

The figures in the margin indicate full marks.

Assume reasonable values for missing data.

USE SEPARATE SCRIPTS FOR EACH SECTION

**SECTION – A**

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

1. (a) Locate the centroid of the composite section shown in Figure 1. (20)  
 (b) Define moment of Inertia. State and explain the Parallel Axis Theorem. (5)  
 (c) Determine moment of inertia of the area shown in Figure 1 about its centroidal X axis. (10)
  
2. (a) Define stress and strain. Derive  $PL/AE$ , where the symbols have their usual meaning. (6)  
 (b) Write the difference between Engineering Stress and True Stress. (6)  
 (c) Draw stress strain diagram of mild steel showing its different components. (6)  
 (d) Draw Axial Force Diagram of the following elastic steel beam (Figure 2). Determine the relative displacement of point D from point A for the elastic steel bar of variable cross sections shown in Figure 2 caused by the application of concentrated forces. Areas  $A_{AB} = 3000 \text{ mm}^2$ ,  $A_{BC} = 1500 \text{ mm}^2$ ,  $A_{CE} = 750 \text{ mm}^2$ . Modulus of Elasticity,  $E = 200 \text{ GPa}$ . (17)
  
3. (a) Write the definition of shear force and bending moment with their sign convention. (8)  
 (b) Draw shear force and bending moment diagrams of the following beam (Figure 3). (15)  
 (c) Determine the location of centroid of a sector of a circle subtending angle  $2\beta$ . (12)
  
4. (a) Define a two force member. (6)  
 (b) In Figure 4, the bodies A and B, connected by a cord and resting on smooth planes, weigh  $W_A = 80 \text{ lb}$ . and  $W_B = 60 \text{ lb}$ . Determine the angle  $\theta$  and tension in the cord. (17)  
 (c) From the coplanar concurrent force system shown in Figure 5 acting on the irregular body through point "A", determine the resultant force and its direction. Given, weight of the body is 10 lb and acting through point A. (12)

**CE 361 (URP)**

**SECTION - B**

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

5. (a) The member AB and AC is supported by cable subjected to a vertical load 5 kip, as shown in Figure 6. Allowable stress of the member AB is 0.5 ksi. Calculate the diameter of the member of AB. Consider all connections are pin connected. (18)
- (b) For the beam shown in Figure 7, draw the SFD and BMD. (17)
6. (a) State the assumptions of truss analysis. (5)
- (b) Find the reaction at support and select the size of member AB, BC, CE, DF, DE and EG in the truss of Figure 8 for the given loading condition. Given allowable stress is 20 ksi. All joints are pin connected. (30)
7. (a) For the timber beam and loading shown in Figure 9, draw the shear and bending moment diagrams. (18)
- (b) Find the moment of inertia, I of the section shown in Figure 10. (17)
8. (a) Describe classification of force systems with examples. (7)
- (b) What is the difference between non-coplanar concurrent force and coplanar non-concurrent force system? Explain with figures. (8)
- (c) Two high strength steel rods of different diameters are attached at A and C and support a mass 'M' at B as shown in Figure 11. What mass can be supported? The ultimate strength rods is 6 ksi and factor of safety is to be 1.5. Given the areas,  $A_{AB} = 0.1 \text{ in}^2$  and  $A_{BC} = 0.2 \text{ in}^2$ . (20)
-

