

**SECTION – A**

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

1. Calculate the maximum bending stresses (positive and negative) of the beam shown in Fig. 1. (14)
2. Determine the allowable bending moment around horizontal neutral axes for the composite beams wood and steel plates having the cross-sectional dimensions shown in Fig. 2. Materials are fastened so that they act as a unit. Given  $E_{st} = 30 \times 10^6$  psi and  $E_w = 1.2 \times 10^6$  psi. The allowable bending stresses are  $\sigma_{st} = 20$  ksi and  $\sigma_w = 1.2$  ksi. (14)
3. Determine the maximum stress in the concrete and the steel for a reinforced-concrete beam with the section shown in Fig. 3 if it is subjected to positive bending moment of 80,000 lb-ft. The reinforcement consists of three #8 steel bars (these bars are 1 inch in diameter). Assume the ratio of E of steel to that of concrete be 10. (14)
4. The beam of Fig. 4 is made of four wooden planks which are nailed to each other. If the beam has to carry a maximum vertical shear of 2500 lbs and shear capacity of a single nail is 250 lbs, determine the spacing of the nails with a factor of safety of 2. (14)
5. Draw the shear stress distribution diagram of the beam shown in Fig. 5 at a section 5 ft from the left support. (14)
6. Determine the equation of the elastic curve (deflection) for the beam shown in Fig. 6. Also calculate the deflection at mid span. (14)
7. Draw the shear force and bending moment diagram of the beam shown in fig. 7. (14)

**CE 365 (ARCH)**

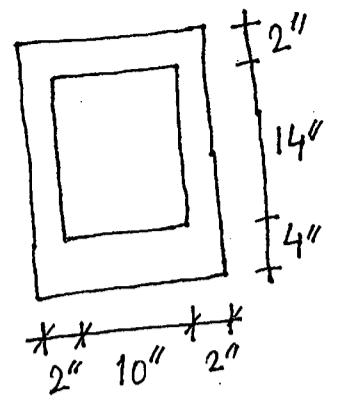
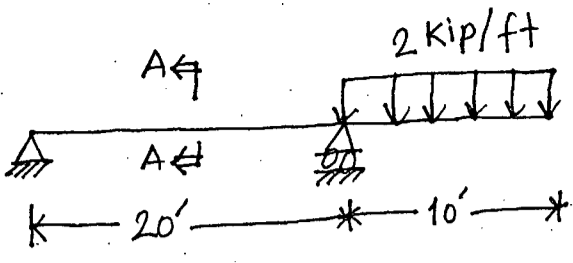
**SECTION – B**

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

8. State of stresses for an element is shown in Fig. 8. Calculate the normal and shear stresses on plane AB. (14)
9. Using Mohr's circle of stresses, for the element shown in Fig. 8, (14)
  - (a) find the principal stresses and show their direction on properly oriented element,
  - (b) find the maximum shear stress and associated normal stresses, if any. Show their proper orientation.
10. Determine the capacity of the column of 24 ft height shown in Fig. 9. The column is braced at mid height to resist its deflection in the y-direction. Use A36 steel having  $\sigma_{yp} = 36$  ksi and  $E = 29 \times 10^3$  ksi. (14)
11. Determine the allowable axial load of a 12 ft long steel column of W 8  $\times$  67 section ( $A = 19.7$  in<sup>2</sup>,  $r_{xx} = 3.71$  in and  $r_{yy} = 2.12$  in. The column is fixed at one end and pin-connected at the other. Use A36 steel having  $\sigma_{yp} = 36$  ksi and  $E = 29 \times 10^3$  ksi. Use AISC/ASD method. (14)
12. Using the moment-area method, determine the deflection of the beam at the middle span as shown in Fig. 10. EI is constant. (14)
13. Using the moment-area method, determine the deflection and slope of the elastic curve at point A due to the applied load for the beam as shown in Fig. 11. Specify the direction of deflection and of rotation. (14)
14. Draw the shear force and bending moment diagram of the beam shown in Fig. 12. (14)

