

The figures in the margin indicate full marks.

Assume reasonable values for any missing data.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. **Question No. 1** is compulsory.

Answer any **TWO** from the remaining **THREE** questions.

1. (a) How does the formation of calcium-silicate-hydrate (C-S-H) contribute to the strength of concrete? Show with neat sketches the rate of heat evolution at different stages of hydration reaction of Ordinary Portland cement. (10)
 - (b) Discuss the effect of alkali-aggregate reactivity on aggregate behavior. List the measures that can control alkali-aggregate reactivity. (10)
 - (c) The quantities of ingredients for specific aggregates characteristics and strength requirements of a non-air-entrained concrete are obtained using ACI Method of mix design without considering any admixture. The ingredients are water: 185 kg/m^3 , cement: 425 kg/m^3 , Fine Aggregate (OD): 740 kg/m^3 , Coarse Aggregate (OD): 1080 kg/m^3 , and volume of entrapped air: 1.5%. From the slump test of the trial batch, it is observed that the concrete mix does not have sufficient workability. An admixture (specific gravity = 1.1) is available in the market that can improve the workability. The admixture can reduce water demand by 10% at a dose of 10 ml/kg of cement. (15)
 - (i) Find the amount of ingredients (OD basis) required to get a concrete mix with same density when the specified admixture is used.
 - (ii) The moisture content and absorption capacity of the fine aggregate are 4.5% and 2.5% and moisture content and absorption capacity of the coarse aggregate are 1.5% and 2.2%. Determine the amount of water (kgs), cement (no. of bags), fine aggregate (kgs), coarse aggregate (kgs), and admixture (L) to cast a 3 ft. thick mat (100 × 80 ft.) after adjusting for aggregate moisture and admixture usage.
2. (a) State the characteristics of open graded, uniform graded, and gap graded aggregate. Also draw their typical gradation curves. (10)
 - (b) How does the water-cement ratio in concrete affect workability, strength, and stress-strain behavior of concrete. (10)

CE 201

Contd ... Q. No. 2

(c) Discuss the reasons for blending of aggregate. (15)

Determine the mix ratio of Aggregate A, B, and C to obtain the aggregate blend to meet the specification. Estimate the Fineness Modulus (FM) of the combined aggregate. Also, calculate the specific gravity of the combined aggregate, if the specific gravity of Aggregate A, B, and C are 2.95, 2.85, and 2.65. Use the following grain size distribution.

Sieve Size mm	Percent passing			Specification
	Aggregate A	Aggregate B	Aggregate C	
50	100	---	---	---
38	100	---	100	---
25	95	100	98	98
19	89	55	88	---
9.5	50	15	60	45
4.76	10	5	32	---
2.36	2	2	10	6
1.18	2	0	6	---
0.6	0	0	2	---
0.3	0	0	0	---

3. (a) Write short notes on (i) field tests of sand, and (ii) bleeding of concrete. (10)

(b) What are the basic factors that influence choice of concrete mix proportion? Briefly describe the fundamental principle of minimum void method of concrete mix design. (10)

(c) A concrete mix is to be designed following British mix design method for casting a column with characteristics strength 60 MPa at 28 days. The maximum allowable slump is 40 mm and maximum allowable w/c ratio is 0.4. Maximum 5% defectives are allowed.

Materials specifications are provided below: (15)

Cement: Rapid Hardening Cement (EN Class 52.5 N)

Coarse Aggregate:

Maximum Size: 25 mm

Type of aggregate: Crushed

Fine Aggregate:

Grading: 80% passing through 600 μm sieve

Type of aggregate: Crushed

Determine the following:

(i) Target mean strength.

(ii) Mix ratio on SSD weight basis and w/c ratio.

(iii) Amount of ingredient required for casting a set of 6-inch cube.

[Use the provided charts and tables, where necessary.]

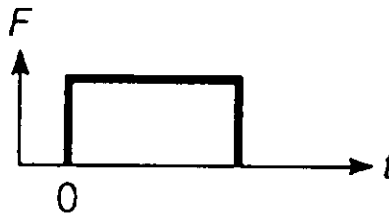
CE 201

- 4. (a) Expound on applicability of different types of ordinary Portland cement. Highlight the advantages of blended cement in comparison to OPC. (10)
- (b) Write down the properties of rubber. Compare natural rubber and synthetic rubber. (10)
- (c) What are the essential constituents of paint? Describe how they function in imparting different properties in paint. (10)
- (d) Write down the principal requirements of a good heat insulating material. (5)

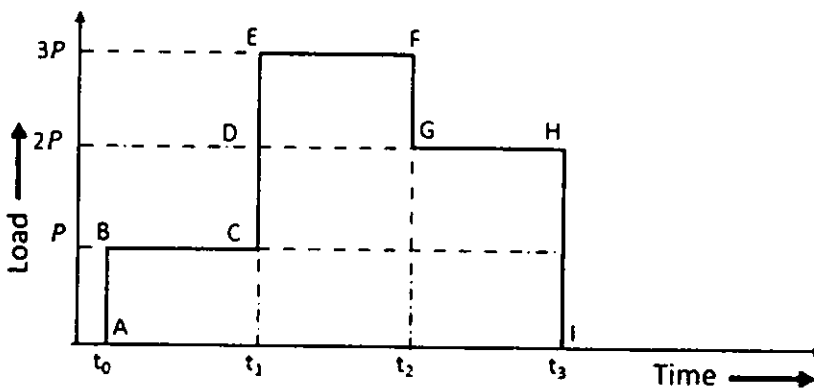
SECTION – B

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

- 5. (a) How does the engineering stress-strain diagram differ from the true stress-strain diagram. Explain with appropriate diagram(s). (6)
- (b) Write down the deformation equation of the Kelvin model as a function of time, t , force, F , and constants. Draw the deformation time curve of the Kelvin model under the following loading condition. (4+5)



- (c) What is corrosion? Why does corrosion occur? Write the factors affecting corrosion. (3+3+4)
 - (d) What is Ferrocement? Draw a typical section of ferrocement and list the component materials of ferrocement. (2+4+4)
6. (a) For the loading sequence shown in the following figure, draw the likely strain response with time of an: (i) Plastic material, (ii) Elasto-plastic material. (16)
- Assume, Equal time intervals, i.e., $\Delta t = t_1 - t_0 = t_2 - t_1 = t_3 - t_2 = t_4 - t_3$.