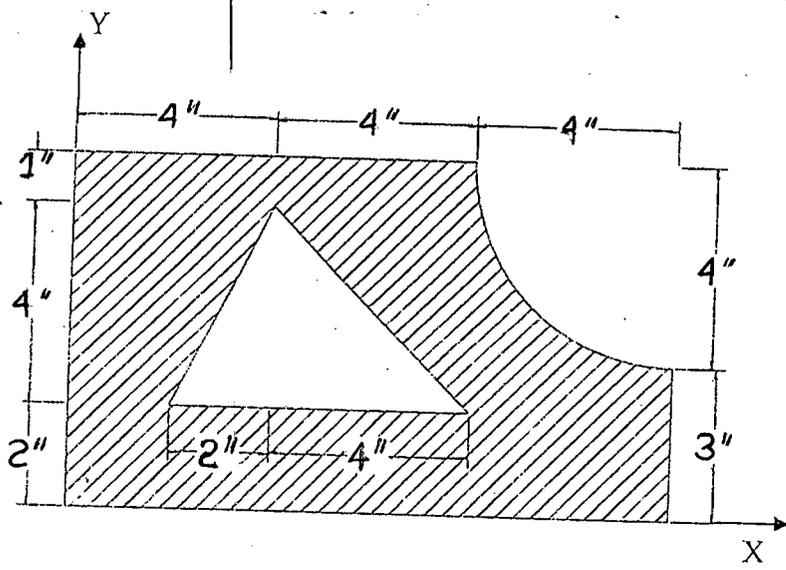


Figure 1

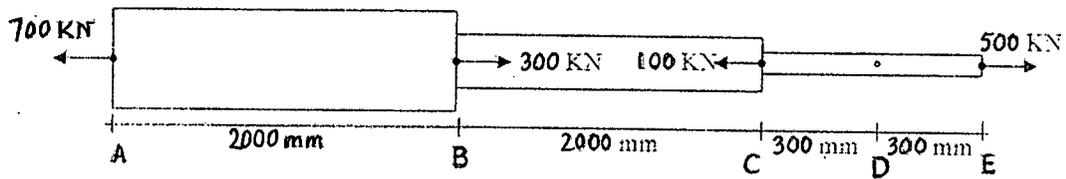


Figure-2

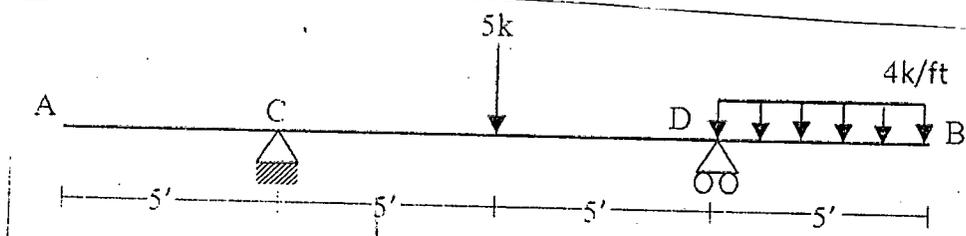


Figure 3

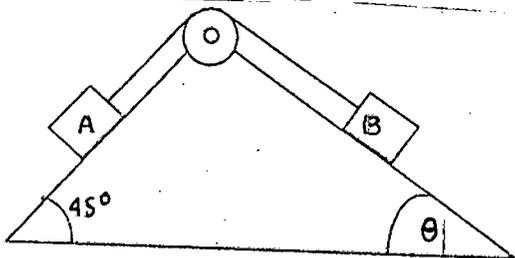


Figure 4

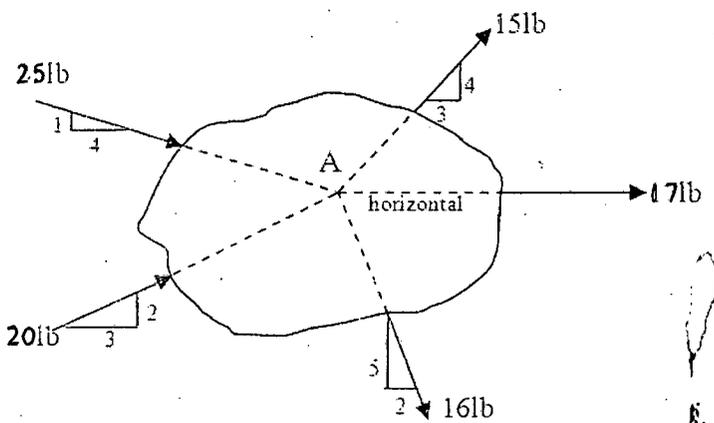


Figure 5

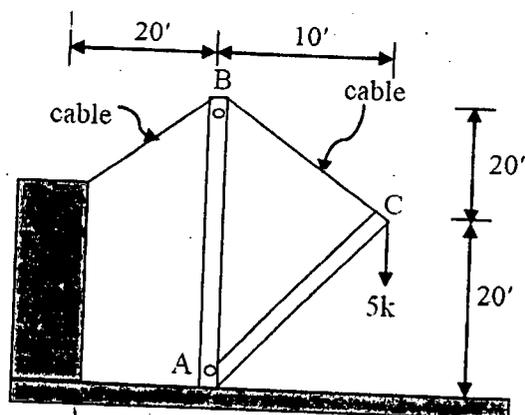


Figure 6

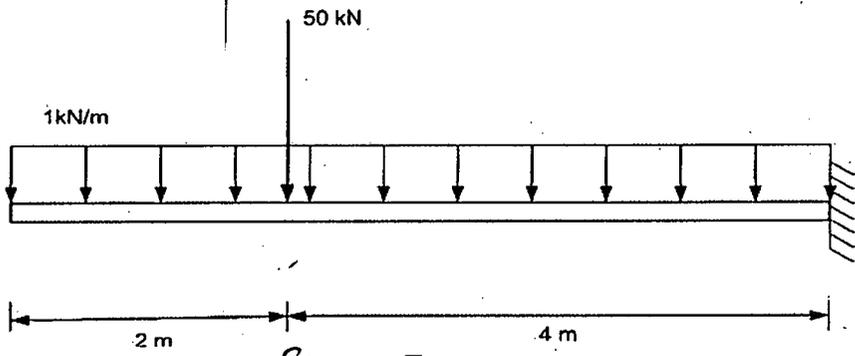


Figure 7

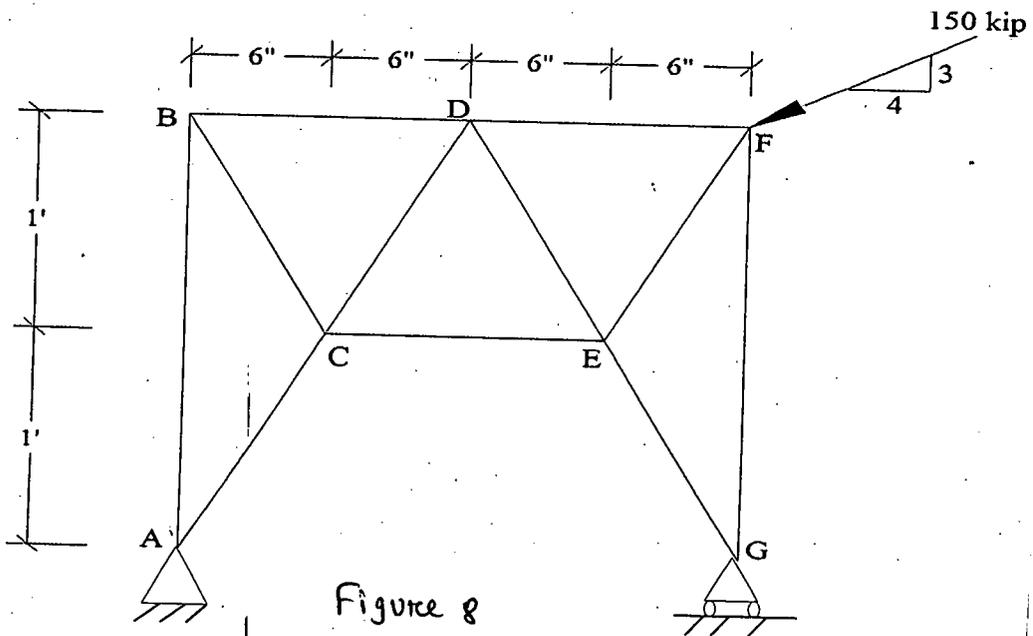


Figure 8

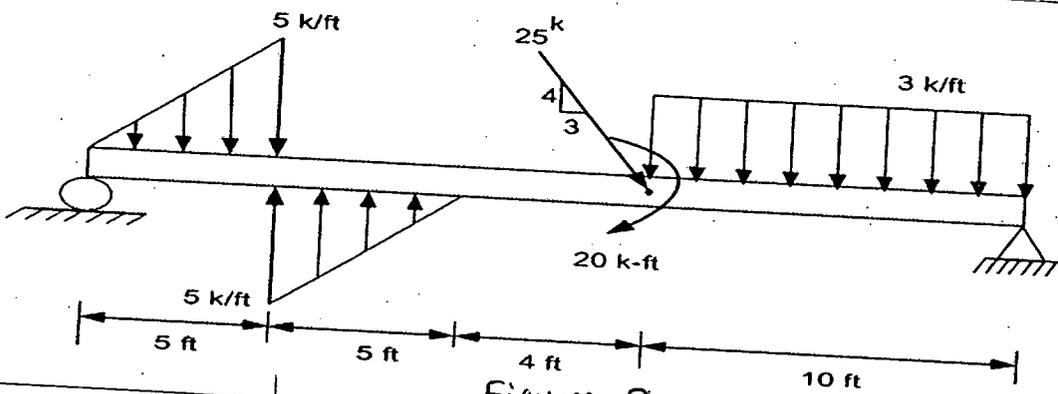


Figure 9

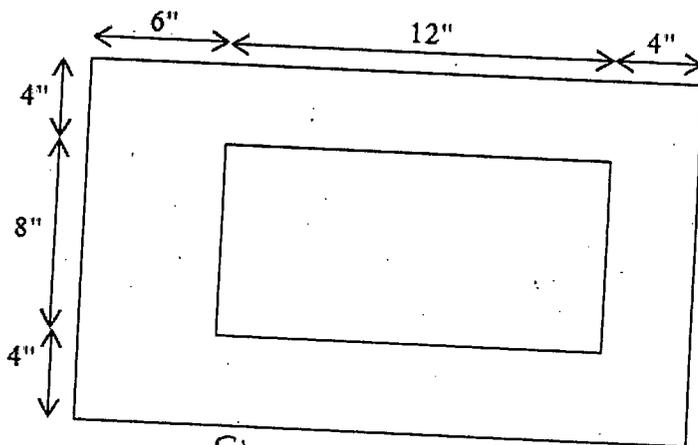


Figure 10

