

Amir
7/12/14

L-2/T-1/WRE

Date : 07/12/2014

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1 B. Sc. Engineering Examinations 2013-2014

Sub : **CE 221** (Mechanics of Solids-I)

Full Marks: 210

Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

The figures in the margin indicate full marks.

1. Calculate reactions, bending moment and shear force at section a-a for the structure shown in Fig. 1. (26¼)

2. Draw bending moment and shear force diagrams for the beam BCD of Fig. 2. (26¼)

3. (a) A steel plate having dimension of 50 mm by 250 mm by 10 mm is subjected to uniformly distributed forces along its edges as shown in Fig. 3. If $P_x = 100$ kN and $P_y = 200$ kN what change in thickness occurs due to application of these forces? Given $E = 200$ GPa and $\nu = 0.25$. (14)
(b) A pressure vessel shown in Fig. 4 has an internal pressure of 0.7 MPa. If 20 bolts are to be used on a 650 mm bolt circle diameter, what is the required bolt diameter at the root of the threads? Allowable stress in tension for the bolts is 125 MPa. At the root of the bolt threads the stress concentration factor is 2. (12¼)

4. A rigid bar as shown in Fig. 5 is supported by a pin at A and two linearly elastic wires at B and C. The area of the wire at B is 60 mm^2 and the area at C is 120 mm^2 . Determine the reactions at A, B, and C caused by applied force $P = 6$ kN. (26¼)

5. A jib crane has the dimensions as shown in Fig. 6. Rod AB has a cross-sectional area of 300 mm^2 and tube BC, 320 mm^2 . (a) Find the vertical stiffness of the crane at point B, (b) Determine the vertical deflection due to the applied force $P = 16$ kN. Given $E = 200$ GPa. (26¼)

Contd P/2

CE 221/WRE

SECTION - B

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

The questions are of equal value.

6. For the stepped shaft shown in Fig. 7 (i) Draw Torque-diagram (ii) Maximum torsional shear stress and (iii) Angle of twist, ϕ . Given: $G = 80 \text{ GPa}$.
7. Compute Maximum tensile and Compressive stresses for the beam shown in Fig. 8. The cross-section is given in Fig. 8(b).
8. Determine maximum stresses in the brass and steel for the composite cross-section of the beam shown in Fig. 9. The beam is subjected to a bending moment of 20 kip-ft. Given: $E_s = 29000 \text{ ksi}$ and $E_b = 15000 \text{ ksi}$.
9. A simply supported beam of span 15 ft is subjected to a uniformly distributed load of 2 kip/ft. The cross-section of the beam is shown in Fig. 10. Calculate the shear stresses at the levels indicated. Level 3-3 indicates the level of neutral axis.
10. Find the approximate location of the shear center for the cross-section of the beam shown in Fig. 11.

