L-3/T-1/URP **Date : 19/10/2019**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-1 BURP Examinations 2018-2019

Sub : **PLAN 321** (Housing and Real Estate Development)

Full Marks : 210 Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

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

1. (a) Suppose, you have been appointed as a research officer at National Housing Authority (NHA). You need to submit an evaluation report on "Low Income Community Housing Support Project (LICHSP) in Kobdaspara Settlement, Sirajganj". Briefly explain the stages you would follow for the projects efficiency evaluation. **(10)**

   (b) What do you understand by implicit price of housing attributes? How can you determine the implicit price of a particular housing attribute by Hedonic approach? Briefly discus with examples. **(3+12=15)**

   (c) What are the impacts of subsidized housing on housing market? Explain with graphical representation. **(10)**

2. (a) Compare between "Alonso-Muth Theory of Income Segregation" and "Wharton's Theory of Income Segregation". **(15)**

   (b) "A city's housing market is composed of a number of submarkets, yet they are related" – Do you agree with the statement? Justify your answer in the context of Dhaka city. **(15)**

   (c) Briefly describe "Pipeline effect in real estate market" in the context of Bangladesh. **(5)**

3. (a) Discuss the factors affecting the structural vacancy of housing both from home-owner's perspective and tenant's perspective. **(10)**

   (b) Briefly explain the phases of real estate trade cycle with diagram. **(15)**

   (c) Explain the sources of market inefficiencies in real estate market in the context of Bangladesh. Name the approaches for assessing market disequilibrium. **(10)**

4. (a) In the light of filtering theory of housing, explain how a dwelling moves down the quality ladder to households with progressively lower income in the context of Dhaka. **(12)**

   (b) What do you understand by "Assurance of title? Discuss the method of title assurance. **(2+6=8)**

   (c) Name the laws and regulations concerned with real estate sector of Bangladesh. **(15)**

Contd P/2

PLAN 321

SECTION – B

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

5. (a) "Housing can be understood both as a product and/or as a process". What are the implications of such different understanding in housing delivery? **(12)**

   (b) List out the actors involved in housing supply and demand sides in Bangladesh. Describe their roles. Also put light and the scale(s) at which they work. **(7+11+5=23)**

6. (a) If you are employed as a having expert in any urban development plan making project, how will you estimate the future housing need and demand in the planning area? Describe. **(12)**

   (b) What is 'Enabling approach' of housing delivery mechanism? **(5)**

   (c) Describe three innovative interventions made outside Bangladesh to address the problems of low income housing in cities. **(18)**

7. (a) Differentiate between (i) Housing stress and Housing deficit, (ii) Slum and Squatter, (iii) Government housing (in Bangladesh) and Social housing . **(18)**

   (b) A housing finance institution in Bangladesh has recently declared to reduce home loan rate to 7% per year in rural areas. Critically analysis the decision in brief. **(10)**

   (c) "Although buildable land for construction of houses is limited in any country, supply of housing units for living and land for construction of housing units can be increased". How? **(7)**

8. (a) What is "life cycle model" of housing? Draw the necessary diagram. **(7+4=11)**

   (b) How responsive is the Housing Policy of Bangladesh to "Life cycle model", low income people and increasing urbanization? Briefly discuss. **(15)**

   (c) How housing can affect both quality of personal life and collective well-being? **(9)**

L-3/T-1/URP Date : 06/11/2019

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA
BURP Examinations 2018-2019

Sub : **PLAN 343** (Traffic and Transportation Study)

Full Marks : 210 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 any **THREE**.

1. (a) 'Integrated land use and transportation planning sounds more convincing approach to address rapid growth and sustainability problems which are fundamental to transportation problem in many cities of the world' - Do you agree? Justify your explanation with reference to accessibility as the key link between transportation and land use. **(15)**

   (b) Under what conditions you would recommend the use of 'stop sign' and 'yield sign' at an urban intersection? **(10)**

   (c) How does blind spots for a left turning traffic affect safety at the intersection? **(10)**

2. (a) 'Design of roadway median could very depending on the hierarchy of the roadway'. Explain with necessary illustration. **(10)**

   (b) Suppose, as part of a one-day volume study plan for an urban area, five coverage count locations, starting from Loc1 through Loc2, have been identified to cover a control count location. Volume count data collected at all the coverage count locations and the control count locations are summarized in table 1 and table 2 respectively. At coverage count locations Loc1, Loc3 and Loc5, actual volume count was done for 12 minutes for every 15 minutes interval. However, at Loc2 and Loc4, actual volume count was done for nine minutes for every 15 minutes interval due to survey fatigue. Estimate 8 hour volume counts and peak hour volume counts across all the coverage count locations. **(10+5+5+5=25)**

Table – 1

Time (pm)	Count at control point
12-01	800
01-02	824
02-03	912
03-04	975
04-05	1,056
05-06	1,153
06-07	938
07-08	397

Table – 2

Time (pm)	Loc1 count	Time (pm)	Loc2 count	Time (pm)	Loc3 count	Time (pm)	Loc4 count	Time (pm)	Loc5 count
01:00	240	02:00	120	03:00	240	04:00	150	05:00	300
01:15	280	02:15	280	03:15	160	04:15	400	05:15	320
01:30	300	02:30	230	03:30	220	04:30	370	05:30	250
01:45	360	02:45	350	03:45	250	04:45	350	05:45	280

Contd P/2

PLAN 343

3. (a) If the intersection at Polashi is decided to be altered with something else, briefly discuss the factors likely to affect the size of the intersection area. **(10)**

   (b) If you have the authority to redesign the intersection at Polashi with an interchange, which interchange type you would pick, and why wouldn't you prefer the other ones over the chosen one? Limit your comparison to two other types of interchanges. **(15)**

   (c) Given that a major read intersects with a minor road, briefly discuss the pros of having the major roadway over and/or under the crossroad of that interchange. **(10)**

4. Write short notes on the followings (any five). **(7×5=35)**

   (a) Running speed vs. journey speed.