CE 201

Contd ... Q. No. 6

- (b) Why does corrosion occur in Reinforced Concrete (RC) elements? What measures should be taken to prevent corrosion in Reinforced Concrete (RC) elements. (2+7)
- (c) Explain with a neat sketch how ferrocement can be used to repair spalling of the slab. (10)
7. (a) What is Fiber Reinforced Polymer (FRP)? What are the applications of Fiber Reinforced Polymer (FRP) in civil engineering constructions? (2+8)
- (b) Compare the burnt clay brick and concrete block in terms of their material compositions and environmental impacts. (5)
- (c) Five first class brick samples were tested for compressive strength. Bricks were cut into identical halves along the length. Following results were obtained from the test. Calculate compressive strength of brick. Compression Test machine calibration equation: $Y = 1.0561X - 5.618$. (12)

Sample	Dimension (inch)				Observed Load (lb)
	Side 1		Side 2		
	Length	Width	Length	Width	
1	4.50	4.55	4.55	4.50	50690
2	4.55	4.55	4.55	4.55	51000
3	4.45	4.48	4.45	4.50	49900
4	4.55	4.55	4.55	4.60	50900
5	4.50	4.45	4.45	4.50	50400

- (d) Write short notes on the followings: (8)
- (i) Annealing
 - (ii) Varnish
 - (iii) ASTM naming convention for blended cement
 - (iv) Slaking of lime
8. (a) Compare between Soda-lime glass, potash lime-glass and potash-lead glass in terms of their properties and applications. (10)
- (b) What are the most common defects in timber? (5)
- (c) Compare between hydraulic lime and non-hydraulic lime. Describe the life cycle of hydraulic lime. (6+4)
- (d) Why seasoning of trees is important? Show the different methods of timber seasoning with a flowchart. What is the main process involved in water seasoning. (3+3+4)

CE 201

Table 1: Approximate Free Water Contents (kg/m³) Required to Give Various Levels of Workability

Slump (mm)	0-10	10-30	30-60	60-180	
Vee-bee time (s)	>12	6-12	3-6	0-3	
Maximum Aggregate Size (mm)	Type of Aggregate	Free Water Contents (kg/m ³)			
10	Uncrushed	150	180	205	225
	Crushed	180	205	230	250
20	Uncrushed	135	160	180	195
	Crushed	170	190	210	225
40	Uncrushed	115	140	160	175
	Crushed	155	175	190	205

Table 2: Approximate compressive strengths (MPa) of concrete mixes made with a free water/cement ratio of 0.5

Cement Type	Type of Coarse Aggregate	Compressive Strength (MPa)			
		Age (days)			
		3	7	28	91
Ordinary Portland Cement (OPC) or Sulphate Resisting (SRPC) EN Class 42.5	Uncrushed	22	30	42	49
	Crushed	27	36	49	56
Rapid Hardening Cement (RHPC) EN Class 52.5 N	Uncrushed	29	37	48	54
	Crushed	34	43	55	61