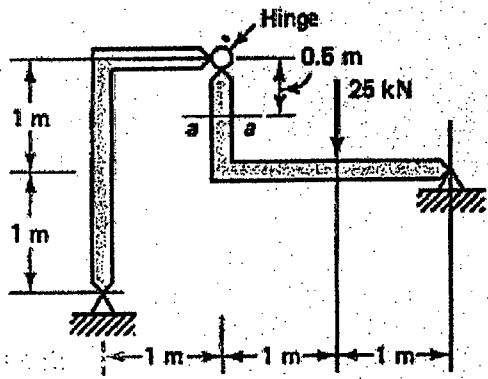


Fig. 1

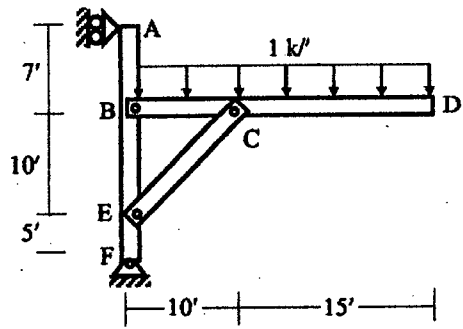


Fig. 2

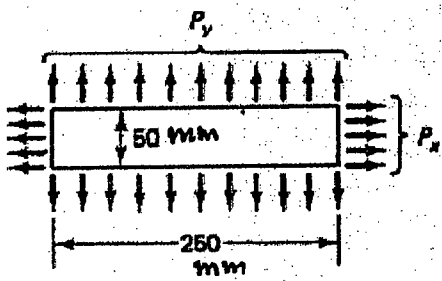


Fig. 3

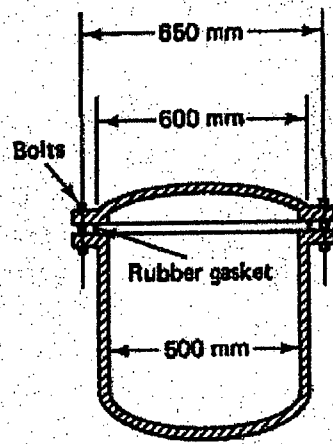


Fig. 4

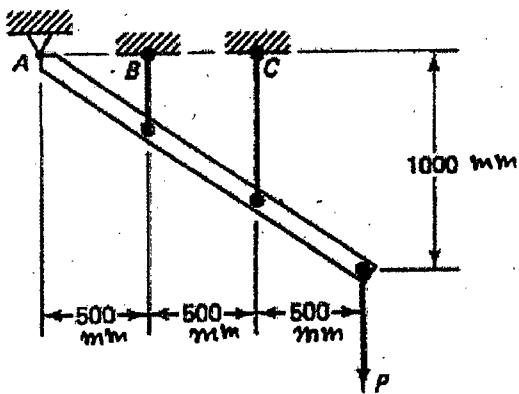


Fig. 5

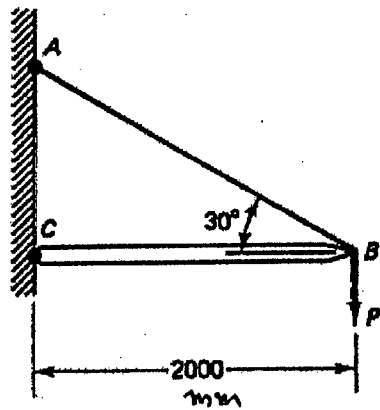


Fig. 6

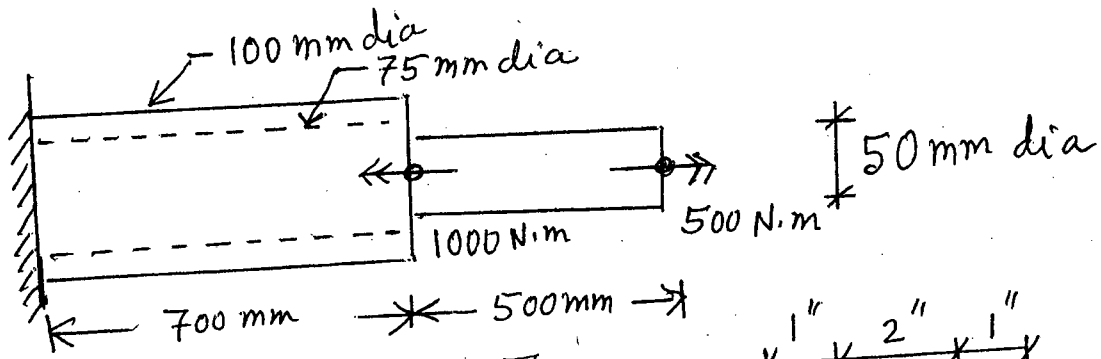


Fig. 7

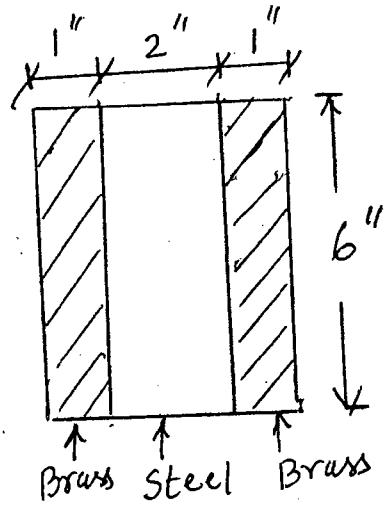
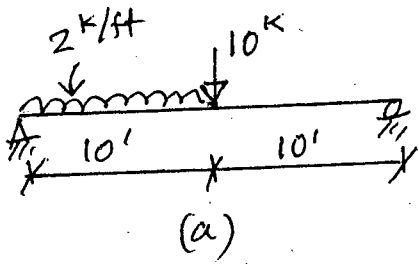
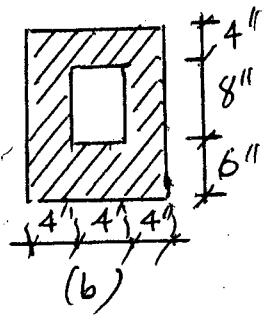


Fig. 9



(a)



(b)