   (b) Diamond interchange

   (c) Floating car method

   (d) Indicators to measure parking efficiency

   (e) Directional interchange

   (f) Color and patterns used for traffic markings

SECTION – B

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

5. (a) Explain how transportation can affect urban form. **(15)**

   (b) Illustrate the fundamental relations of traffic flow with the help of diagrams. **(20)**

6. (a) State the characteristics of different categories of urban roads. **(15)**

   (b) Compare Dhanmoindi and Uttara from the perspective of roadway hierarchy. **(20)**

7. (a) Define Design Hourly Volume (DHV), Peak Hour Factor (PHF), design speed, and spacing. **(10)**

   (b) On a motorway with a speed limit of 100 km/hr. the spot speeds of the vehicles passing through were recorded as per the table below. Determine the time mean speed and speed mean speed. Use at least 4 digits after decimal point in calculations. Prove the relationship between the time mean speed and space mean speed from the results. If these vehicles occupy a 20-km section of a one-lane road at a given instant, calculate the traffic flow. **(25)**

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Contd….. Q. No. 7(b)

Spot speed (km/hr) (v_i)	frequency (f_i)
72	1
83	2
87	5
88	3
90	6
92	12
95	31
97	24
99	27
100	46
101	21
103	15
105	11
107	3
115	2
117	1
120	1

8. Write notes on any two of the following three topics. **($17\frac{1}{2} \times 2 = 35$)**

   (a) Short-term employment in the transportation sector

   (b) MSD (Minimum Stopping Distance)

   (c) Intersection improvement measures

L-3/T-1/URP **Date : 02/11/2019**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA
BURP Examinations 2018-2019

Sub : **HUM 225** (Accounting)

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 any **THREE**.

1. (a) What is degree of operating leverage? The degree of operating leverage for 'X' company is 5 times where as it is 7 times for 'Z' company, what does it imply? **($3\frac{1}{3}$)**

(b) Samsung company manufactures and sales a specialised cordless telephone for the most electromagnetic radiation environments. The company's contribution margin format income statement for recent year is given below: **(20)**

	Total (Tk.)	Per Unit (Tk).
Sales	10,00,000	50
Less: Variable cost of sales	800,000	40
Contribution margin	200,000	10
Less: Fixed cost for the period	150,000	
Net Profit	50,000	

Management is anxious to increase company's profit and has asked for an analysis of a number of items.

Requirements:

(i) Compute the company's contribution margin ratio.

(ii) Compute the company's break even-point in Units and in amounts.

(iii) Assume that in next year company wants to sell 70000 Units; if selling price increased by Tk. 2 per Unit and fixed costs increased by Tk 20,000 then calculate the profit or loss.

(iv) Refer to the original data. Assume that next year management wants to earn a profit of at least Tk. 100,000. How many Units will have to be sold to meet this target profit?

(v) If selling price decreased by Tk.2 per Unit and variable cost increased by Tk 1. per Unit what will be the new break-even point in Units? (Other information remaining same as original data).

(vi) Calculate margin of safety and margin of safety ratio based on original data.

(vii) Compute the degree of operating leverage and use it to forcast the changes in net profit of next year if sales increase by 15%. Verify your answer by preparing income statement.

2. (a) What do you understand by mixed cost and cost formula. **($3\frac{1}{3}$)**

(b) The following costs and inventory data are taken from the accounting records of Bluebird Company: **(10)**

Contd P/2

HUM 225

Contd..... Q. No. 2(b)

Depreciation, factory equipment	Tk.	28,000
Depreciation, office equipment		3000
Administrative cost		120,000
Utilities, factory		8,000
Power and electricity		40,000
Supplies (30% for factory, 70% for office)		12,000
Insurance factory		4000
Purchase of raw materials		12500
Direct Labour		15,000
Sales		650,000
Rent (60% for factory, 40% for office)		45,000
Selling cost		50,000
Sales Salaries		25,000
Property taxes, factory		15,000

Inventories	January 1	December 31
Raw Materials	Tk. 8000	Tk 7,000
Work-in-process	17,000	30,000
Finished goods	19,000	39,000

Requirements

Prepare a cost of goods sold statement and an income statement for the year.

(c) The data below have been taken from the cost records of Atlanta Processing Company. The data relate to the cost of operating one of the company's processing facilities at various levels of activity: **(10)**

Month	Unit Processed	Total cost (Tk.)
January	8000	14,000
February	4500	10,000
March	7000	12,500
April	9000	15,500
May	3750	10,000
June	6000	12,500

Requirements:

(i) Using the high-low point method, determine the variable cost per unit and total fixed cost for the period.

(ii) Express the variable cost & fixed cost in a cost formula (Y = mx +c).

(iii) What will be the total processing cost, if the company processed 3000 Units during the month of July.

Contd P/3

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3. (a) Distinguish between production department and service department. $(3\frac{1}{3})$

(b) Lenovo computer has two production departments and two service departments. Following information are given below to allocate service departments cost to the production department by using **(20)**

(i) Direct method and

(ii) Reciprocal service method.