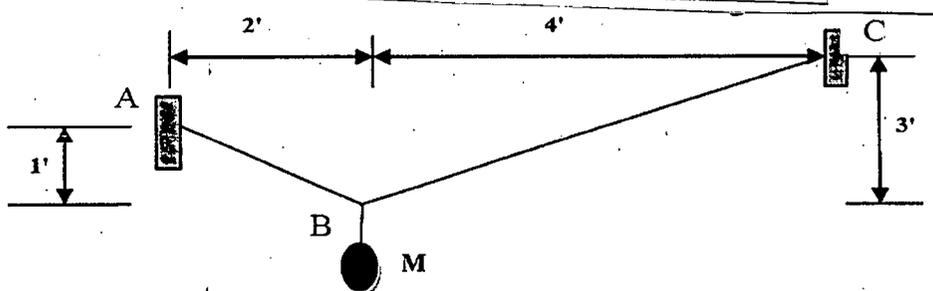


Figure 11

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

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) "Affordable housing can be addressed systematically: setting targets, employing cost-reduction levers, and strengthening local delivery" – explain this statement with necessary illustrations. (10)
- (b) Discuss some initiatives which would assist in improving the quality of housing in Dhaka city. (15)
- (c) Categories different types of housing values and discuss their influence on human lifestyle. (10)
  