Fig. 8

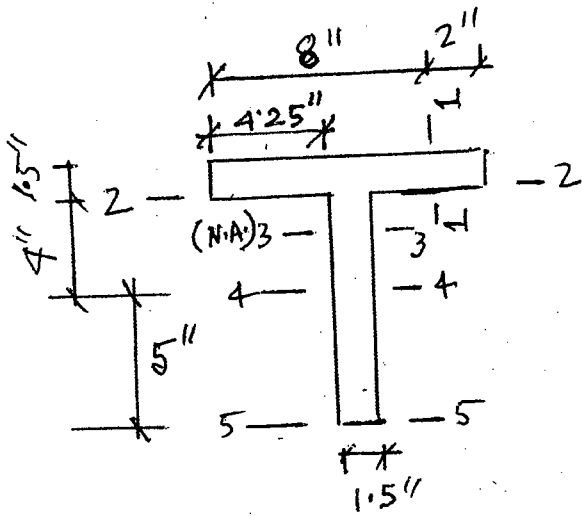


Fig. 10

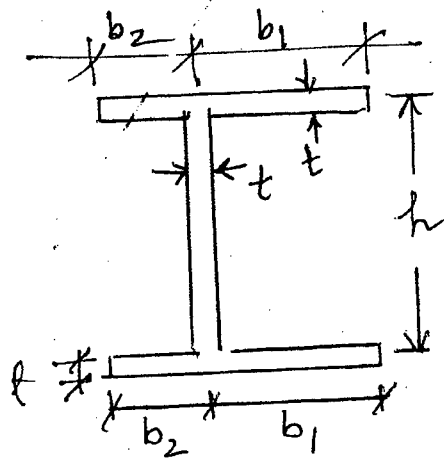


Fig. 11

Amber

L-2/T-1/WRE

Date : 13/12/2014

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1 B. Sc. Engineering Examinations 2013-2014

Sub : CE 291 (Engineering Materials)

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**.

Assume any reasonable value of missing data.

1. (a) A series of 14 test cylinder results had a standard deviation of 400 psi. A second series of 12 test results has a standard deviation of 600 psi. Calculate the average standard deviation for the two series and the required mean strength for a specified compressive strength of 3000 psi. If the modification factor for standard deviation given by ACI 318-11 is as follows:

(15)

Nos. of tests	15	20	25	30
Factor for standard deviation	1.16	1.08	1.03	1.0

(b) Explain the factors for durability of concrete. How is permeability of concrete related to durability? Explain.

(10)

(c) What is meant by the margin in concrete mix design? Why is it necessary? State the quality control (QC) requirement of concrete strength according to ACI Code.

(10)

2. (a) Write down the various laboratory and field tests of bricks. Describe absorption capacity test.

(15)

(b) Define 'bound water' and 'gel water' necessary during hydration of cement. Describe water requirements of cement in hydration process, while giving special reference to:

(i) minimum w/c ratio, (ii) too wet state, and (iii) too dry state.

(15)

(c) Differentiate between artificial cement and natural cement.

(5)

3. State the specific indices of various range of aggregate sizes. Using them, calculate the total surface index (fx) of a CA, FA and standard aggregate given in the following Table 1:

(35)

Table 1: Surface index and particle range

Sieve size within which particles lie	80-40 mm	40-20 mm	20-10 mm	10-4.75 mm	4.75-2.36 mm	2.36-1.18 mm	1.18-0.60 mm	0.60-0.30 mm	0.30-0.15 mm	<0.15 mm
Surface index for particles within sieve size indicated	-2.5	-2.0	-1.0	1.0	4.0	7.0	9.0	9.0	7.0	2.0

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Contd... Q. No. 3

Table 2: Standard sieve size and percent finer for a field coarse aggregate (CA) and fine aggregate and an aggregate of standard grading

Standard Sieve (mm)	Percentage Finer		
	C. A.	F. A.	Standard Grading
40	100	100	100
20	96	100	98
10	35	100	61
4.75	6	92	42
2.36	0	85	35
1.18	0	75	28
600 μ	0	60	22
300 μ	0	10	5
150 μ	0	0	0
75 μ	0	0	0

Also, calculate the mix ratio of FA and CA of the combine aggregate so as to obtain field grading of aggregate resembling the Standard Grading given in **Table 2**. At the end, calculate the FM of the combined aggregate.

4. (a) Design a concrete mix for construction of an elevated water tank using **Table3~7**. The specified strength of concrete (characteristic strength) is 30 MPa at 28 days measured on standard cylinders. Standard deviation can be taken as 4 MPa based on 35 test cylinders for the same project maintaining the similar conditions. The specific gravity of FA and CA are 2.65 and 2.7, respectively. The dry-rodded bulk density of CA, containing 12 mm maximum size of aggregate, is 1600 kg/m³, and fitness modulus of FA is 2.80. Ordinary Portland cement (Type I) will be used. A slump of at least 75 mm is necessary. In the field, CA is found to be absorptive to the extent of 1% and free moisture in sand is found to be 2 percent. Assume any other essential data. **(25)**

- (b) Define hydraulicity. Why is it important for a cementing material? What else can you do if a lime, which is to be used as a cementing material, is found to be devoid of this property? State the factors affecting hydraulicity of lime. **(10)**