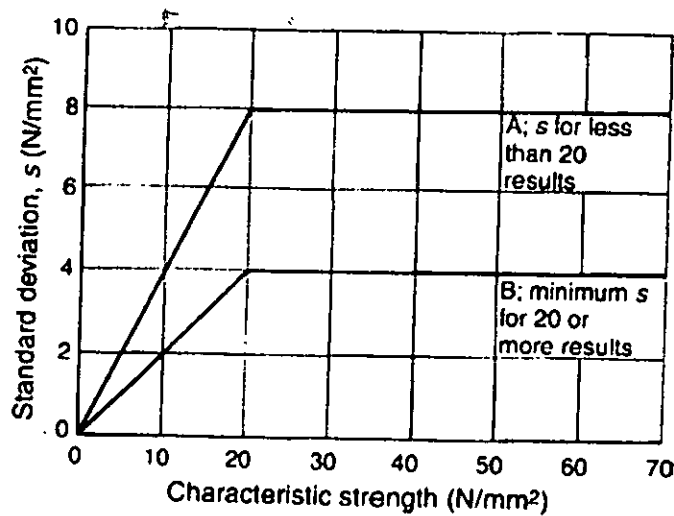


Figure 1: Assumed Relationship Between Standard Deviation and Strength

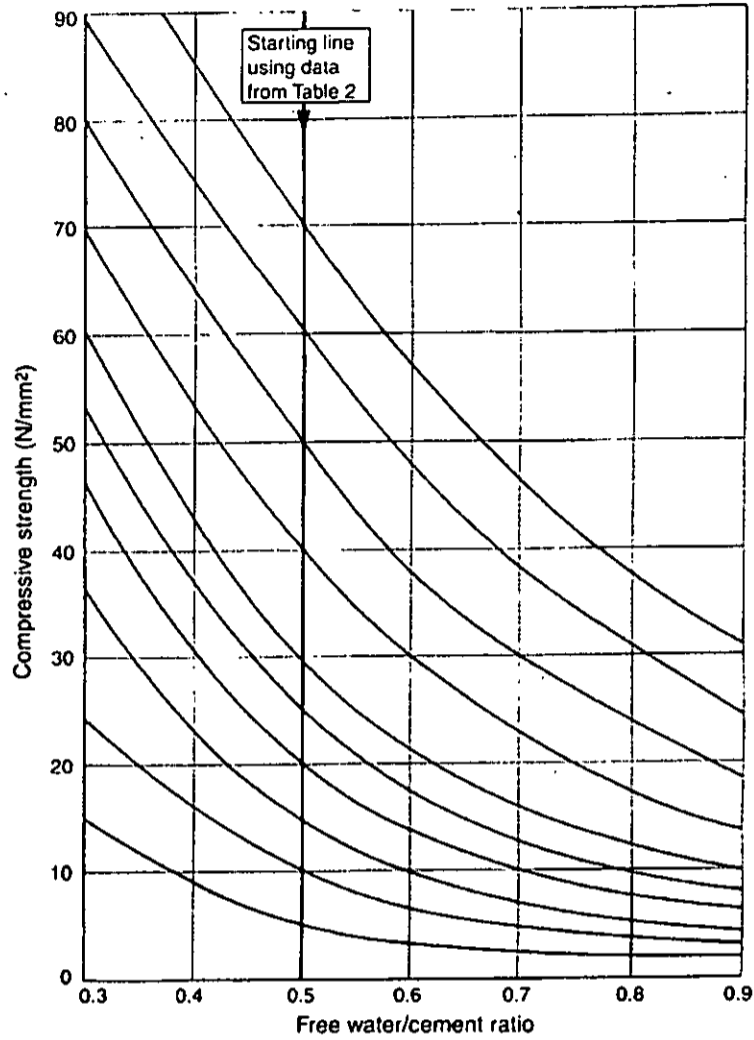


Figure 2: Relationship Between Strength and w/c Ratio

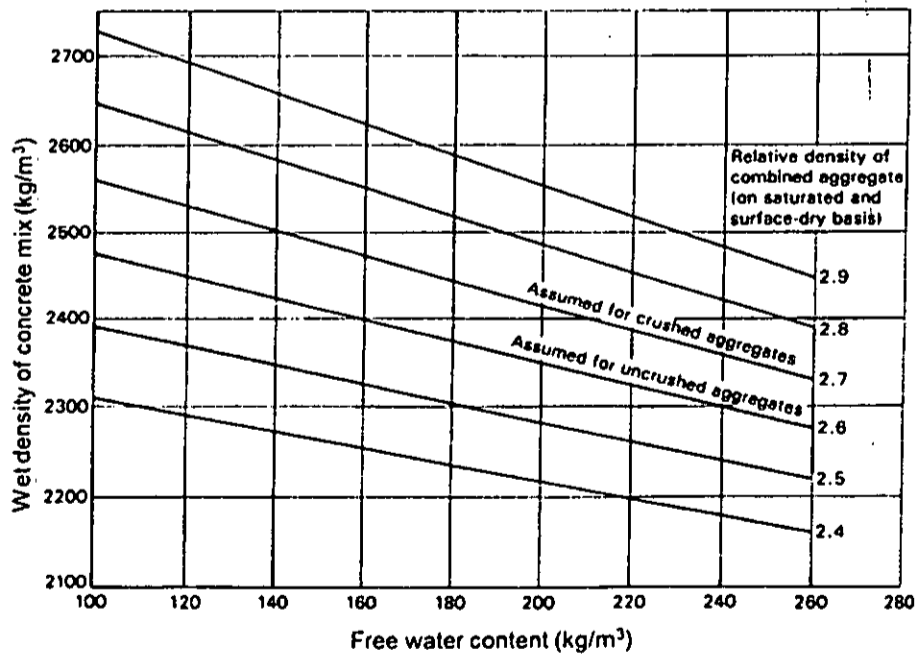


Figure 3: Relationship Between Density and Water Content

CE 201

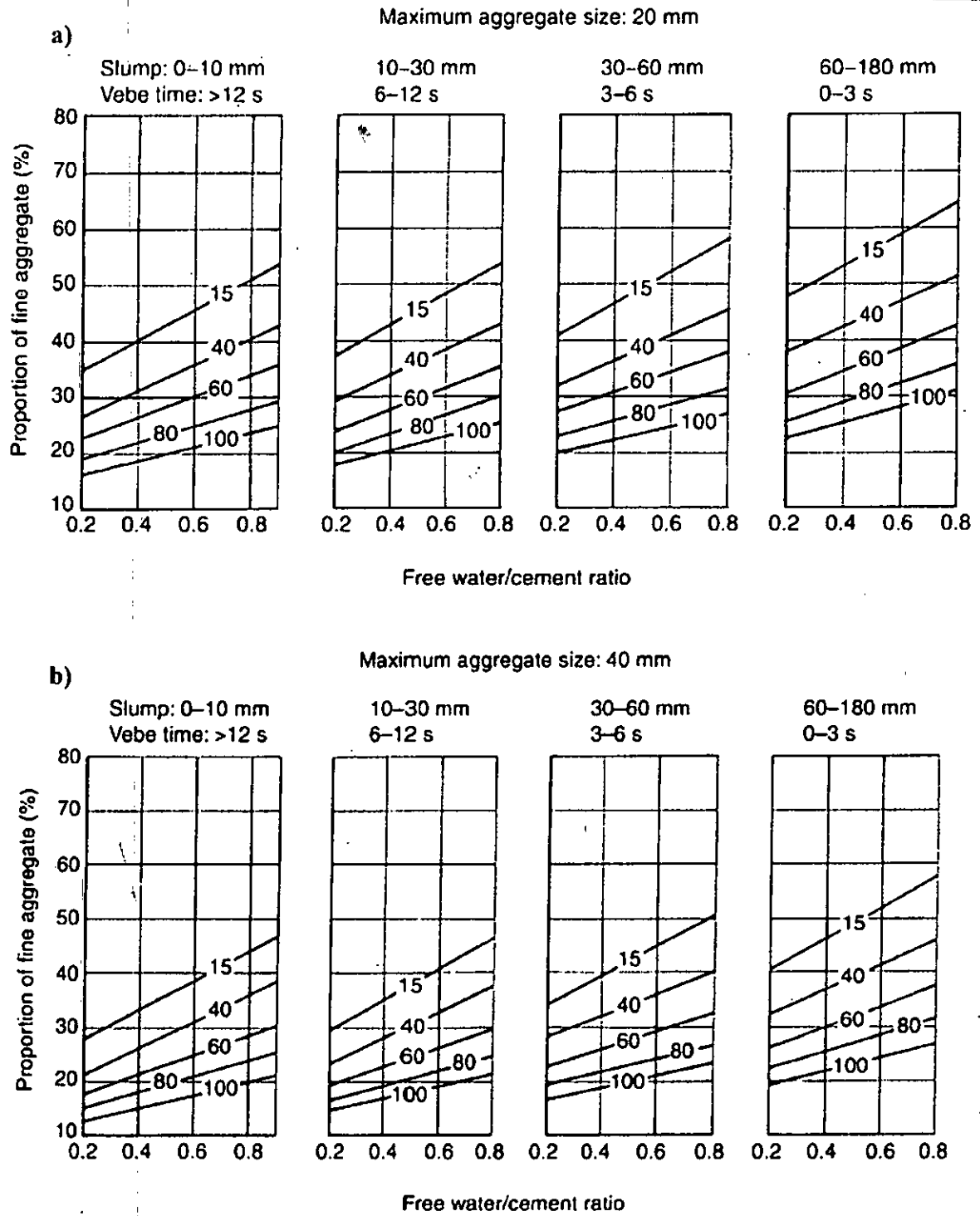


Figure 4: Relationship Between Proportion of Fine Aggregate and w/c Ratio based on percent passing a 600 µm sieve

SECTION – A

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

Symbols bear their usual meanings.

1. (a) Nails having total shear strength of 40 lb are used in a beam that can be constructed either as in Case I or as in Case II. Figure-1. If the nails are spaced at 9 in., determine the largest vertical shear that can be supported in each case so that the fasteners will not fail. (20)
 (b) The beam shown in Figure-2 is made from two boards. Determine the maximum shear stress in the glue necessary to hold the boards together along the seam where they are joined. (15)
2. (a) A rigid bar, hinged at one end, is supported by two identical springs as shown in Figure-3. Each spring consists of 20 turns of 10-mm wire having a mean diameter of 150 mm. Compute the maximum shearing stress in the springs. Neglect the mass of the rigid bar. (20)
 (b) Derive equation for spring deformation, measured along its axis, caused by torsional deformation of the spring neglecting the effect of direct shear. (15)
3. (a) For the planar structure shown in the Figure-4, find the reactions and determine the axial force P, the shear V, and the bending moment M caused by the applied loads at section a-a. Show the magnitude and sense of calculated quantities on separate free-body diagrams. For simplicity, assume that members can be represented by lines. (15)
 (b) Draw shear and moment diagrams for the beam shown in Figure-5. (20)
4. (a) A beam ACDB is supported by a hinge at 'A' and a roller at 'D'. It is subjected to the loads shown in Figure-6. Draw shear and moment diagrams for the beam ABCD only. (15)
 (b) Draw the shear force and bending moment diagrams for the beam with loads shown in Figure-7. (20)