	Production Departments		Service Department	
	Laptop division	Work station division	Legal deptt.	Personnel deptt.
Overhead cost before allocation (Tk)	300,000	200,000	500,000	100,000
Cost allocated by: By legal department Budgeted labour hours in%	40%	50%	-	10%
By Personnel departments Budgeted personnel hours in %	50%	30%	20%	-

4. (a) Chuck Wagon grills manufacturing company makes special barbecue grill that it sells for Tk. 210.Data for Last year's operations are as follows: **(20)**

Units produced		20,000
Units sold		19,000
Variable cost per Unit		
Direct materials	Tk.	50
Direct Labour		80
Variable manufacturing overhead		20
Variable selling & administrative overhead		10

Fixed cost for the Period

Fixed manufacturing overhead	Tk. 700,000
Fixed selling and administrative Overhead	285,000

Requirement.

(i) Compute Unit product cost under absorption costing and variable costing method.

(ii) Prepare income statements under both of the methods.

(b) What is the basic difference between absorption costing and variable costing methods? $(3\frac{1}{3})$

Contd P/4

HUM 225

SECTION – B

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

5. Mr. Abdur Rahman is a licensed Chartered Accountant. During the first month of operations of his business name A.R. Limited, the following events and transactions occurred. **($23\frac{1}{3}$)**

May 1 Mr. Abdur Rahman invested Tk. 60,000 cash in his business.
2 Hired a secretary-receptionist at a salary of Tk. 2,000 per month.
3 Purchased Tk. 2,500 of supplies on account from Read Supply Company.
7 Paid office rent of Tk. 900 cash for the month.
8 Provided order for office supplies Tk. 1000.
10. Completed an audit work for a client and immediately collected the Tk. 32,000 cash
11 Completed a tax assignment and billed client Tk. 3,200 for services provided.
12 Received Tk. 3500 advance on a management consulting engagement.
16 Owner withdrew Tk. 500 cash for personal use.
17 Received cash of Tk. 1,200 for services completed for C. Desmond Co.
31 Paid secretary-receptionist Tk. 2,000 salary for the month.
31 Paid 60% of balance due Read Supply Company.

Mr. Abdur Rahman uses the following accounts: Cash, Accounts Receivable, Supplies, Accounts Payable, Unearned Service Revenue, Owner's Capital, Owner's Drawings,. Service Revenue, Salaries and Wages Expense, and Rent Expense.

Required:

(a) Journalize the transactions.

(b) Post to the ledger accounts (Use T-Accounts)

(c) Prepare a trial balance on May 31, 2019

6. (a) Prove that A=L+O/E with proper example. **(5)**

(b) Santa started her own consulting firm, Tech Solution Ltd. on June 1 January 2018. The trial balance at 31st December is shown below

Contd P/5

HUM 225

Contd..... Q. No. 6(b)

Tech Solution Ltd.
Trial Balance
December 31, 2018

Accounts	Debit (Tk.)	Credit (Tk.)
Cash	7,150	
Accounts Receivable	6,000	
Supplies	2,000	
Prepaid Insurance	6,000	
Equipment	15,000	
Accounts Payable		4,500
Unearned Service Revenue		4,000
Owner's Capital		24,750
Service Revenue		7,900
Salary Expense	4,000	
Rent Expense	1,000	
Total	41,150	41,150

Other Data:

1. Suppliers on hand at December 31 are Tk. 500.
2. The insurance policy is for two years.
3. Tk. 3,000 of unearned service revenue has been earned at the end of the year 2018.
4. Salaries of Tk. 1,000 due at December 31, 2018.
5. Invoices representing Tk. 1,000 of services performed during the year have not been recorded as on December 31, 2018.

Required:

(a)Prepare the adjusting entries for the month of June. **($18\frac{1}{3}$)**

(c) Prepare an adjusted trial balance at December 31, 2018.

7. (a) Briefly explain the four assumptions of Conceptual Framework of Accounting. **(6)**

(b) The statement of Profit or Loss and Statement of Financial Position of Ajwa Company, Ltd., on June 30, 2019 are shown below: **($17\frac{1}{3}$)**

Contd P/6

HUM 225

Contd..... Q. No. 7(b)

Ajwa Company Ltd.
Statement of Profit or Loss
For the year ended on June 30, 2019

	Tk.	Tk.
Sales		16,00,000
Less Cost of goods sold (COGS).....		9,00,000
Gross Profit		**7,00,000**
Less: Selling expense	1,00,000	
Administrative expense	3,50,000	
		4,50,000
Earnings Before interest and Tax		**2,50,000**
Less: Interest		45,000
Earnings Before Tax		**2,05,000**
Less: Tax (42.5%)		87,125
Earnings After Tax		**1,17,875**

Ajwa Company Ltd.
Statement of Financial Position
30th June, 2019

Description	**Tk.**	**Tk.**
Assets		
Current Assets:		
Cash.....	2,40,000	
Account Receivable	1,00,000	
Inventory	2,00,000	
Total Current Assets		5,40,000
Noncurrent Assets:		
Fixed Assets		4,00,000
Total Assets		**9,40,000**
Liability and Equity		
Current Liability:		
Creditor	70,000	
Account Payable	90,000	
Other Current Liability	50,000	
Total Current Liability		2,10,000
Non-current Liability :		
15% Debenture		1,80,000
Equity:		
Owner's Equity		5,50,000
Total Liability and Equity		**9,40,000**

Contd P/7

HUM 225

Contd..... Q. No. 7(b)

Required: Calculate and comment on the following ratios:-

(a) Current Ratio.

(b) Quick or Acid Test Ratio.

(c) Debt to Total Asset Ratio.

(d) Inventory Turnover.

(e) Accounts Receivable Turnover.

(f) Account Payable Turnover (Credit Purchase Tk. 2,00,000).