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SECTION – B

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

5. (a) For a solid in tension, write the differential equation showing relation between strain rate and constant stress rate K . Use the equation to derive the expression relating stress and strain for constant stress rate K . Use the relation and draw qualitative stress-strain diagram for various rates of loading. (20)
- (b) Draw mechanical models depicting stress-strain behaviour of ideal elastic, ideal viscous and ideal visco-elastic material. Write the basic expression for Maxwell solids and use it to get the differential equation describing such material behaviour. From this equation, derive strain and stress as a function of time for step functions of stress and strains respectively. Draw qualitative graphs showing stress and strain step function at corresponding strain and stress change with time. (15)
6. (a) Identify basic components of elastic and plastic strain, viscous creep and transient creep in an idealized qualitative creep curve. Use the curve to identify the principal characteristics of viscous and transient creep. Compare in a graph the various curves describing transient creep of different materials and identify each curve with its respective creep equation. (20)
- (b) Define stress relaxation. For an idealized situation, derive the differential equation for stress relaxation. Use the equation to derive stress as a function of time and show the relation qualitatively in a graph. (15)
7. (a) Show that for an idealized polycrystalline material yielding in simple tension, a maximum shearing stress equal to one-half the tensile stress always acts at any plane making an angle of 45° with the axis of applied stress. (20)
- (b) Define yield strength, tensile strength, secant modulus, tangent modulus, ductility and toughness with reference to (wherever possible) the stress-strain curve of an ideal polycrystalline metal. (15)
8. (a) State the characteristics of S-grade bricks. Define hydraulic lime and state its properties and usages. Classify hydraulic lime and mention their properties. (20)
- (b) Describe suitability of sea sand as fine aggregates in concrete. What is bulking of sand and why it is important in civil engineering construction? (15)
-

Table 3: Relation between w/c ratio and average compressive strength of concrete (ACI 211.1-91)

Average compressive strength at 28 days, MPa	Effective w/c ratio (by mass)	
	Non-air-entrained concrete	Air-entrained concrete
45	0.38	--
40	0.43	--
35	0.48	0.40
30	0.55	0.46
25	0.62	0.53
20	0.70	0.61
15	0.80	0.71

Table 4: Dry-rodded bulk volume of CA per unit volume of fresh concrete

Maximum size of aggregate mm	FM of fine aggregate			
	2.40	2.60	2.80	3.00
10	0.50	0.48	0.46	0.44
12.5	0.59	0.57	0.55	0.53
20	0.66	0.64	0.62	0.60
25	0.71	0.69	0.67	0.65
40	0.75	0.73	0.71	0.69
50	0.78	0.76	0.74	0.72
70	0.82	0.80	0.78	0.76
150	0.87	0.85	0.83	0.81

Table 5: Requirements of ACI 318-89 for w/c ratio and strength for special exposure conditions

Exposure condition	Maximum w/c ratio, normal density aggregate concrete	Minimum design strength, low density aggregate concrete, MPa
i. Concrete intended to be watertight:		
a. Exposed to fresh water	0.5	25
b. Exposed to brackish or sea water	0.45	30
ii. Concrete exposed to freezing and thawing in a moist condition:		
a. kerbs, gutters, guard rails or thin sections	0.45	30
b. other elements	0.50	25
c. in presence of de-icing chemicals	0.45	30
iii. For corrosion protection of reinforced concrete exposed to de-icing salts, brackish water, sea water or spray from these sources	0.40	33

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Table 6: First estimate of density of fresh concrete (ACI 211.1-91)

Nominal maximum size of CA	First estimate of density of fresh concrete (kg/m ³)	
	Non-air-entrained	Air-entrained
10	2285	2190
12.5	2315	2235
20	2355	2280
25	2375	2315
40	2420	2355
50	2445	2375
70	2465	2400
150	2505	2435

Table 7: Approximate requirements for mixing water and air content for different workability and nominal maximum size of aggregates (ACI 211.1-91)

Maximum size of CA (mm)	10	12.5	20	25	40	50	70	150
Slump value (mm)	Amount of mixing water in kg per 1 m ³ concrete (Non-air-entrained concrete)							
30 to 50	205	200	185	180	160	155	145	125
80 to 100	225	215	200	195	175	170	160	140
150 to 180	240	230	210	205	185	180	170	-
Entrapped air approx. (%)	3	2.5	2	1.5	1	0.5	0.3	0.2