SECTION – B

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

5. (a) The 4-mm diameter cable BC is made of steel with $E = 200$ GPa. Knowing that the maximum stress in the cable must not exceed 190 MPa and that the elongation of the cable must not exceed 6 mm, find the maximum load P that can be applied as shown in Figure-8. (20)

CE 211
Contd...Q. No. 5

- (b) The hollow shaft has the cross section shown in Figure-9 and is made of an elastic perfectly plastic material having a yield shear stress of τ_y . Determine the ratio of the plastic Torque T_p to the maximum elastic Torque T_y . (15)
6. (a) The A-36 steel circular tube is subjected to a Torque of 10 kNm. Determine the shear stress at the mean radius $\rho = 60$ mm and complete the angle of twist of the tube if it is 4-m long and fixed at its far end. (Figure-10) (15)
- (b) Two cylindrical rods, CD made of steel ($E = 29 \times 10^6$ psi) and AC made of aluminum ($E = 10.4 \times 10^6$ psi) are joined at B and restrained by rigid supports at A and D as shown in Figure 11. Determine the reactions at A and 'D'. (20)
7. (a) If the applied shear force $V = 18$ kip, determine the maximum shear stress in the member (Figure 12). (17)
- (b) A bending moment is applied to the bar shown in Figure 13 causing plastic zones 3-in thick to develop at the top and bottom of the bar. Calculate the moment required to produce those plastic zones. (Given: $E = 29 \times 10^6$ psi, $\sigma_y = 42$ ksi) (18)
8. The tube shown in Figure 14 has a uniform wall thickness of 0.5 in. For the given loading, determine, (35)
- (a) the stress at points A and B
- (b) the point where the neutral axis intersects line ABD.
-

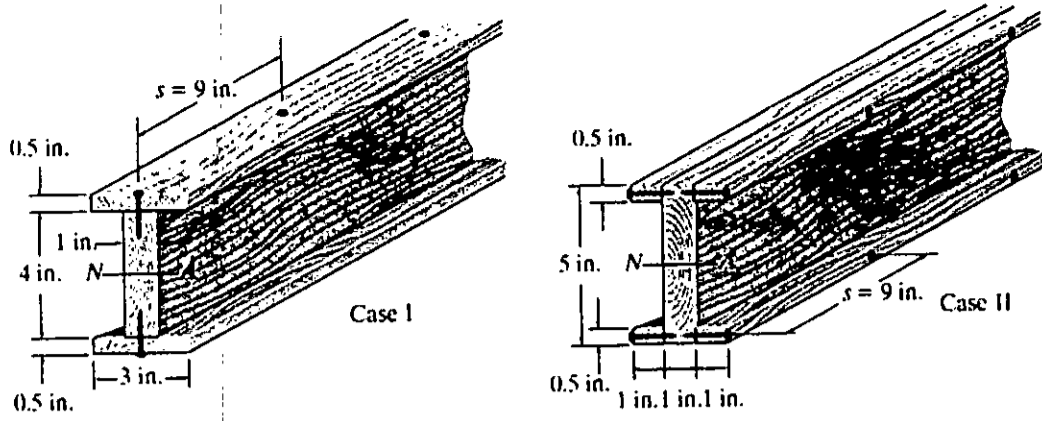


Figure -1

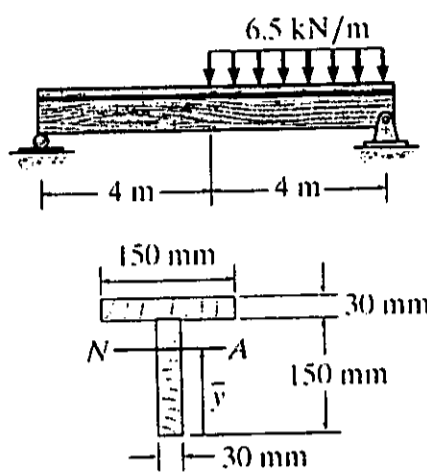


Figure -2

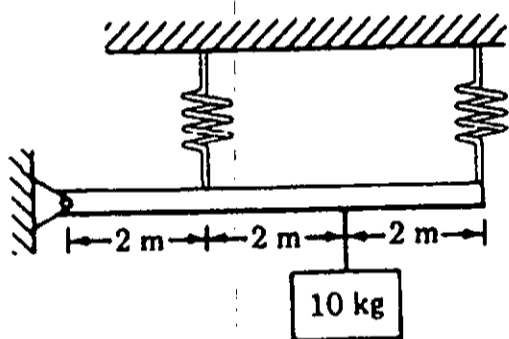


Figure-3 (a)

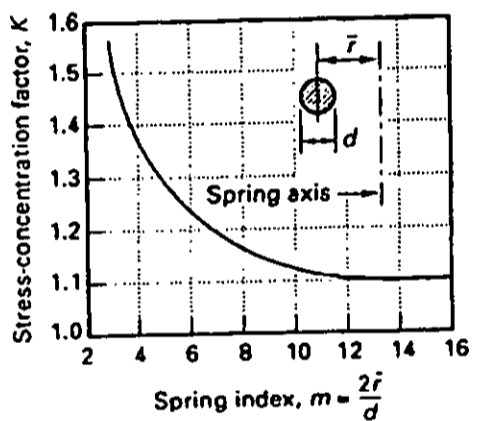


Figure -3(b)