(g) Net Profit Margin.

(h) Return on Total Asset.

8. The Trial Balance of Titan Wholesale Ltd for the year ended on 31st December 2018 is as follows: $(23\frac{1}{3})$

Titan wholesale Ltd
Trial Balance
December 31, 2018

Accounts Name	Debit (Tk.)	Credit (Tk.)
Cash	1,90,000	
Bank Deposit	1,40,500	
Accounts Receivable	85,000	
Accounts Payable		99,000
Building	3,00,000	
Sales		505,000
Sales Return	5,000	
Goodwill	10,000	
Opening Inventory	35,000	
Purchase	308,000	
Purchase Return		8,000
Bank Loan		240,000
Salary Expanse	32,000	
Prepaid Rent	18,000	
Owner's Equity		201,900
Telephone Bill	2,400	
Supplies	17,000	
Interest Expense	2,200	
Insurance Expense	8,800	
Notes Payable		65,000
Drawings	5,000	
Sales commissions	20,000	
Investment	120,000	
Furniture	100,000	
Bond Payable		255,000
Interest Payable		25,000
Total	1,398,900	1,398,900

Contd P/8

HUM 225

Contd..... Q. No. 8

Adjustment Data:

(i) Inventory actually on hand at 31st December Tk. 50,000.

(ii) Rent were expired Tk. 3,000.

(iii) Depreciation on office Equipment @ 10% per annum.

(iv) Outstanding Salary of Tk. 4,000 for the period.

(v) Office Supplies on hand Tk. 7,000

Required: Prepare Profit or Loss Statement, Statement of Changes in Equity and a Classified Balance Sheet/Statement of Financial Position on 31st December 2018.

L-3/T-1/URP **Date : 29/10/2019**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 BURP Examinations 2018-2019

Sub : **CE 361** (Elements of solid Mechanics)

Full Marks: 210 Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

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

1. (a) Draw axial force and axial strain diagram of the following elastic beam (Figure 1). Determine the relative displacement of point D from point A for the elastic steel bar of variable cross sections shown in Figure 1 caused by the application of concentrated forces. Area A_{AB} = 2000 mm^2, A_{BC} = 600 mm^2, and A_{CD} = 1000 mm^2. Modulus of Elasticity, E = 200 GPa. **(23)**

   (b) A cylindrical hole is made within a right circular cone. Locate the center of gravity of the cone with the hole (Figure 2). **(12)**

2. (a) The coplanar concurrent force system acting through point O, as shown in Figure 3, is in equilibrium. Determine the magnitudes of force P and Q. **(10)**

   (b) In Figure 4, the bodies A and B are connected by a cord and rest on smooth inclined planes. Here W_A = 55 lb and W_B = 75 lb. Determine the angle θ and tension in the cord. **(15)**

   (c) What is the difference between coplanar concurrent force systems? Explain with figures. **(10)**

3. (a) Derive PL/AE, where the symbols have their meaning? Draw typical stress strain diagrams for ductile and brittle material. **(10)**

   (b) What is stress tensor? Write down the matrix representation of a stress tensor. **(7)**

   (c) Find the reaction at support and select the size of member FC and Compare between in the truss of Figure 5 for the given loading condition. Given allowable stress is 150 MPa. **(18)**

4. (a) Explain the terms modulus of resilience and modulus of toughness using graphs. **(8)**

   (b) A continuous string ABCDE, Figure 6, passes over smooth pegs at B and D 20 in. on centers. To the ends of the string are attached the weights W_A = 7 lb and W_E = 5 lb. A 10 lb weight is attached at C and the three bodies are in equilibrium. Determine the distance a and the angle α. **(17)**

   (c) Define Poisson's Ratio. An aluminum bar of 50-mm diameter is stressed in a testing machine as shown in Figure 7. At a certain instant the applied force P is 150 kN, while the measure elongation of the rod is 0.210 mm in a 300-mm gage length, and the diameter's dimension is decreased by 0.01215 mm. Calculate the Poisson's ratio of the material. **(10)**

Contd P/2

CE 361

SECTION - B

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

5. (a) A bar is axially loaded as shown in Figure 8. Determine the normal stress and shear stress on the plane AB shown in the Figure. **(8)**

(b) The concrete pier shown in the Figure 9 is loaded at the top with a uniformly distributed load of 20 kN/m^2. Determine the stress at a level 0.5 m above the base. Concrete weighs approximately 25 kN/m^2. **(14)**

(c) Determine the moment of inertias of area with respect to X & Y axes for the figure shown in the Figure 10. **(13)**

6. (a) A solid bar 30 mm in diameter and 2500 mm long consists of a steel and an aluminum part fastened together, as shown in Figure 11. When axial force P is applied to the system, a strain gage attached to the aluminum indicates an axial strain of 873 μm/m.