SECTION - AThere are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Form the differential equation of all parabolas whose axes are parallel to the axis of y. (11)
- (b) Solve $(2\sqrt{xy-y})dx - xdy = 0$. (12)
- (c) Solve the Bernoulli's differential equation $x^2 \frac{dy}{dx} - 2xy = 3y^4$ subject to the initial condition $y(1) = \frac{1}{2}$. (12)
2. (a) Test whether the differential equation is exact or not. If not then reduce it into exact form and solve $y(y^2 - 2x^2)dx + x(2y^2 - x^2)dy = 0$. (12)
- (b) Solve $p^2 + 2py \cot x = y^2$ where $p = \frac{dy}{dx}$. (11)
- (c) Find the solution of the Cauchy Euler differential equation (12)
- $$[(x+3)^2 D^2 - (x+3)D + 2]y = (2x+7)e^x.$$
3. (a) Find the complete solution as well as singular solution of the Clairaut's differential equation $p + \cos px \sin y = \sin px \cos y$ where $p = \frac{dy}{dx}$. (12)
- (b) Solve $\frac{d^2y}{dx^2} + 16y = \sec 4x$. (11)
- (c) Solve $(D^2 - 7D + 12)y = e^x$. (12)
4. Find the regular singular point of the differential equation $x \frac{d^2y}{dx^2} + (x-1) \frac{dy}{dx} - y = 0$ and hence solve the equation in series by Fröbenius method. (35)

MATH 231/WRE**SECTION - B**

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

5. (a) Solve the following differential equation by Lagrange's method: (10)

$$2y(z-3)p + (2x-z)q = y(2x-3).$$

- (b) Find the integral surface of the first order linear partial differential equation (13)

$$(x-y)p + (y-x-z)q = z$$

passing through $z = 1, x^2 + y^2 = 1$.

- (c) Apply Charpit's method to solve $(p^2 + q^2)y = qz$. (12)

6. Solve the following partial differential equations:

(a) $(12D_x^2 - 5D_xD_y - 3D_y^2)z = y^2 \cos(x-3y)$. (10)

(b) $(D_x^2 - 3D_x + 3D_y - D_y^2)z = 2xy + 5 \exp(x+2y)$. (12)

(c) $(x^2D_x^2 - 4xyD_xD_y + 4y^2D_y^2 + 6yD_y)z = x^3y^4$. (13)

7. (a) Express $f(x) = x^4 + 2x^3 + 2x^2 - x - 3$ in a series of Legendre polynomials. (11)

- (b) Use the generating function of Legendre polynomials to prove (12)

$$nP_n(x) = (2n-1)xP_{n-1}(x) - (n-1)P_{n-2}(x).$$

(c) Show that $\int_{-1}^1 x^2 P_{n-1}(x) P_{n+1}(x) dx = \frac{2n(n+1)}{(4n^2-1)(2n+3)}$. (12)

8. (a) Derive the formula for $J_{\frac{1}{2}}(x)$ and $J_{\frac{3}{2}}(x)$ and hence use recurrence formula to prove

that $J_{\frac{3}{2}}(x) = -\sqrt{\frac{2}{\pi x}} \left(\frac{\cos x}{x} + \sin x \right)$. (17)

(b) Prove that $\int_0^1 x J_n(\alpha x) J_n(\beta x) dx = \begin{cases} 0 & \text{if } \alpha \neq \beta \\ \frac{1}{2} [J_{n+1}(\alpha)]^2 & \text{if } \alpha = \beta \end{cases}$ (18)

where α and β are the roots of $J_n(x) = 0$.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1 B. Sc. Engineering Examinations 2013-2014

Sub : **HUM 313** (Principles of Accounting)

Full Marks: 140

Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – AThere are **FOUR** questions in this section. Answer any **THREE**.

1. (a) 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 1/3)
- (b) Briefly explain the concept of cost structure? (3)
- (c) Bogside Farm and Sterling Farm are two blueberry farms. Bogside Farm has higher variable cost as it depends on migrant workers to pick its berries by hand, where as Sterling Farm has higher fixed cost as a result of its investment in expensive machine to pick its berries. Following are the income statements of these two blueberry farms: (17)

	Bogside Farm	Sterling Farm
Sales	Tk. 100,000	Tk. 100,000
Less: Variable cost	60,000	30,000
contribution	40,000	70,000
Less: Fixed costs	30,000	60,000
Net profit	10,000	10,000

Requirements:

- (i) Considering CM ratio, break-even point and margin of safety expression which farm has the better cost structure.
- (ii) Explain which farm will earn greater profit under the condition of 10% increase in sales and 10% decrease in sales (show the calculations).
2. (a) What is the basic difference between absorption costing and variable costing? (4 1/3)
- (b) Chuck Wagon grills manufacturing company makes a single product– a handmade specially barbecue grill that it sells for Tk. 210. Data for last year's operations follow: (19)

Units in beginning inventory	0
Units produced	20,000
Units sold	19,000
Units in ending inventory	1000

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

Variable costs per unit:

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

Requirements:

- (i) Compute unit production cost under absorption costing and variable costing method;
- (ii) Prepare income statements under both of the methods;
- (iii) Reconcile the amount of net income under two methods.

