) What is the objective of installing sanitary drainage system in a building? Mention the principles governing design of building drainage system. **(8)**
- (b) What is a Sunken Slab? Why traps shouldn't be buried in sunken slab? Discuss your considerations during planning of a toilet system along with pipes and fittings. **(10)**
- (c) What is the function of an anti-siphonage pipe? Draw a neat sketch of it. **(5<sup>1/3</sup>)**
8. (a) What are the objectives of WASH? Illustrate the correlation between sanitation and diseases. **(8)**
- (b) What are the general design considerations for a Pit Latrine? Design a single pit pour flush latrine (with pre-cast concrete rings of 1.0 m diameter and 0.3 m depth) for a family of 7 with maximum desludging period. The family generates 90 lpcd wastewater. The groundwater table is 5.0 m below ground surface, soil infiltration rate is 0.3 m/day. **(15<sup>1/3</sup>)**
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## Appendix

Q (2):

Table 8.5.1(a): Water Consumption for Domestic Purposes in Residential Buildings (Cities/Big District Towns)

Category	Socio-economic group, Type of Building, Source and Other Facilities	Water Consumption	
		Full Facility (lpcd)	Restricted Facility (lpcd)
<b>A</b>	<b>Metropolitan Cities/City Corporation Area/District Towns</b>		
x	High income group:		
A1	Single family dwelling (with garden and car washing)	260	200
A3	Big multi-family apartment/flat (> 2500 sft)	200	150
y	Middle income group:		
y <sub>1</sub>	Officer's qtr./Colony and moderate apartment (< 2000 sft)	180	135
y <sub>2</sub>	Small building/staff qtr. and small apartment (< 1500 sft)	---	120
z	Low income group:		
z <sub>1</sub>	Junior staff qtr./flat (< 1000 sft) and temporary shade	---	80
z <sub>2</sub>	Stand post connection in the fringe area	---	65
z <sub>3</sub>	Common yard (stand post) connection in the fringe area	---	50
z <sub>4</sub>	Slum dwellers collection from road side public stand post	---	40

Q (3):

Table 8.5.1(b): Water Requirement for Domestic Purposes in Residential Buildings (Pourashavas/Upazilas/Urban growth Centers)

Category	Socio-economic group, Type of Building, Source and Other Facilities	Water Consumption	
		Full Facility (lpcd)	Restricted Facility (lpcd)
<b>A</b>	<b>Pourashavas/Upazilas and Urban Growth Centre</b>		
y	Middle income group:		
A1	Single family dwelling (with garden)	---	150
A3	Officer's qtr./colony and moderate apartment (< 2000 sft)	---	135
A3	Small building/staff qtr. and small apartment (< 1500 sft)	---	120
z	Low income group:		
z <sub>1</sub>	Junior staff qtr. /flat (< 1000 sft) and temporary shade	---	80
z <sub>2</sub>	Private stand post connection in the fringe area	---	65
z <sub>3</sub>	Common yard (stand post) connection in the fringe area	---	50
z <sub>4</sub>	Slum dwellers collection from road side public stand post	---	40

**Table 4-1 Q(2):  
Fire Protection Flow Requirements**

Building Type	Sprinkler System (l/min.)*	Standpipe and hose System (l/min.)*	Duration** (minute, min.)
Light hazard- I	1000	1000	30
Light hazard- II	1900	1900	50
Ordinary hazard- I	2650	1900	75
Ordinary hazard- II	3200	1900	75
Ordinary hazard- III	4800	1900	75

**Notes:**

- \* Values will be for one riser serving floor area of 1000 m<sup>2</sup>.
- \*\* These durations shall be for a building up to the height of 51 m. For greater height of 51-102 m and above 102 m, the duration will be 1.25 times and 1.5 times of the specified values respectively.