2. (a) Do you think statist approach can avoid the pitfalls of market dependent system or of the socialist system for the provision of affordable housing? Justify your opinion from the context of Singapore and China's housing policy. (15)
- (b) Write down a list of government organizations and their responsibilities associated with housing provision in Dhaka city. Also mention the categories of private sector actors involved in housing supply. (10+5=15)
- (c) Define Housing Affordability Index (HAI). (5)
  
3. (a) Discuss the key principle of "Enabling Approach" initiated by the World Bank. Despite the adoption of different enabling strategies, the actual role played by the Government of Bangladesh is neither a provider nor an enabler. What are the main reasons behind this failure? (5+15=20)
- (b) Explain the housing specialized mortgage lending system with diagram. Also provide a brief description of two specialist housing finance institutions of Bangladesh. (5+10=15)
  
4. (a) Name the categories of land tenure established in Bangladesh. Draw a diagram illustrating the economic implications of Defacto and De June tenure formalization. (5+10=15)
- (b) "The impact of lifestyle on housing choices is filtered by the housing norms that are present in a culture". – Explain this statement with necessary examples. (20)

**PLAN 321**

**SECTION - B**

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

5. (a) What do you understand by property title? Name different methods of title assurances. **(2+5=5)**  
(b) In the light of filtering theory of housing, explain how a dwelling moves down the quality ladder to households with progressively lower income. What are the implications of filtering process on spatial segmentation of housing market? Discuss in the context of urban spatial structure models. **(12+10=22)**  
(c) "Housing market is an urban area which consists of a number of inter-connected sub-markets. – Justify this statement with proper examples. **(8)**
6. (a) Explain how the trade-off between commuting and housing cost affects housing consumption of urban residents. What factors, other than commuting cost, can likely affect the spatial variation of housing prices in a city? **(6+6=12)**  
(b) Explain the supply, demand and price adjustment mechanisms of real estate market with Simple Stock-flow Model. **(17)**  
(c) Write down the difference between the following – **(6)**  
(i) Deed and Will  
(ii) General Warranty Deed and Special Warranty Deed
7. (a) Describe the process of estimating housing price with Hedonic Pricing Approach. **(23)**  
(b) What are the factors affecting the structural vacancy of housing? Discuss from the home owner's and the tenant's perspectives. **(12)**
8. (a) What are the main determinants of real estate demand? Discuss how the myopic expectations of the investors affect the demand of real estate market. **(5+5=10)**  
(b) Discuss different demand-side housing strategies. "Demand-side housing strategies can be more effective than supply-side housing strategies in context of Dhaka" – Do you agree with the statement? Give reasons in support of your answer. **(25)**
-

**SECTION – A**

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

1. (a) What do you understand by contribution and break-even point? (3 ⅓)

(b) Angie Silva Co. has been experiencing difficulty for some time. The company's recent month's income statement is as follows: (20)

Sales (19,500 units@ Tk. 30 per unit)	585,000
Less: Variable expenses	<u>409,500</u>
Contribution margin	175,500
Less: Fixed expenses	<u>180,000</u>
Net income/Loss	<u>4500</u>

**Required:**

- (i) Compute the company's CM ratio and break-even point.
- (ii) The president of the company believes that Tk. 16,000 increase in monthly advertising cost will result in Tk. 80,000 increase in monthly sales. If he is right, what will be the effect on monthly net income or loss?
- (iii) Refer to the original data, the sales manager is thinking that a 10% reduction in the selling price, combined with an increase of Tk. 60,000 in the monthly advertising cost, will cause unit sales to double. What will be the new income statement look like if these changes are adopted?
- (iv) Refer to the original data, the marketing department thinks that a new attractive package for the product would help sales. The new package would increase packaging costs by Tk. 0.75 per unit. Assuming no other changes, how many units would have to be sold to earn a target profit of Tk. 9,500?
2. (a) "A variable cost is a cost that varies per unit of product, where as a fixed cost is constant per unit of product". Do you agree? Explain with suitable example. (3 ⅓)
- (b) The data below have been taken from the cost records of Beverly Hospital. A careful study by the company's cost analyst has determined that if the number of x-rays taken is 7000, the average operating cost is Tk. 4.14 per x-ray. If the number of x-rays taken is 3000, the average operating cost is Tk. 5.65 per x-ray. (10)

**Required:**

- (i) Using the high and low point method, determine the variable cost per x-ray and the fixed cost in total.
- (ii) Express the variable cost and fixed cost in the form of  $Y = mx + c$ .
- (iii) If the number of x-rays taken in a month is 4600, what total operating x-rays costs would you expect?

**HUM 225(URP)**

**Contd ... Q. No. 2**

(c) Listed below are a number of costs typically found in an organization. Classify each cost as either variable, fixed or mixed. (10)

- (i) Property taxes, factory;
- (ii) Boxes used for packing products;
- (iii) Sales persons' commission;
- (iv) Supervisor's salary, factory;
- (v) Lubricants for machine;
- (vi) Advertising cost;
- (vii) Rent on factory building;
- (viii) Depreciations on equipment;
- (ix) Power and electricity;
- (x) Accountant's salary.