3. (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 example. (4)
- (b) What do you understand by mixed cost and cost formula? (2 1/3)
- (c) 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 is 3000, the average operating cost is t. 5.65 per x-ray. (11)

Requirements:

- (i) Using the high and low point method, determine the variable cost per x-ray and the fixed cost in total.
 - (ii) Draw a cost formula in the form $Y = a + bx$.
 - (iii) If the number of x-rays taken in a month is 4600, what total operating x-rays cost would you expect?
- (d) Listed below are a number of costs typically found in organisations: (6)
- (i) Clay used in brick production;
 - (ii) Boxes used for packing detergent;
 - (iii) Wages of workers assembling computers;
 - (iv) Advertising by a dental office;
 - (v) Microchips used in producing calculators;
 - (vi) Executive life insurance cost;
 - (vii) Depreciation of cafeteria equipment;
 - (viii) Glue used in book production.

Requirements:

Indicate whether each cost would typically be treated as variable cost or fixed cost or mixed cost.

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4. (a) Why are administrative expenses and selling and distribution expenses treated as overhead cost? (3 1/3)
- (b) "Manufacturing cost is composed of three components— direct materials, direct labour and manufacturing overhead." Define each of the components and give examples of each component for an electric bulb manufacturing plant. (4)
- (c) Various costs and sales data for Rosebud Company for the year ended on December 31, 2013 follows: (16)

Depreciation, factory equipment	Tk. 27,000
Depreciation, office equipment	3,000
Administrative expenses	110,000
Utilities, factory	8,000
Maintenance, factory	40,000
Supplies (30% for factory, 70% for office)	12,000
Insurance, factory	4,000
Purchase of raw materials	12,500
Direct labour	15,000
Sales	600,000
Rent (60% for factory, 40% for office)	45,000
Selling expenses	60,000
Sales salaries	30,000
Property taxes, factory	15,000

Inventories:

	January 1	December 31
Raw materials	Tk. 9000	Tk. 6,000
Work in process	17,000	30,000
Finished goods	20,000	40,000

Requirements:

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

SECTION – B

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

Symbols indicate their usual meaning.

5. (a) State the differences between 'Event' and 'Transaction'. Mention whether the following items will be considered as transaction or not. Also mention the reason(s) for your answer. (6)

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Contd... Q. No. 5

(b) On April 1, Mr. Rahman established a travel agency at Singapore. The following transactions were completed during the month.

(17 1/3)

- (i) Invested \$15,000 cash to start the business.
- (ii) Paid \$600 cash for April office rent.
- (iii) Purchased equipment for \$3,000 cash.
- (iv) Incurred \$700 of advertising costs in The Daily Prothom Alo, on account.
- (v) Paid \$800 cash for purchasing office supplies.
- (vi) Performed services worth \$10,000: \$3,000 cash is received from customers, and the balance is due from the customers.
- (vii) Withdraw \$500 cash for personal use.
- (viii) Paid the Prothom Alo \$500 of the amount due in transaction (iv).
- (ix) Paid employees' salaries \$2,500.
- (x) Received \$4,000 in cash from customers who have previously been billed in Transaction (vi).

Required:

Prepare a tabular analysis of the transactions using the appropriate column headings.

6. Ms. Sultana is a software developer and started her own business, Dream Developers, on May 1, 2014. The following transactions occurred during the month of May:

(23 1/3)

- May 1 Ms. Sultana invested \$7,000 cash in the business.
- May 2 Paid \$900 for office rent for the month.
- May 3 Purchased \$600 of supplies on account.
- May 5 Paid \$125 to advertise in the *County News*.
- May 9 Received \$4,000 cash for services provided.
- May 12 Withdrew \$1,000 cash for personal use.
- May 15 Performed \$6,400 of services on account.
- May 17 Paid \$2,500 for employee salaries.
- May 20 Paid for the supplies purchased on account on May 3.
- May 23 Received a cash payment of \$4,000 for services provided on account on May 15.
- May 26 Borrowed \$5,000 from the bank on a note payable.
- May 29 Purchased office equipment for \$3,100 on account.
- May 30 Paid \$175 for utilities.

Instructions:

- (i) Journalize the May transactions.
- (ii) Prepare Cash Ledger account and Accounts Receivable Ledger account.