Light hazard - I : Occupancy groups, A1, A2, A3, E1

Light hazard - II : Occupancy groups, A4, A5, B, C, D, E2, E3, I2, I4,

Ordinary hazard - I : Occupancy groups, I1, I3, I5, F2, F3, G1

Ordinary hazard - II : Occupancy groups, G2, H1

Ordinary hazard - III : Occupancy groups, H2

Extra hazard : Occupancy group J - pressure and flow requirement for this group shall be determined by Fire Department but shall not be less than required value for Ordinary hazard-III

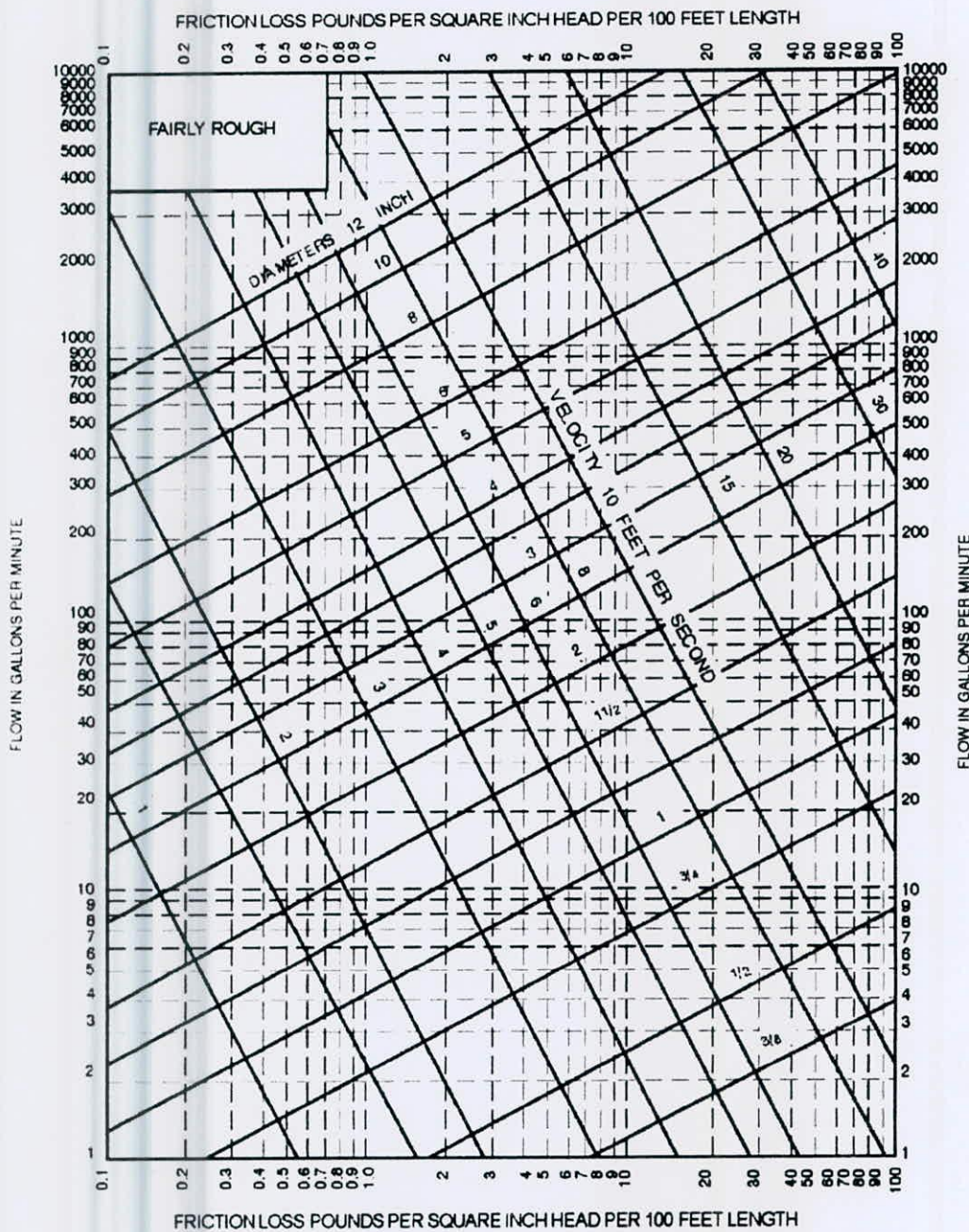


Chart for Q(4)