3. (a) Why are administrative costs and selling and distribution costs treated as overhead cost? (4 1/3)

(b) What are the components of total Manufacturing cost? Give some examples for each of the elements. (5)

(c) The following costs and inventory data are taken from the accounting records of a company for the year ended on December 31st 2015:

**Costs Incurred** (14)

Direct labour cost	Tk. 70,000
Purchase of raw materials	118,500
Indirect labour	30,000
Maintenance, factory	6,000
Advertising expenses	90,000
Insurance, factory	800
Sales salaries	50,000
Rent, factory	20,000
Depreciation, factory equipment	9,000

<u>Inventories</u>	<u>Jan 1st</u>	<u>Dec 31st</u>
Raw materials	Tk. 7000	Tk. 15,000
Work in process	10,000	5000
Finished goods	20,000	35,000

**Required:**

- (i) Prepare a statement of cost of goods sold in good form.
- (ii) If sales for the year is Tk. 500,000, prepare an income statement showing gross profit and net profit.

4. (a) What is the basic difference between absorption costing and variable costing? (3 1/3)

(b) Chuck wagon grills manufacturing company makes barbecue grill that it sells for Tk. 210, Data for last year's operations follow: (20)

**HUM 225(URP)**

**Contd ... Q. No. 4(b)**

Units produced	20,000
Units sold	19,000
<u>Variable cost per unit:</u>	
Direct materials	Tk. 50
Direct labour	80
Variable manufacturing overhead	20
Variable selling and administrative overhead	10
Fixed costs:	
Fixed manufacturing overhead	Tk. 700,000
Fixed selling and administrative overhead	285,000

**Required:**

- (i) Compute unit product cost under both absorption costing and variable costing methods.
- (ii) Prepare income statements under both of the methods.

**SECTION – B**

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

5. (a) What is the difference between revenue and gain? Explain with example. (3 1/3)

(b) Mr. Crimson has started his computer service business on April 1st of 2016. The following transactions occurred during the month. (20)

April-1: Invested cash in the business Tk. 30,000.

April-2: Purchased computer terminals for Tk. 20,000 on account.

April-3: Purchased supplies for Tk. 1500 cash.

April-6: Performed computer services Tk. 8000 cash.

April-8: Paid dues for purchase on account in April 2.

April-19: Provide services on credit to a customer Tk. 5000.

April-25: Paid expenses for the month: rent Tk. 1000; salaries Tk. 800 and utilities bill Tk. 200.

April-30: Received Tk. 5000 from the customer who has been previously billed in April-19.

**Required:**

- (i) Show the effects of transaction on accounting equation.
- (ii) From the equation analysis prepare the income statement for April 30, 2016.

6. (a) What is accrual basis and cash basis of accounting? (4 1/3)

(b) Mrs. Cathy opened a consultancy firm on May 1, 2016. Following transactions happened for the month of May. (19)

**HUM 225(URP)**

**Contd ... Q. No. 4(b)**

- May-1: Initially invested Tk. 200000 cash in the business.
- May-3: Purchased decorated office room for Tk. 150000 cash.
- May-5: Paid advertising expense of Tk. 7000.
- May-10: Received Tk. 30000 as consultancy fees.
- May-18: Billed a client for services performed on account Tk. 8500.
- May-25: Withdraw Tk. 5000 for personal use.
- May-28: Received dues on services provided on credit.
- May-29: Purchase supplies for office Tk. 2000 in cash.
- May-30: Paid salary to the office staff Tk. 10000.

**Required:**

Journalize the transactions in a good form.

7. (a) Selected transactions for the Bergers Company are presented in journal form below: (10 1/3)

Date	Account Titles	Ref.	Debit(Tk.)	Credit(Tk.)
May 5, 2016	Accounts Receivable Dr.		4100	
	Service Revenue Cr.			4100
May 12	Cash Dr.		2400	
	Accounts Receivable Cr.			2400
May 15	Cash Dr.		3000	
	Service Revenue Cr.			3000
May 18	Supplies Dr.		1000	
	Cash Cr.			1000

**Required:**

Post the journals to ledger accounts and then prepare a trial balance.

- (b) Selected comparative data for Queer Products Company are presented below: (13)

	2015 (Tk.)	2016 (Tk.)
Net Sales (all in credit)	720000	750000
Cost of Goods Sold	440000	480000
Interest Expense	5000	70000
Net Income	42000	45000
Account Receivable	100000	120000
Inventory	75000	85000
Total Assets	500000	580000
Total Shareholder's Equity	325000	430000

**Required:**

- (i) Profit Margin
- (ii) Asset Turnover
- (iii) Return on Assets
- (iv) Return on Shareholders' Equity.
- (v) Inventory turnover.
- (vi) Accounts Receivable turnover.

**HUM 225(URP)**

8.