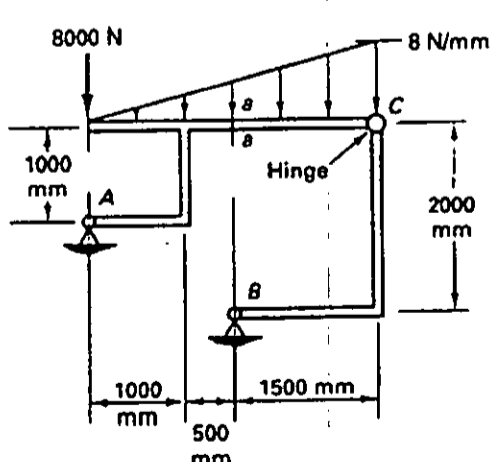


Figure -4

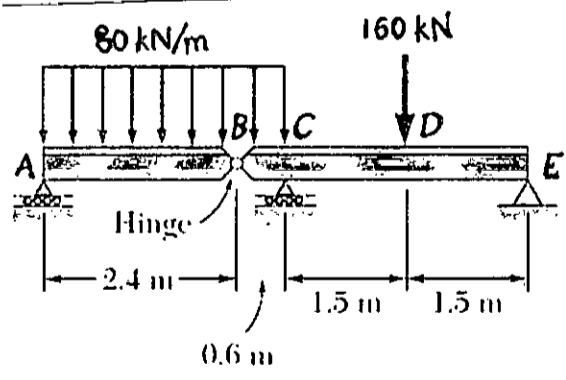


Figure -5

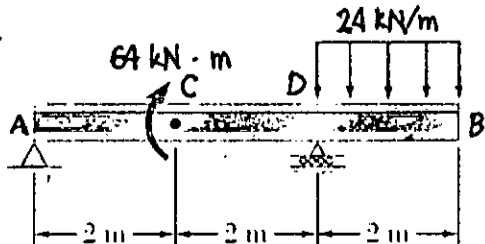


Figure -6

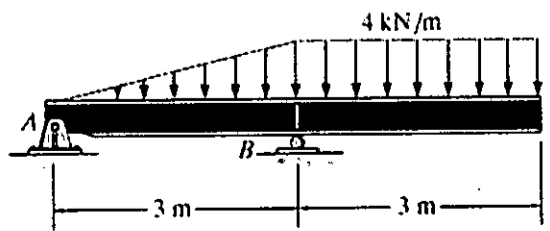


Figure -7

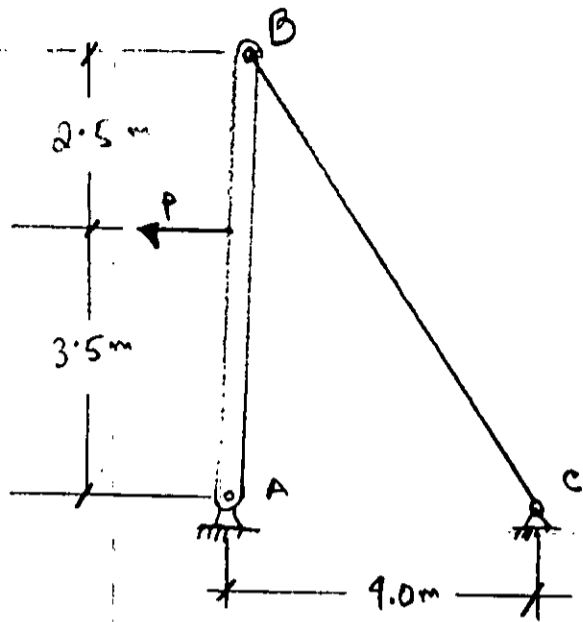


Figure 8

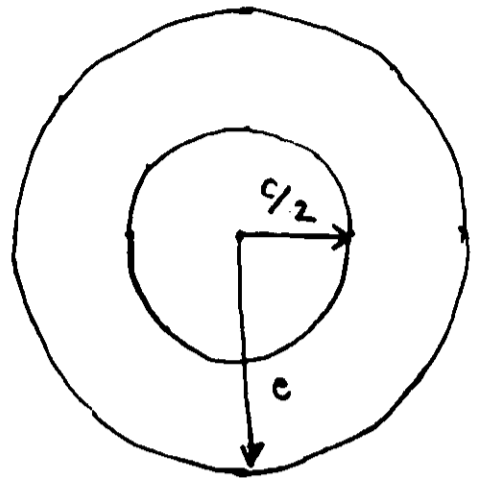


Figure 9

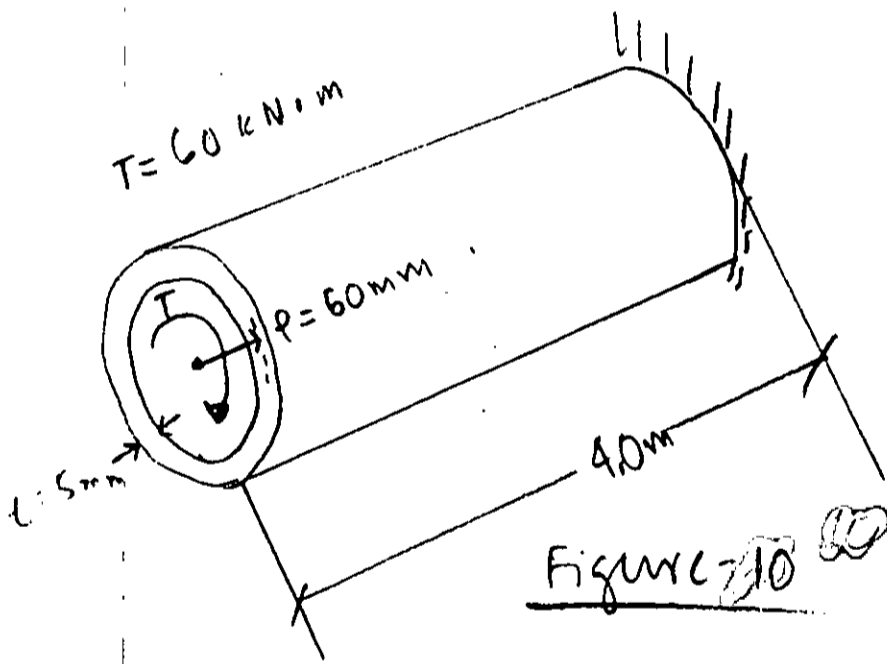


Figure 10

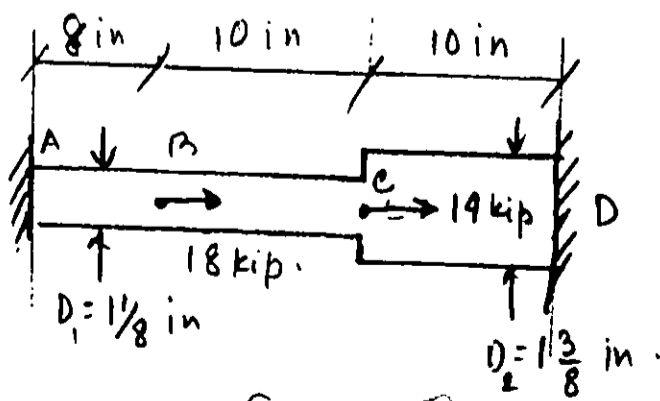


Figure 11

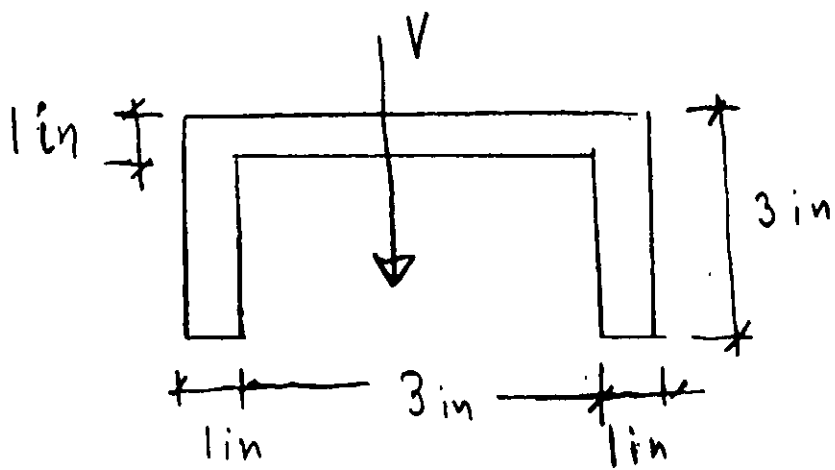


Figure 12

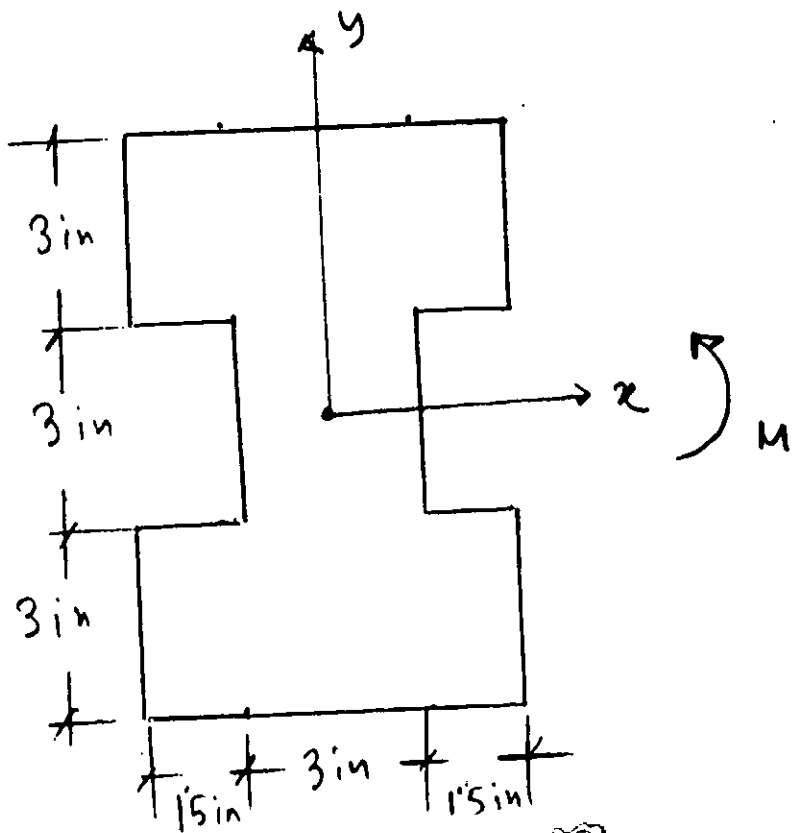


Figure 13

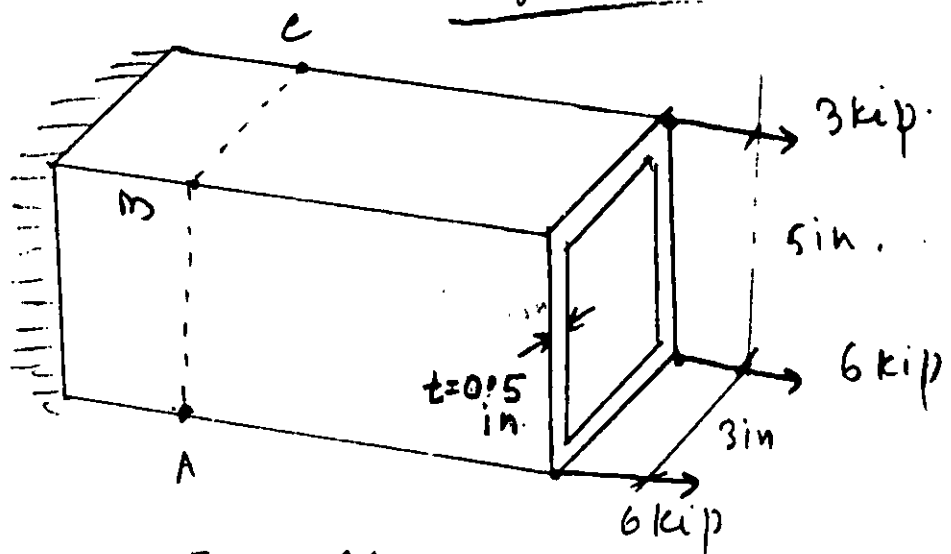


Figure 14

SECTION – A

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

Symbols have their usual meaning.

1. (a) Define scalar triple product mentioning its geometrical interpretation. Prove that the area of the triangle formed by joining the mid-point of one of the non-parallel sides of a trapezium to the extremities of the opposite side is half of that of the trapezium. (15)
- (b) Discuss reciprocal system of vectors. If the system of vectors \mathbf{a}' , \mathbf{b}' , \mathbf{c}' , are reciprocal to the system of vectors \mathbf{a} , \mathbf{b} , \mathbf{c} respectively, then prove that any vector \mathbf{r} can be given by $\mathbf{r} = (\mathbf{r} \cdot \mathbf{a})\mathbf{a}' + (\mathbf{r} \cdot \mathbf{b})\mathbf{b}' + (\mathbf{r} \cdot \mathbf{c})\mathbf{c}'$. (10)