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SECTION A-A

Fig. 01

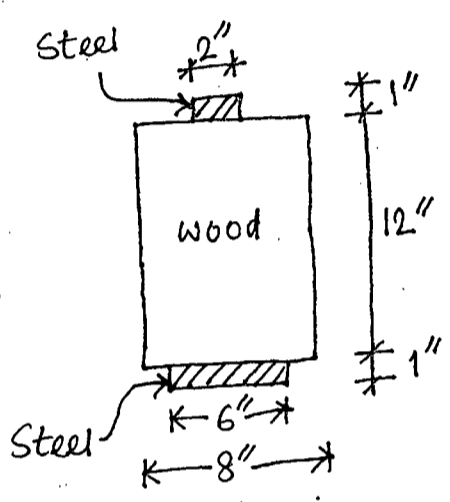


Fig. 02

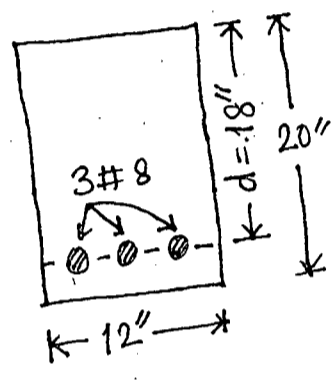


Fig. 03

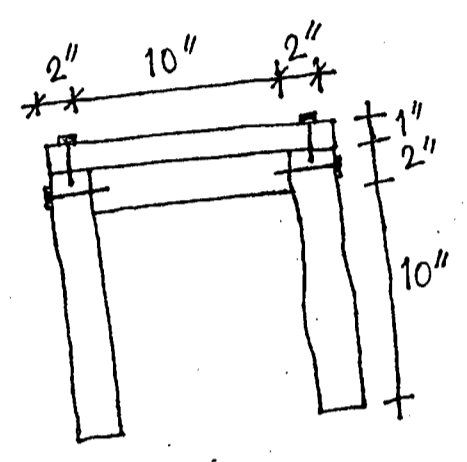
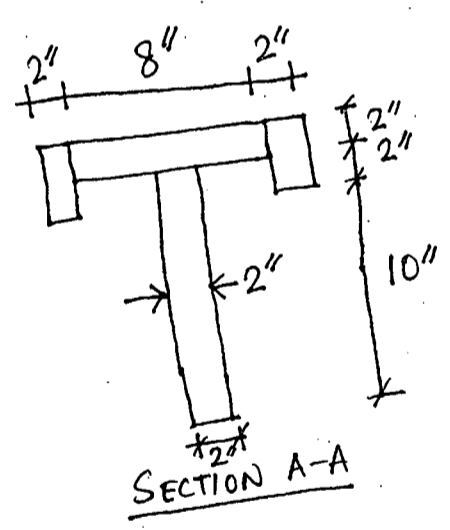
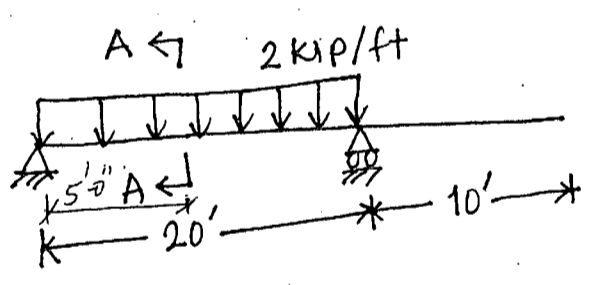