(23 1/3)

Austrian Corporation  
Trial Balance  
December 31, 2016

Account Titles	Debit (Tk.)	Credit (Tk.)
Cash	5300	
Accounts Receivable	10800	
Supplies	1500	
Prepaid Insurance	2000	
Equipment	27000	
Accumulated Depreciation		5600
Notes Payable		15000
Accounts Payable		6100
Salaries Payable		2400
Interest Payable		600
Owner's Capital		13000
Owner's Drawings	7000	
Service Revenue		61000
Advertising expense	8400	
Supplies expense	4000	
Depreciation expense	5600	
Insurance expense	3500	
Salaries expense	28000	
Internet expense	600	
Total	<u>103700</u>	<u>103700</u>

Tk. 1000 of prepaid insurance expired during the year

**Required:**

- (i) Prepare an Income Statement and owner's equity statement.
  - (i) Prepare a Balance Sheet.
-

**SECTION – A**

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

1. (a) Define “**Residence time**”. Explain the impact of residence time in weather forecasting. (Use Table 1 & 2) (1+5=6)
- (b) With the help of typical annual hydrographs, give a comparison between an intermittent stream and ephemeral stream. (5)
- (c) Estimate PET of an area for the season November to March in which sugarcane is grown. The area is in North India at a Latitude of 33°N with mean monthly temperatures as below: (10)

Month	Nov	Dec	Jan	Feb	Mar
Temp (°C)	17	14.2	11.5	15	13

Apply Blaney-Cridle formula by using  $k = 0.90$  and Table 3.

- (d) Route the following flood hydrograph through a river reach for which  $K = 10h$  and  $x = 0.25$ . At the start of the inflow flood the outflow discharge is  $10m^3/s$ . (14)

Time (h)	0	6	12	18	24	30	36	42	48	54
Inflow ( $m^3/s$ )	10	20	50	60	55	45	35	27	20	15

2. (a) Explain briefly the following relationships relating to the precipitation over a basin:
- (i) Depth Area Duration relationship
- (ii) Intensity Duration Frequency relationship (3+3=6)
- (b) Drainage areas with each of the isohyetal lines for a storm are tabulated for a watershed. Use **Isohetal Method** to determine average precipitation depth within the basin for the storm. (10)

Isohyet interval (in)	0-2	2-4	4-6	6-8
Area (acres)	2700	1900	1000	1200

**WRE 309**

**Contd ... Q. No. 2**

(c) What are the practical applications of unit hydrograph in water resource planning and development activities?

Following are the ordinates of storm hydrograph of a river draining a catchment area of 423 km<sup>2</sup> due to a 6-h isolated storm. Derive the ordinates of a 6-h unit hydrograph for the catchment. **(4+15=19)**

Time (h)	-6	0	6	12	18	24	30	36	42	48
Discharge(m <sup>3</sup> /s)	10	10	30	87.5	115.5	102.5	85	71	59	47.5

3. (a) State Theis assumptions. Derive the equation of transmissivity for steady radial flow in an unconfined aquifer. **(5+12=17)**

(b) The discharge from a fully penetrating well operating under steady state in a confined aquifer of 30m thickness is 2100 litre/min. The drawdowns observed at two observation wells located at 15m and 150 m from the well are 3.2m and 0.28m respectively. Determine transmissivity and permeability of aquifer. **(10)**

(c) 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<sup>2</sup> and runoff coefficient is 0.7. Use IDF curves (Figure 1) and kirpich formula for your estimation. **(2+6=8)**

4. (a) Analysis of annual flood series data covering a period of 35 years yielded a mean and standard deviation of 2960 and 1450 m<sup>3</sup>/s respectively. Roads and Highways proposed to construct a bridge over this river having an expected design life of 40 years for a design flood magnitude of 10000 m<sup>3</sup>/s. What is the risk of this hydrologic design? Given: reduced mean = 0.538 and reduced standard deviation = 1.119. **(15)**

(b) What is well rehabilitation? Explain several causes and remedial measures of well rehabilitation. **(11)**

(c) A constant head permeability test is performed on a soil sample with a length of 15cm and a cross-sectional area of 10cm<sup>2</sup>. If 24 cm<sup>3</sup> of water passes through the sample in a 3 minute period when the head difference between the ends the sample is 30 cm, determine the following **(9)**

(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?

**WRE 309**

**SECTION – B**

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

5. (a) Discuss the classes of alluvial river based on (i) Location of the reach and (ii) Planform (4+4=8)
- (b) Describe the river channel forming processes in detail. (13)
- (c) Write short notes on following topic:
- (i) Floodplain and levee formation (ii) Development of meanders (4+4=8)
- (d) What are the challenges contributing to recent floods in Bangladesh? (6)
6. (a) Classify Groin with sketch based on (i) Material and (ii) Alignment (5+5=10)
- (b) Discuss the general concept of bank protection measures. (5)
- (c) What are the components of a revetment? Write down the qualities of a good revetment. (5+6=11)
- (d) Write down the methods of achieving navigability. (9)
7. (a) Draw the layout of an irrigation canal network. What are the advantages of sprinkler irrigation over other surface irrigation methods? (5+4=9)
- (b) Differentiate between
- (i) Capital dredging and maintenance dredging (ii) storage reservoir and retarding basin. (3+3=6)
- (c) Write down 4 major objectives of dredging? Discuss the stages of planning for disaster management. (4+4=8)
- (d) Describe the non-structural measures for flood mitigation. (12)
8. (a) What are the special sites conditions for sub-surface irrigation? Differentiate between the following: (i) border strip flooding and check flooding (ii) Sprinkler irrigation and Trickle irrigation. (4+6+6=16)
- (b) Write down the key functions of integrated water resources management? Show five examples of key development issues to which IWRM can be linked. (5+5=10)
- (c) After how many days will you supply water to soil in order to ensure sufficient irrigation of a crop if
- Field capacity of the soil = 25%
- Permanent wilting point = 12%
- Density of soil = 1.1 gm/cc
- Effective root zone depth = 10 cm
- And it has been decided to irrigate when water level depleted to 80% of the available water.