(i) Determine the magnitude of applied force P **(12)**

(ii) If the system behaves elastically, find the total elongation of the bar. Let, E_{st} = 200 GPa and E_{Al} = 70 GPa. **(11)**

(b) Find the reaction at support of the beam shown in the Figure 12 due to the given loading conditions. **(12)**

7. (a) Write the definition of shear force and bending moment with their sign convention. **(8)**

(b) Draw shear force and bending moment diagram of the following beam. (Figure 13). **(19)**

(c) What is a rigid body? Distinguish between uniformly distributed load and uniformly varying load with diagrams. **(8)**

8. (a) A bar of variable cross section held on the left, is subjected to three forces. P1 = 5 kN, P2 = -2 kN and P3 = 4 kN, as shown in Figure 14. Find the maximum axial stress if A_1 = 200 mm^2, A_2 = 100 mm^2 and A_3 = 150 mm^2. **(12)**

(b) Locate the centroid of the composite area shown in Figure 15. **(15)**

(c) Define moment of inertia and state the parallel axis theorem. **(8)**

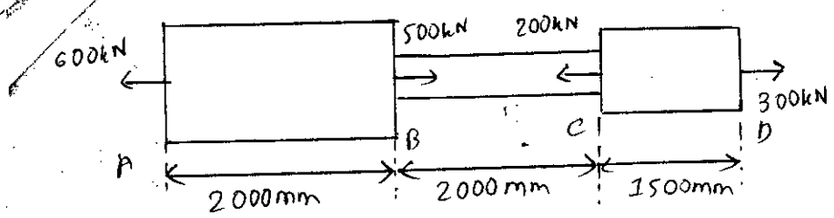


Figure 1

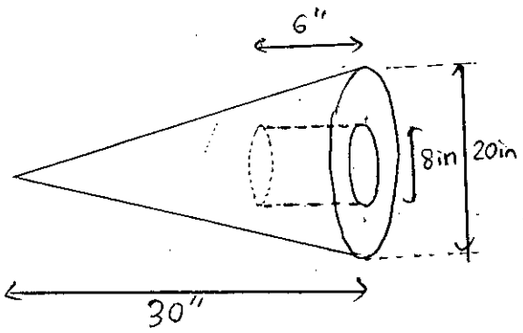


Figure 2

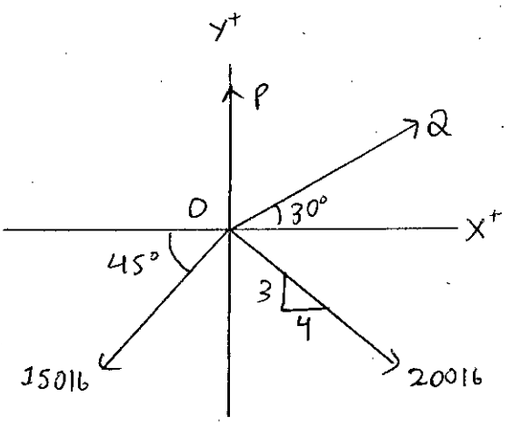


Figure 3

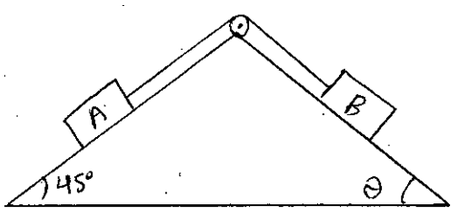


Figure 4

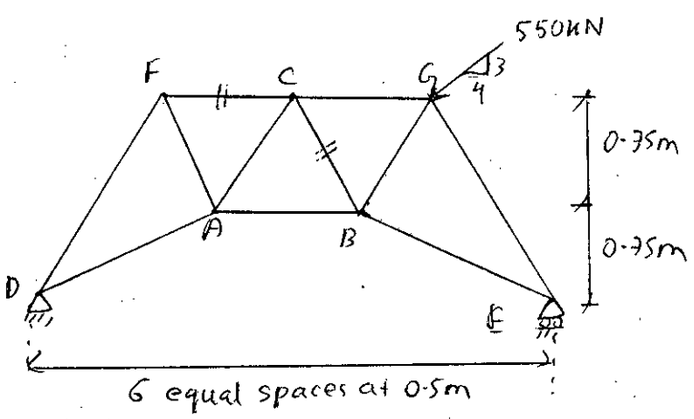


Figure 5

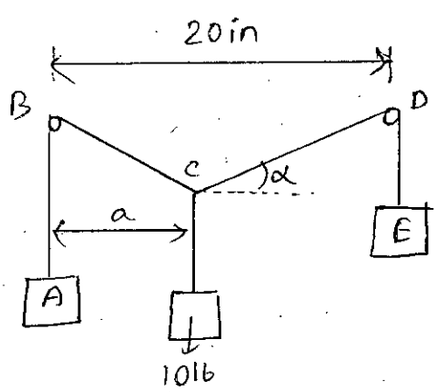


Figure 6

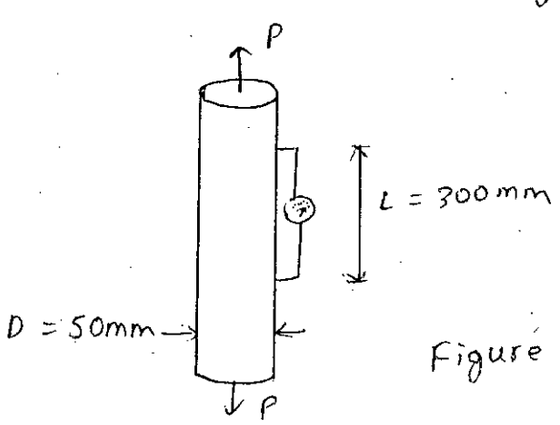


Figure 7

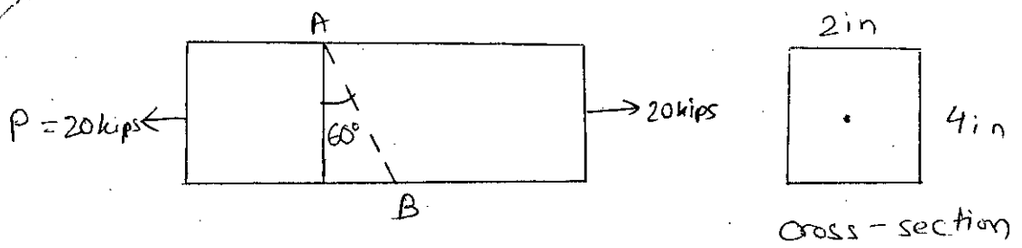
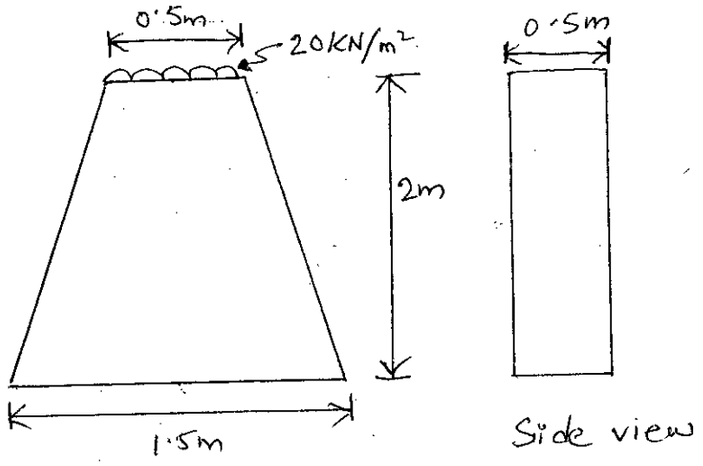


Figure : 8



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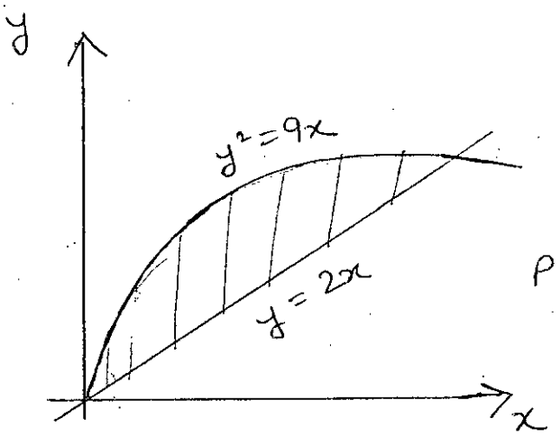