- (c) Show that $\nabla \times (\mathbf{A} \times \mathbf{B}) = \mathbf{A}(\nabla \cdot \mathbf{B}) - \mathbf{B}(\nabla \cdot \mathbf{A}) - (\mathbf{A} \cdot \nabla)\mathbf{B} + (\mathbf{B} \cdot \nabla)\mathbf{A}$. (10)

2. (a) Define linearly dependent and independent set of vectors. Are the following three vectors $(1, 2, 3, 4)$, $(0, 1, 0, -1)$ and $(1, 3, 3, 3)$ form a linearly dependent set? If so, then express each vector as a linear combination of the other two. (15)
- (b) If $\mathbf{P} = \mathbf{A} \cos kt + \mathbf{B} \sin kt$, where \mathbf{A} and \mathbf{B} are constant vectors and k , a constant scalar, then show that $\frac{d^2 \mathbf{P}}{dt^2} + k^2 \mathbf{P} = \mathbf{0}$. (10)
- (c) Solve the vector equation $\mathbf{a} \times \mathbf{x} + \mathbf{a}(\mathbf{a} \cdot \mathbf{x}) + \mathbf{b} = \mathbf{0}$ for the vector \mathbf{x} . (10)

3. (a) Define gradient of a scalar point function. Find the acute angle between the surfaces $xy^2z = 3x + z^2$ and $3x^2 - y^2 + 2z - 1 = 0$ at $(1, -2, 1)$. (10)
- (b) Define divergence and curl of vector function. Show that the vector angular velocity of a uniformly rotating body about an axis is half of the curl of the linear velocity. (10)
- (c) State Stoke's theorem and apply this theorem to find the work done by the force field $\mathbf{F} = -3y^2\mathbf{i} + 4z\mathbf{j} + 6x\mathbf{k}$ on a particle that traverses the triangle C in the plane $z = \frac{1}{2}y$ with vertices $(2, 0, 0)$, $(0, 2, 1)$ and $(0, 0, 0)$ having a counterclockwise orientation. (15)