**Table 1: Estimated world water quantities**

Item	Area (10 <sup>6</sup> km <sup>2</sup> )	Volume (km <sup>3</sup> )	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

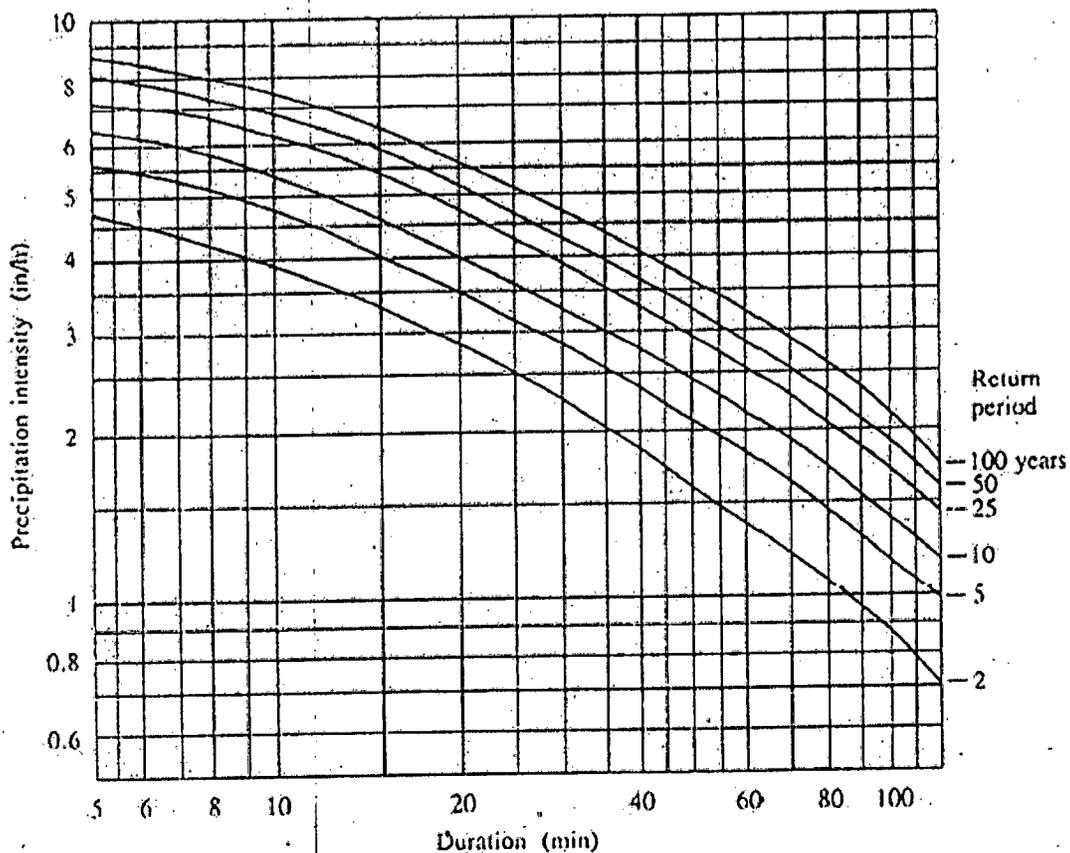
Table from World Water Balance and Water Resources of the Earth, Copyright, UNESCO, 1978.

**Table 2. Global annual water balance**

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

**Table 3. Monthly daytime hours percentages, Ph, for use in Blaney- Criddle Formula**

North latitude	Nov	Dec	Jan	Feb	Mar
30	7.19	7.15	7.30	7.03	8.38
35	6.97	6.86	7.05	6.88	8.35



**Figure 1: Intensity Duration Frequency curve**

**SECTION – A**

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

1. (a) Differentiate between Vehicular Control System and Flow Control System with examples. (8)
- (b) “Better Solution to a transport problem can be found outside the transport sector itself” – do you agree with this statement? Justify your answer with relevant examples. (10)
- (c) Differentiate among the service categories of passenger modes. (9)
- (d) What are the advantages of rail service over bus service? (8)
  
2. (a) Define ‘Headway’ and ‘Spacing’. (8)
- (b) “As traffic flow increases, average speed of traffic falls. After a critical density or maximum flow, both the rate of flow and average speed decrease” – elaborate on this statement with necessary illustrations. (12)
- (c) State the factors that determine the level of service of a roadway section. (6)
- (d) Differentiate among Pedestrian Movement, Local Area Movement and Intra-Urban Movement. (9)
  
3. (a) “One of the major advantages of one-way street is it reduces the number of points of conflicts to improve traffic condition”- justify this statement with necessary illustrations. (10)
- (b) Discuss the problems and prospects of introducing exclusive bus lanes in the context of Dhaka City. (10)
- (c) Briefly explain the relationship between ‘Urban Density’ and ‘Per Capita Car Use’ in urban areas. (10)
- (d) What are the advantages of gridiron road pattern? (5)
  