Figure : 10

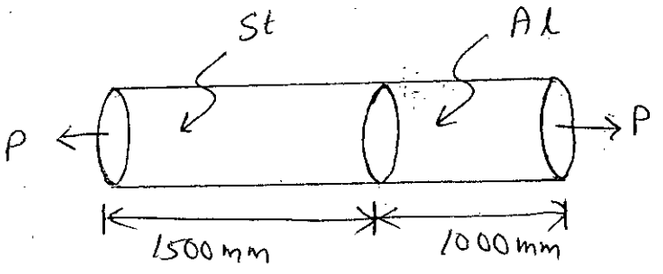

Figure : 11

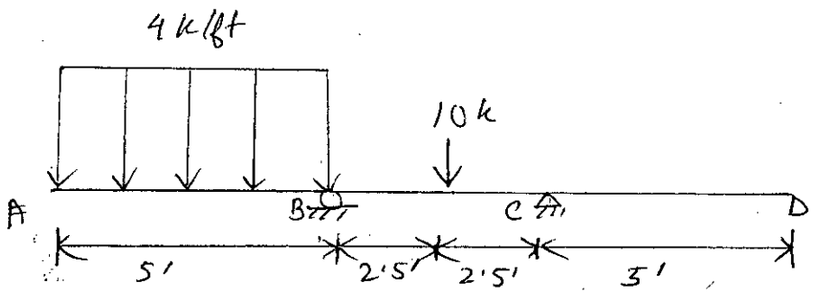

Figure : 12

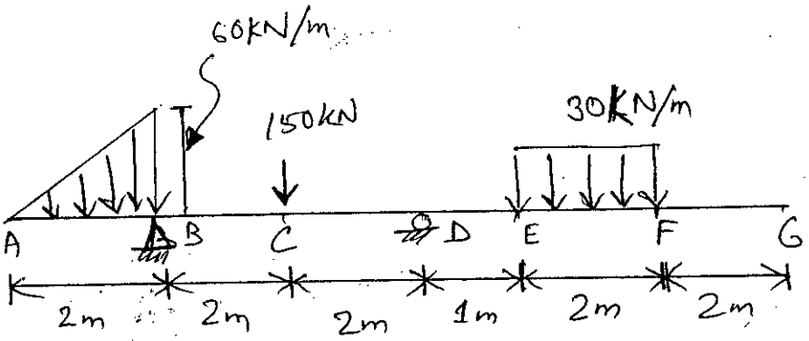

Figure : 13

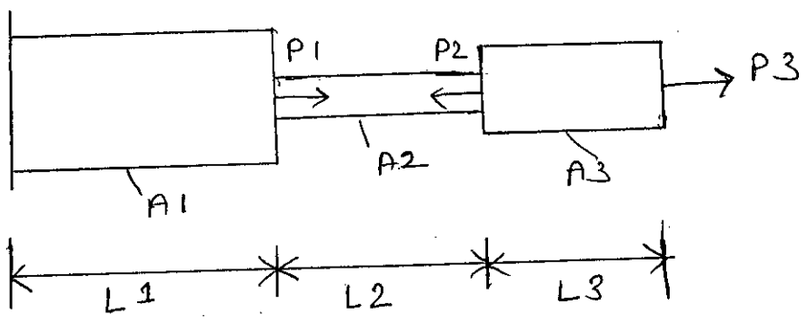

Figure : 14

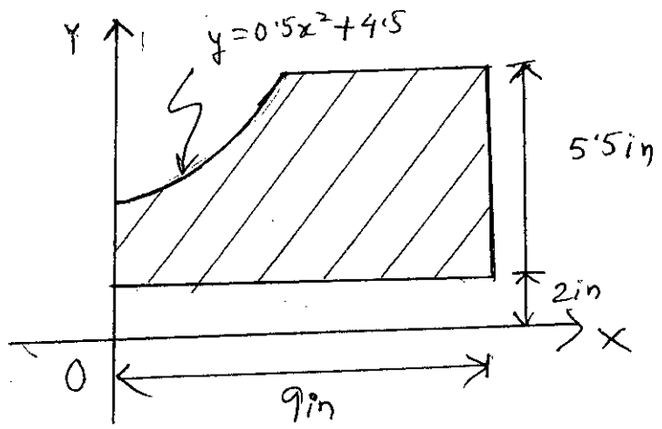

Figure : 15

L-3/T-1/URP **Date : 24/10/2019**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 BURP Examinations 2018-2019

Sub : **WRE 309** (Introduction to Water Resource planning)

Full Marks : 210 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 any **THREE**.

1. (a) Define "Residence Time". Mathematically proof that longer time is required to clean contaminated groundwater (Use Tables 1 and 2). **(1+5=6)**

(b) Theissen polygon method is superior compared to the arithmetical averaging method- Justify your answer.

The analysis of a storm yielded the following information regarding isohyets. Calculate the average depth of rainfall.

(5+10=15)

Isohyetals interval (cm)	15 – 12	12 – 9	9 – 6	6 – 3	3 – 1
Area (Km_2)	92	128	120	175	85

(c) Define: (i) Infiltration capacity (ii) φ-index

The mass curve of an isolated storm is given below: **(4+10=14)**

Time from start of rainfall (h)	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Cummulative rainfall (cm)	0	0.25	0.5	1.10	1.60	2.60	3.50	5.70	6.50	7.30	7.7

If the storm produced a direct runoff of 3.5 cm at the outlet of the watershed, estimate the φ-index of the storm and duration of rainfall excess.

2. (a) Classify the streams based on contribution of base flow. **(6)**

(b) Define "Time of Concentration". The design precipitation intensity for a storm with a T-year return period with slope of 0.007 and maximum length of travel of water of 1500m for the catchment is 2.5 in/hr. Estimate the design return period. In addition, estimate the design peak discharge using rational method for the catchment. The area of the catchment is $3km^2$ and runoff coefficient is 0.7. Use IDF curves (Figure 1) and kiprich formula for your estimation. **(1+6=7)**

(c) What are the practical application of unit hydrograph in water resource planning and development activities? **(4+8=12)**

Given below are observed flows from a storm of 6-h duration on a stream with a catchment area of $500km^2$.

Time(h)	0	6	12	18	24	30	36	42	48	54	60	66	72
Discharge (m^3/s)	0	100	250	200	150	100	70	50	35	25	15	5	0

Assuming the base flows to be zero, derive the ordinates of 6-h unit hydrograph.

Contd P/2

WRE 309

Contd..... Q. No. 2

(d) The mean annual flood of a river is 590 m^3/s and the standard deviation of the annual flood time series is 230 m^3/s. What is the probability of a flood magnitude 1200 m^3/s occurring in the river within next 5 years? Use Gumbel's method and assume the sample size to be very large. **(10)**