Contd P/5

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- 7. (a) Mention the four principles of a accounting according to Conceptual Framework. (4)
- (b) Why is it important to analyze financial statements? Explain with examples. (2)
- (c) What do the following classes of ratios measure? Mention at least two names of ratios for each category. (4)
 - (i) Liquidity Ratio.
 - (ii) Profitability Ratio.
 - (iii) Solvency Ratio.
- (d) W Company's comparative balance sheets are presented below: (13 1/3)

W Company
Balance Sheets
December 31

	<u>2014</u>	<u>2013</u>
Cash	\$4,300	3,700
Accounts Receivable	21,200	23,400
Inventory	10,000	7,000
Land	20,000	26,000
Buildings	70,000	70,000
Accumulated Depreciation	<u>(15,000)</u>	<u>(10,000)</u>
Total	<u>\$110,500</u>	<u>\$120,100</u>
Accounts payable	\$12,370	\$31,100
Owner's Capital	75,000	69,000
Retained Earnings	<u>23,130</u>	<u>20,000</u>
Total	<u>\$110,500</u>	<u>\$120,100</u>

The company's 2014 income statement included net sales of \$100,000, cost of goods sold of \$60,000 and net income of \$15,000.

Instructions: Calculate the following ratios for 2014-

- (i) Current Ratio.
- (ii) Acid-test Ratio.
- (iii) Accounts Receivable turnover
- (iv) Inventory turnover
- (v) Profit Margin
- (vi) Asset Turnover
- (vii) Return on assets
- (viii) Return on Owner's Equity
- (ix) Debt to Assets ratio.

HUM 313/WRE**Contd... Q. No. 2(b)**

8. The adjusted trial balance columns of the worksheet for Alsher Company has been presented in below:

(23 1/3)

Alsher Company
Adjusted Trial Balance
December 31, 2014

Ref.	Account Titles	Debit (\$)	Credit (\$)
101	Cash	5,300	
112	Accounts Receivable	10,800	
126	Supplies	1,500	
130	Prepaid Insurance	2,000	
157	Equipment	27,000	
158	Accumulated Depreciation- Equipment		5,600
200	Notes Payable		15,000
201	Accounts Payable		6,100
212	Salaries Payable		2,400
230	Interest Payable		600
301	Owner's Capital		13,000
306	Owner's Drawings	7,000	
400	Service Revenue		61,000
610	Advertising Expense	8,400	
631	Supplies Expenses	4,000	
711	Depreciation Expense	5,600	
722	Insurance Expense	3,500	
726	Salaries Expense	28,000	
905	Interest Expense	600	
	Total	<u>103,700</u>	<u>103,700</u>

Instructions:

Prepare a multiple-step income statement, owner's equity statement and a classified Balance Sheet. (Note: The 1,000 of the Prepaid Insurance will expire during the next year.)

SECTION – A

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

1. (a) Define geomorphic processes and geomorphic agent. Briefly describe geomorphic cycle. (9)
- (b) What do you mean by mass exfoliation? Briefly describe young and mature stages of stream. (12)
- (c) Briefly describe Earth's rotational theory and Helicoidal flow theory of meandering. (8)
- (d) The radius of curvature of Ganges River near Varanasi is about 4120 m. Meander length and valley length of the river is measured about 2510 m and 1990 m respectively. Find the value of meander ratio, meander amplitude, sinuosity and tortuosity of the river. (6)
2. (a) Write short notes on (i) Natural Levees (ii) Oxbow Lakes (iii) Ice sheet (iv) Littoral Transport (v) Tombolo. (5×4=20)
- (b) How wind erosion occurs? Briefly describe loess and dune form of wind borne material deposition. (2+8=10)
- (c) Explain the statement– "Glaciers grow and shrink with time". (5)
3. (a) What do you understand by fluvial deposits? Briefly describe (i) Meander belt deposits (ii) Deltaic plain deposits (iii) Alluvial fans and bajadas. (2+9=11)
- (b) Write short notes on (i) Old Himalayan Piedmond flood plain and (ii) Old Meghna estuarine flood plain. (9)
- (c) Define form factor and compactness co-efficient. (4)
- (d) What do you understand by Lacustrine deposits? Briefly describe various types of lacustrine deposits. (11)
4. (a) What are the common drainage Patterns? Describe with figure (i) Radial pattern (ii) Rectangular Pattern (iii) Dendritic pattern. (13)

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- (b) A stream network is shown in the Fig. 1. Make stream ordering according to Horton's method and Strahler's method of stream order. Calculate Bifurcation ratio using Horton's method of stream order. (14)
- (c) What do you mean by drainage texture? Calculate (i) Drainage density (ii) Length of overland flow (iii) Stream frequency for the stream network shown in the Fig. 1 using Horton's method of stream order. Given that the mean length of 1st, 2nd, 3rd and 4th order streams are 8 miles, 30 miles, 100 miles and 200 miles respectively. (8)