4. (a) “Transportation and land use are part of a retroactive feedback system where they influence one another” – elaborate this statement with reference to the land use-transport feedback cycle. (15)
- (b) State the problems of unconnected automobile cities. (10)
- (c) How can ring roads confer further time improvements while travelling through a metropolitan area? Explain with an example and necessary figures. (10)

**PLAN 343**

**SECTION – B**

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

5. (a) What issues need to be considered during Home-Interview method of O-D survey? What are the associated disadvantages? **(8+2=10)**
- (b) Briefly explain the procedure for Post-Card Questionnaire and Tag-on-Vehicles survey? **(5+5=10)**
- (c) What are the main differences between full cloverleaf and directional interchange? **(4)**
- (d) Draw a neat sketch of a full cloverleaf interchange. Do you think it is possible to take U-turn in this interchange? If possible, identify only one U-tern in a separate sketch. **(11)**
- 6 (a) What is the principle of giving mandatory and prohibitory traffic signs? What are their conventional design standards? Give an example of each of the signs? **(2+4+2=8)**
- (b) Suppose you have provide ‘No Overtaking Zone Markings’ on the Dhaka-Sylhet highway having no physical median. A large number of trucks and lorries ply from Dhaka to Sylhet direction; and the fast moving vehicles have to overtake frequently. In this context, which pavement marking would you propose and why? Explain with a figure. **(9)**
- (c) Calculate the following for Nilkhet to Technical Bus Stop section of Mirpur Road based on Tables 1 and 2. **(18)**

- (i) Traffic flow (veh/hour)
- (ii) Journey speed (KPH)
- (iii) Running speed (KPH)

Table 1

Northbound					
Name of the links	Length (m)	Running time (min)	Delay (min)	Vehicles in the same direction (PCU)	Overtaking vehicles–Overtaken vehicles
Nilkhet – Dhaka City College	822	2.14		1346	13
Dhaka City College – Panthapath	1402	4.21	0.53	2295	17
Panthapath – Dhanmondi 27	660	2.20	3.33	1080	11
Dhanmondi 27 – Asad Gate	462	1.21	1.17	756	7
Asad Gate – Lake Road	497	1.19	1.01	814	5
Lake Road – Shishu Mela	1082	2.16	0.47	1771	9
Shishu Mela – Technical Bus Stop	2877	8.63	1.29	4710	22

Table 2

Southbound					
Name of the links	Length (m)	Running Time (min)	Delay (min)	Vehicles in the same direction (PCU)	Overtaking vehicles–Overtaken vehicles
Technical Bus Stop – Shishu Mela	2877	13.71		5210	13
Shishu Mela – Lake Road	1082	2.87	3.48	2324	2
Lake Road – Asad Gate	497	1.70	1.45	514	4
Asad Gate – Dhanmondi 27	462	1.78	2.14	313	4
Dhanmondi 27 – Panthapath	660	3.74	5.55	1326	11
Panthapath – Dhaka City College	1402	6.68	4.77	1548	1
Dhaka City College – Nilkhet	822	3.16	1.02	1102	24

**PLAN 343**

7. (a) 'O-D Survey can give information on parking demand'. – explain. (5)
- (b) What are the ill effects of parking? (7)
- (c) What is the difference between multi-storey and mechanical car parks? Briefly explain their design specifications and disadvantages? (2+6=8)
- (d) During a study on parking demand along Shat Mashjid Road having 24 designated parking bays, a parking usage survey by patrol has been conducted as given in the long sheet (Table 3). (15)

Determine –

- (i) Parking volume
- (ii) Parking load
- (iii) Average parking duration
- (iv) Parking turnover in one whole day
- (v) Parking index

**Table 3**

	Time (9AM – 2PM)									
	9:00-9:30	9:30-10:00	10:00-10:30	10:30-11:00	11:00-11:30	11:30-12:00	12:00-12:30	12:30-1:00	1:00-1:30	1:30-2:00
No of cars parked	17	23	21	24	24	24	24	23	22	20
Arrival of cars		7	2	6	7	1	1	2	1	2
Departure of cars		1	4	2	7	1	1	3	2	4

8. (a) Which longitudinal pavement marking is used in dividing traffic lanes and why? In the Dhaka Cantonment area, the traffic lanes have separate speed limits within the same carriageway. How can you manage the vehicles in their corresponding speed lane through traffic lane lines? (5+5=10)
- (b) Suppose you have to take spot speed measurements in a busy road section, where the sidewalks are frequently used by pedestrians. Which long-base method you would undertake and why? Describe the procedure of the method. (10)
- (c) The following speed measurements were taken by a Rader Speed Meter (giving speed at meter per second) in a 30 m segment of the Tom Murphy Freeway that is used by a variety of traffic modes. Calculate time mean speed (TMS) and space mean speed (SMS) in KPH. (10)

= 4 =

**PLAN 343**

**Contd ... Q. No. 8(b)**

**Table 4**

<b>Speed in MPS</b>	<b>No of vehicles spotted by Rader Speed Meter</b>
21.94	2
18.33	2
17.22	3
16.67	3
15.56	4
14.72	4
14.17	4
13.89	4
13.61	4
12.50	4
9.72	5
8.89	5
5.56	5

(d) How far accurate is the TMS and SMS measurements by the stated method in the previous question? Justify your opinion.

**(5)**

-----