3. (a) A constant head permeability test is performed on a soil sample with a length of 12cm and a cross-sectional area of $10cm^2$. If 20 cm^3 of water passess through the sample in a 2 minute period when the head difference between the ends the sample is 15 cm, provide the following information: **(3+2+1=6)**

   (i) Make a sketch of the test set up

   (ii) What is the co-efficient of permeability of the soil?

   (iii) What type of soil would this probably be?

   Use the following Table 3:

Soil type	K(cm/s)
Clean Gravel	1 – 100
Coarse sand	0.01 – 1
Fine sand	0.001 – 0.01
Silty clay	0.00001 – 0.001
Clay	<0.0001

(b) Define: (i) Specific yield, (ii) Storage-co-efficient. Derive the equation of drawdown for steady flow in a well penetrating an extended confined aquifer. **(4+8=12)**

(c) In a confined aquifer of 8m thick, a 10cm diameter will is pumped at a constant rate of 1000 lit/minute. The steady state drawdown observed in two wells located at 10 m and 50 m distances from the centre of the well are 3m and 0.05m respectively. Compute the transmissivity and the hydraulic conductivity of the aquifer. **(10)**

(d) Explain "Gravel Pack plays an important role in increasing the yield or a productive well". **(7)**

4. (a) What is well development? Brefly describe various methods of well development. **(1+8=9)**

   (b) Differentiate between "Direct Circulation Rotary method" and "Reverse Circulation Rotary method". **(7)**

   (c) Define: (i) Residual drawdown, (ii) Well efficiency, (iii) Transmissivity

   Why it is necessary to do recovery phase after pumping phase? Justify your answer. **(6+6=12)**

   (d) Discuss sequence of activities preceding the start of groundwater management investigations. **(7)**

Contd P/3

WRE 309

Contd..... Q. No. 4

Table 1: Estimated world water quantities

Item	Area (10^6 km^2)	Volume (km^3)	Percent of total water	Percent of fresh water
Oceans	361.3	1,338,000,000	96.5	
Groundwater				
Fresh	134.8	10,530,000	0.76	30.1
Saline	134.8	12,870,000	0.93	
Soil Moisture	82.0	16,500	0.0012	0.05
Polar ice	16.0	24,023,500	1.7	68.6
Other ice and snow	0.3	340,600	0.025	1.0
Lakes				
Fresh	1.2	91,000	0.007	0.26
Saline	0.8	85,400	0.006	
Marshes	2.7	11,470	0.0008	0.03
Rivers	148.8	2,120	0.0002	0.006
Biological water	510.0	1,120	0.0001	0.003
Atmospheric water	510.0	12,900	0.001	0.04
Total water	510.0	1,385,984,610	100	
Fresh water	148.8	35,029,210	2.5	100

Table from World Water Balance and Water Resources of the Earth, Copyright, UNESCO, 1978.