MATH 237 (CE)

4. (a) Define an irrotational field. Is the vector field $\mathbf{F} = (x^2 - yz)\mathbf{i} + (y^2 - zx)\mathbf{j} + (z^2 - xy)\mathbf{k}$ irrotational? If so, then find a scalar function ϕ such that $\mathbf{F} = \nabla\phi$. It is given that $\phi(1, 2, -1) = 7$. (15)
- (b) If $\mathbf{F} = 2y\mathbf{i} - z\mathbf{j} + x^2\mathbf{k}$ and S is the surface of the parabolic cylinder $y^2 = 8x$ in the first octant bounded by the planes $y = 4$ and $z = 8$, evaluate $\iint_S \mathbf{F} \cdot \mathbf{n} \, ds$. (15)
- (c) Describe source and sink. Determine the condition for which the following vector field is free of sources and sinks $\mathbf{F} = (x^3 - x)\mathbf{i} + (y^3 - y)\mathbf{j} + (z^3 - z)\mathbf{k}$. (5)

SECTION - B

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

Symbols have their usual meaning.

5. (a) State Gauss's divergence theorem and Stokes' theorem. (6)
- (b) Use Gauss's divergence theorem to evaluate $\iiint_V \nabla \cdot \mathbf{F} \, dV$ where $\mathbf{F} = yx^2\mathbf{i} + (xy^2 - 3z^4)\mathbf{j} + (x^3 + y^3)\mathbf{k}$ and V is the region bounded by the sphere $x^2 + y^2 + z^2 = 16$, $y \leq 0$ and $z \geq 0$. (14)
- (c) Verify Stokes' theorem for the vector function $\mathbf{F} = (z^2 - 1)\mathbf{i} + (z + xy^3)\mathbf{j} + 6\mathbf{k}$ taken over the portion of $x = 6 - 4y^2 - 4z^2$ in front of $x = -2$. (15)
6. (a) Find the value of (i) $L\{1 + t^3 e^{-2t}\}^2$ and (ii) $L\{\sin 3t \cos^2 2t\}$. (8+4)
- (b) Use $L\{f'(t)\} = sF(s) - f(0)$, where $L\{f(t)\} = F(s)$ to assess $L\left\{\frac{\cos \sqrt{t}}{\sqrt{t}}\right\}$. (12)
- (c) Apply the definition of error function to compute the value of $L\{\text{erf} \sqrt{t}\}$. (11)
7. (a) Describe (i) convolution theorem and (ii) Heaviside expansion method for inverse Laplace transform. (11)
- (b) Apply the convolution theorem to find $L^{-1}\left\{\frac{1}{(s+3)(s-5)^2}\right\}$ (12)
- (c) Using the Heaviside expansion method find $L^{-1}\left\{\frac{2s^2 - 1}{(s-3)(s^2 + 2s + 2)}\right\}$. (12)
8. (a) Solve the initial value problem using Laplace Transform $\frac{d^2x}{dt^2} + 6\frac{dx}{dt} + 9x = \sin t$ ($t \geq 0$) subject to the conditions $x(0) = x'(0) = 0$. (12)
- (b) Apply Laplace transform to find solution of the initial value problem with variable coefficients: $ty''(t) + y'(t) + ty(t) = 0$; $y(0) = 1, y'(0) = 0$. (11)
- (c) Use Laplace transform to solve the following system of equations: (12)

$$\frac{dx}{dt} - y = e^t, \quad \frac{dy}{dt} + x = \sin t; \quad \text{where } x(0) = 1, y(0) = 0$$

SECTION – A

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

1. (a) What is meant by degree of operating leverage (DOL)? How is it useful in planning business operations? (4 1/3)

(b) Stealtech company produce memory enhancement kits for fax machines. Sales have been very erratic with some months showing a profit and some months showing a loss.

The company's income statement for the most recent month is given below: (19)

	Tk.
Sales (12,400 units at Tk. 20 per unit)	248,000
Less: Variable expenses	<u>189,000</u>
Contribution margin	59,000
Less: Fixed expenses	<u>60,000</u>
Net operating loss	<u>(1,000)</u>

Required:

- (i) Compute the company's CM ratio and its break-even point in both Units and Taka.
- (ii) The sales manager feels that Tk. 8,000 increase in the monthly advertising budget, combined with an intensified effort by the sales staff, will result in a Tk. 70,000 increase in monthly sales. If the sales manager is right, what will be the effect on the company's monthly net operating income or loss.
- (iii) The President is convinced that a 10% reduction in the selling price, combined with an increase of Tk. 15,000 in the monthly advertising budget, will cause unit sales to double. What will the new income statement look like if these changes are adopted?
- (iv) Based on the original data, calculate the company's margin of safety and margin of safety ratio.
- (v) Assume that the operating results for the last year were as follows:

Sales	Tk. 360,000
Less: Variable costs	<u>162,000</u>
Contribution margin	198,000
Less: Fixed costs	<u>180,000</u>
Net operating income	<u>(18,000)</u>

- * What will be the degree of operating leverage in this situation?
- * The president expects sales to increase by 15% next year. By how much should net operating income increase (Use degree of operating leverage)?
- * Verify your answer by preparing income statement.

HUM 353/CE

2. (a) Why do net income under variable costing and that under absorption costing differ? (4 1/3)

(b) Consider the following data relating to Stratford manufacturing company for the period ended on December 31, 2019: (19)

Cost Data (Tk.)

Variable costs per unit:

Direct materials	Tk. 25
Direct Labour	12
Variable manufacturing overhead	13
Variable selling and administrative overhead	10

Fixed cost per year:

Fixed manufacturing overhead	Tk. 250,000
Fixed selling and administrative overhead	150,000

Production and Sales Data:

Units produced	25,000 units
Units sold	20,000 units
Unit selling price	Tk. 100

Required:

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

3. (a) Explain the difference between (4 1/3)

- (i) Direct materials and indirect materials
- (ii) Direct labour and indirect labour
- (iii) Manufacturing overhead and Administrative overhead

Give example of each category.

(b) Various cost and sales data for Meriwell Company for the just ended year are as follows: (19)

<u>Particulars</u>	<u>Amount (Tk.)</u>
Material purchased	250,000
Direct labour	90,000
Indirect labour	16,000
Office manager salary	15,000
Depreciation, factory machine	4,000
Fuel for factory equipment	12,000
Showroom rent	3,000
Office rent	5,000
Factory rent	40,000
Depreciation, office equipment	12,000
Machine repairing cost, factory	3,000

HUM 353/CE

Contd ... Q. No. 3(b)

<u>Particulars</u>	<u>Amount (Tk.)</u>	
Sales		900,000
Advertisement		20,000
Sales salaries expenses		5,000
Factory guard salary		30,000
Utilities, factory		20,000
Supplies (30% factory, 70% office)		15,000
<u>Inventories</u>	<u>January 1, 2021</u>	<u>December 31, 2021</u>
Direct materials	Tk. 5,000	Tk. 9,000
Work-in-process	15,000	9,000
Finished goods	5,000	7,000

Required:

- (i) Prepare a cost of goods sold statement.
- (ii) Prepare an income statement for the year.