SECTION - B

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

5. (a) What is metamorphism? Describe the types of metamorphic Rock. (15)
- (b) Describe the texture of sedimentary rock. (10)
- (c) What are the causes of igneous activity? Briefly discuss the types of igneous rock. (10)
6. (a) Define non-ferromagnesian minerals. Illustrate different types of non-ferromagnesian minerals. (15)
- (b) Write short notes on (20)
- (i) Hornblende; (ii) Biotite; (iii) Bowen's Reaction Principle (iv) Mineraloids.
7. (a) Briefly describe the mechanisms that convert unconsolidated rock forming minerals into consolidated coherent rock. (15)
- (b) Difference between- (15)
- (i) P-waves and S-waves.
- (ii) Joint and Fault.
- (iii) Reverse fault and Strike-slip fault.
- (c) What are the plate boundaries? Show them in a figure. (5)
8. (a) Write down five characteristics of minerals. (10)
- (b) Discuss the types of surface waves from seismicity with figure. (10)
- (c) Show the masses of igneous rock in a flow chart. (5)
- (d) Describe the geological characteristics of Bangladesh. What are the tectonic blocks of Bangladesh? (10)
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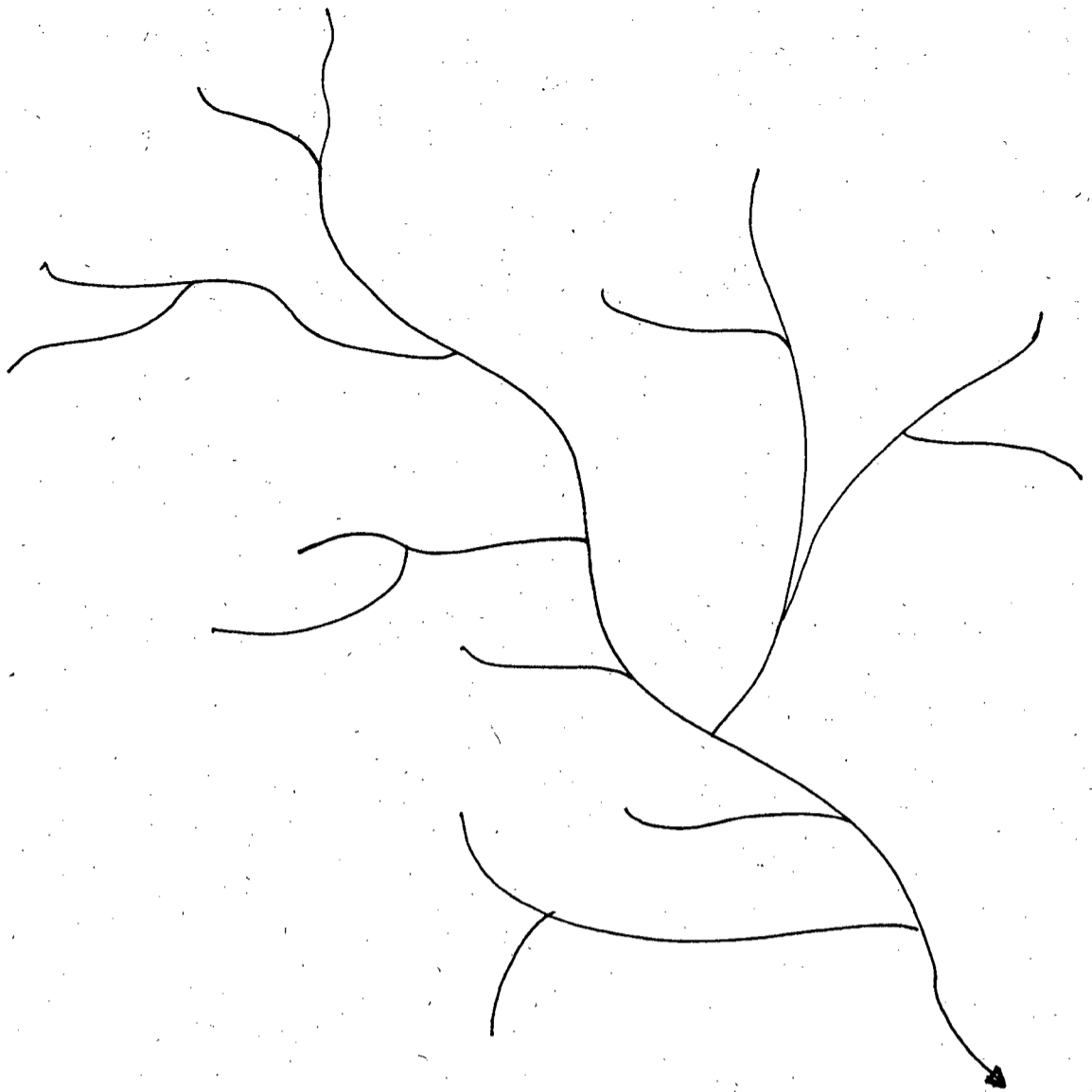


Fig: 1. for Question no. 4(b) & 4(c).