SECTION – B

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

5. (a) Discuss "Transportation" as a River Channel Process. Differentiate between the Perennial and Ephemeral River. **(5+5=10)**

   (b) Write short note on following topic: (i) Development of Meanders and Cutoff, (ii) Formation of River Delta. **(6+6=12)**

   (c) Draw drainage basin of a river and define different components. Discuss the following: (i) Lock and Dam method of navigation with applicability, (ii) Physical factors affecting waterborne transport. **(7+3+3=13)**

6. (a) Discuss the types of Groins based on alignment and height. Differentiate between Marginal Embankment and Guide banks. **(8+4=12)**

   (b) Describe the components of a revetment. Elaborate the steps of Navigation planning. **(4+8=12)**

   (c) Write down the relative advantages and disadvantages of Mechanical and Hydraulic Dredger. Differentiate between Capital and Maintenance dredging. **(6+5=11)**

7. (a) Discuss "Flood proofing" and "Flood plain Zoning" as non-structural measures of flood mitigation. Differentiate between (i) Tangible and Intangible loss due to flood with examples (ii) Storage reservoir and retarding basin. **(8+3+3=14)**

   (b) Differentiate between (i) Field capacity and Permanent wilting point (ii) Available water and Readily available water (iii) Monsoon flood and Flash flood. **(4+3+3=10)**

Contd P/4

WRE 309

Contd..... Q. No. 7

(c) Write short note on (i) Steps of planning for disaster management (ii) "Irrigation Efficiencies". **(5+6=11)**

8. (a) Define net irrigation requirement (NIR) and gross irrigation requirement (GIR). Write short notes on following surface irrigation methods: (i) Furrow irrigation (ii) Border Strip Flooding. **(3+5+5=13)**

(b) What are the adaptability and advantages of Sprinkler irrigation? Write down the key functions of integrated water resources management. Discuss the role of IWRM in following issues: (i) Securing food production (ii) mitigating disaster risks. **(4+4+4=12)**

(c) Compare between the traditional and integrated approach of water resources management (WRM). Discuss the steps in Environmental Impact Assessment (EIA). **(4+6=10)**

Table 2.Global annual water balance

		Ocean	Land
Area (km^2)		361,300,000	148,800,000
Precipitation	(km^3/yr)	458,000	119,000
	(mm/yr)	1270	800
	(in/yr)	50	31
Evaporation	(km^3/yr)	505,000	72,000
	(mm/yr)	1400	484
	(in/yr)	55	19
Runoff to ocean			
Rivers	(km^3/yr)	–	44,700
Groundwater	(km^3/yr)	–	2200
Total runoff	(km^3/yr)	–	47,000
	(mm/yr)	–	316
	(in/yr)	–	12

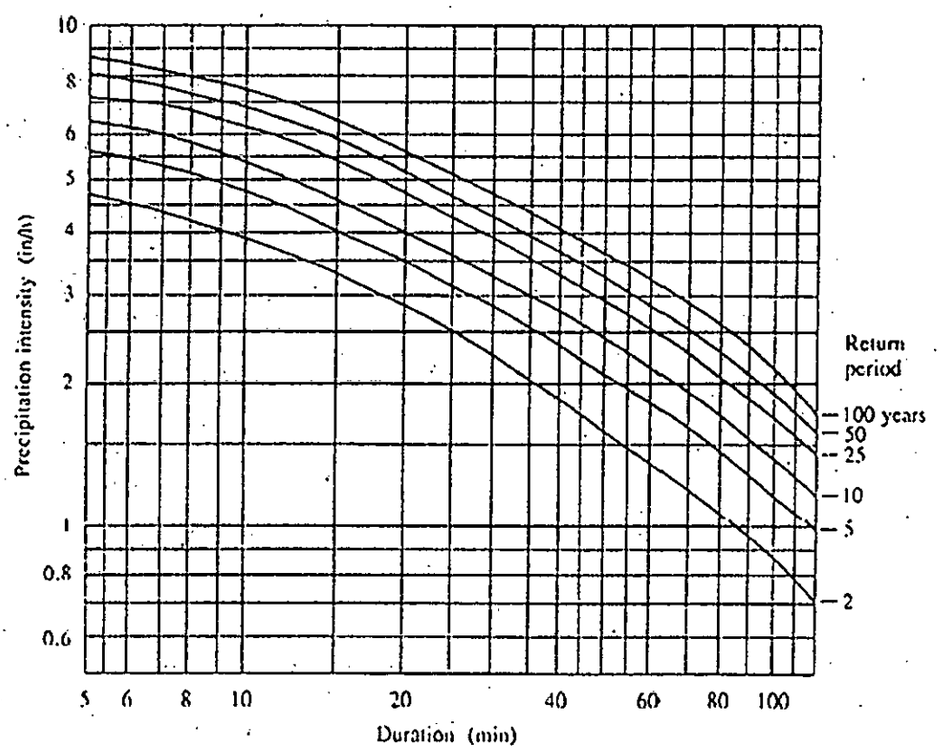

Figure 1: Intensity Duration Frequency (IDF)curve