4. (a) Siemens Company Ltd is considering two projects to invest in 2024. Each project's primary investment requires Tk. 200,000. The required rate of return of the company is 12%. The more detailed information on those projects is as follows:

(13 1/3)

	<u>Cash Inflows (Tk.)</u>	
<u>Year</u>	<u>Alpha</u>	<u>Beta</u>
1	50,000	80,000
2	40,000	90,000
3	70,000	50,000
4	80,000	35,000
5	250,000	130,000

Required:

- (i) Calculate the Payback Period (PBP) of each project and comment if a company wants to get back its investment within 3 years.
 - (ii) Calculate the Net Present Value (NPV) of each project and comment.
 - (iii) Calculate the Profitability Index (PI) of each project and comment.
 - (iv) Based on the above calculation which projects will you suggest? And why?
- (b) Neptune Rentals offers a boat rental service. Consider the following costs of the company over a relevant range of 5000 to 20000 hours of operation time for its boats.

(10)

HUM 353/CE

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

	<u>Hours of Operation Time</u>			
	<u>5,000</u>	<u>10,000</u>	<u>15,000</u>	<u>20,000</u>
Total costs (Tk.)				
Variable costs	20,000	?	?	?
Fixed costs	<u>180,000</u>	<u>?</u>	<u>?</u>	<u>?</u>
Total costs	<u>200,000</u>	<u>?</u>	<u>?</u>	<u>?</u>
<u>Cost per hour (Tk)</u>				
Variable costs	?	?	?	?
Fixed costs	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>
Total costs per hour	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>

Required:

Compute the missing amounts assuming that implied cost behavior patterns remain unchanged over the relevant range of 5000 to 20,000 hours.

SECTION – B

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

5. Mrs. Hasina is a licensed dentist who started Ayan Dentistry at Dhanmondi Dhaka. During the first month of the operation of her business, the following events and transactions occurred:

(23 1/3)

April 1	Invested Tk 5,00,000 cash and Dental Equipment of Tk. 45,000 in her dental business.
1	Hired a secretary-receptionist at a salary of Tk 5,000 per week payable monthly.
2	Paid office rent for the month Tk. 18,000.
5	Purchase Equipment for Tk. 90,000 out of which Tk. 60,000 was paid instantly.
8	Purchased Dental Equipment on account from Smile Company Tk 41,000.
10	Provided dental services to a patient on account Tk. 50,000.
11	Received Tk 55,000 cash advance from Taj for an implant.
15	Taken a Bank Loan for Tk. 2,00,000 from Sonali Bank PLC.
20	Received Tk 31,000 cash for dental services provided to Mr. Shah Jahan.
30	Paid secretary-receptionist salary for the month Tk. 20,000.
30	Paid Tk 35,000 to Smile Company for accounts payable due.
30	Hasina withdraw Tk. 7000 for personal use.

Mrs. Hasina uses the following accounts: Cash, Rent Expense, Equipment, Accounts Payable, Unearned Service Revenue, Owner's Capital, Owner's Drawings, Service Revenue, Salaries and Wages Expense, Account Receivables, and Bank Loan.

Required:

- Journalize the transactions.
- Post to the ledger accounts.
- Prepare a trial balance on April 30, 2024.

HUM 353/CE

6. (a) Discuss the qualitative characteristics of accounting information that are required to make information more useful to the interested users. (8 1/3)
- (b) Golden Club opened the Disc Golf Course on March 1, 2024. The following selected events and transactions occurred during March. (15)

Mar. 1	Invested \$30,000 cash and \$5000 Golf accessories in the business.
Mar. 3	Purchased Heeren's Golf Land for \$15,000 cash
Mar. 5	Paid advertising expenses of \$700.
Mar. 6	Paid cash \$600 for a one-year insurance policy.
Mar. 10	Purchased golf discs and other equipment for \$1,050 from Insole Company payable in 30 days.
Mar. 18	Received \$1,100 in cash for golf fees earned (Forte records golf fees as service revenue).
Mar. 19	Sold 150 coupon books for \$10 each. Each book contains 4 coupons that enable the holder to play one round of disc golf.
Mar. 25	Withdrew \$800 cash for personal use.
Mar. 30	Paid salaries of \$250.
Mar. 30	Paid Insole Company in full.
Mar. 30	Received \$2,100 cash for fees earned.

Required:

Show the effect of the above transaction on the Accounting Equation.

7. (a) Why are adjusting entries required to be prepared before preparing financial statements? Mention the types of adjusting entries with one example of each. (8 1/3)
- (b) Here are the extracts from the financial statements of Fintech Ltd for the year ended on 31st December 2023: (15)

Description	Tk.
Current Assets	650000
Current Liabilities	380000
Inventory	80000
Total Assets	1400000
Equity	300000
Sales	600000
Cost of Goods Sold (COGS)	400000
Net Profit (After tax)	120000
Number Common Share	16000
Account Receivables	199000
Number of common shares outstanding	6000

HUM 353/CE

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

Required: Calculate and comment on the following ratios:

- (i) Current Ratio.
- (ii) Quick or Acid Test Ratio.
- (iii) Debt to Total Asset Ratio.
- (iv) Inventory Turnover (Times).
- (v) Accounts Receivable Turnover (Times).
- (v) Earnings Per Share (EPS).

8. The year-ended Trial Balance of Agora Ltd is as follows:

(23 1/3)

Agora Ltd Trial Balance December 31, 2022		
Particulars	Debit Tk.	Credit Tk.
Cash	20000	
Investment	100000	
Account Receivable	50000	
Opening Inventory	15000	
Office Supplies	9000	
Office Equipment	60000	
Prepaid Rent	4000	
Notes Payable		34000
Accounts Payable		90000
Agora's Capital		70000
Agora's Drawings	3500	
Sales		200,000
Purchase	100000	
Salary Expense	18000	
Rent Expense	9000	
Insurance Expense	4500	
Freight Out	1000	
Total	<u>394000</u>	<u>394000</u>

Adjustment Data:

- (i) Merchandise inventory actually on hand at 31st December Tk. 30000
- (ii) Rent were expired Tk 2500
- (iii) Depreciation on office Equipment @10% per annum
- (iv) Outstanding salary of Tk. 2000 for the period
- (v) Office Supplies on hand Tk. 4000

Required: Prepare

- (a) Statement of Profit or Loss
- (b) Statement of Changes in Equity
- (c) Statement of Financial Position on 31st December 2022