Fig. 04



SECTION A-A

Fig. 05

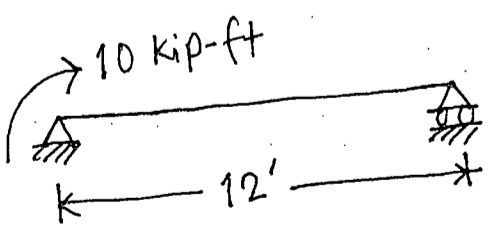


Fig. 06

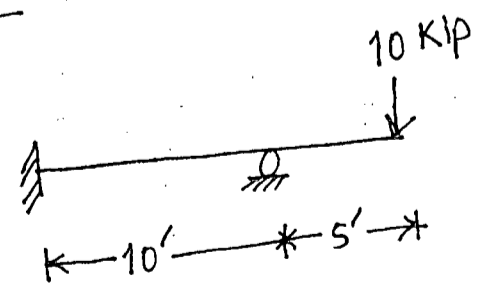


Fig. 07

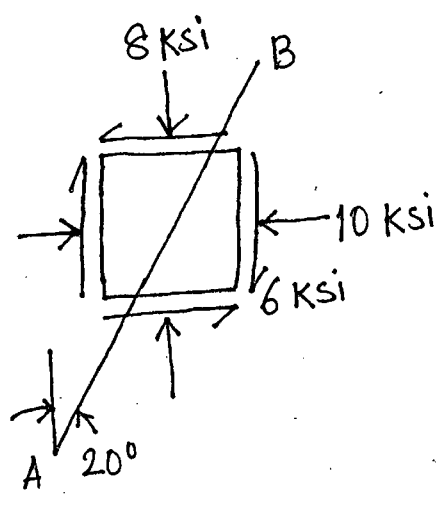


Fig. 08

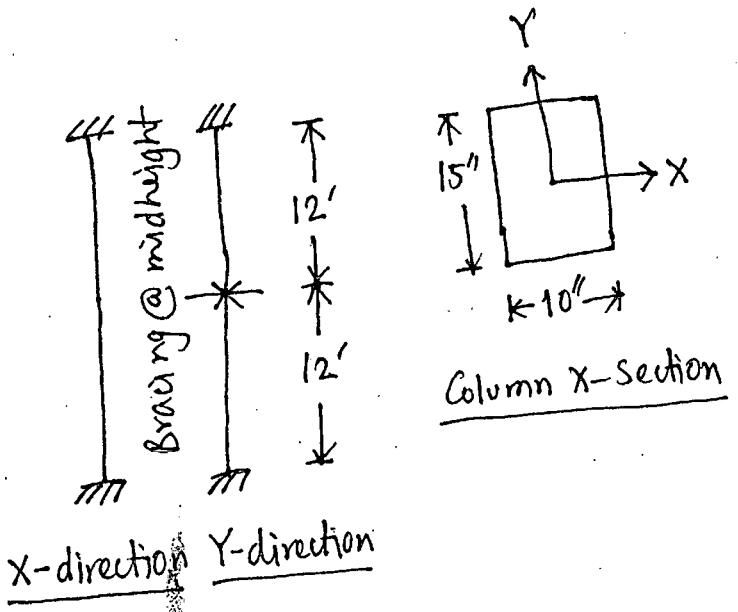


Fig. 09

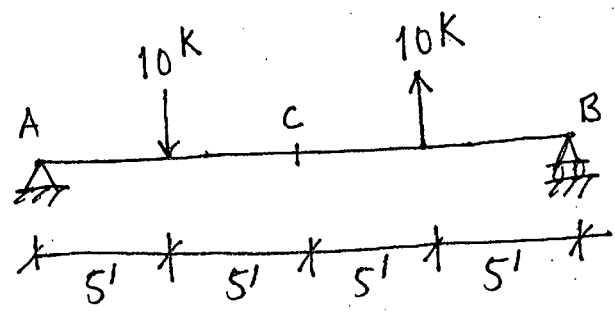


Fig. 10

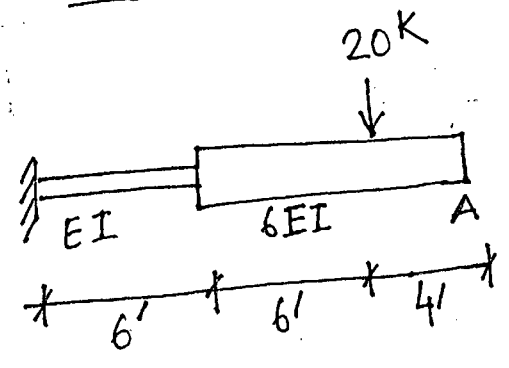


Fig. 11

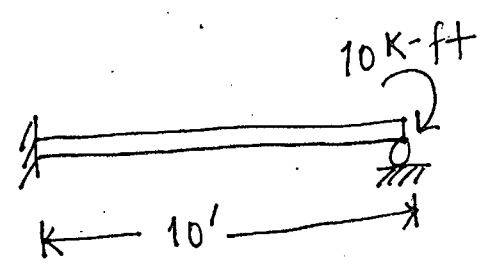


Fig. 12

**SECTION – A**

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

1. Critically compare among the tomb of Iltutmish, Sultan Ghari's tomb and the tomb of Ghiyas-ud-din Tughlaq in terms of concept, architectural features, materials, structure and function. Use necessary sketches. (30)
2. What is the first attempt of slave dynasty's important building scheme? Discuss and graphically represent its stages. (20)
3. (a) Critically review the architectural characteristics of Hauz Khas. (15)  
(b) Draw plan and section of Militant Palace of Firoz Shah Kotla. (5)
4. Write short notes on the followings: (10×2=20)
  - (i) Uniqueness of Khirki Mosque
  - (ii) Qutb Minar

**SECTION – B**

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

5. (a) Draw the master plan of Fatehpur Sikri denoting significant buildings. (10)  
(b) Critically describe Fatehpur Sikri in connection with the following aspects: (16)
    - (i) Planning scheme
    - (ii) Experiential unity and diversity
  6. (a) Draw plans of different levels of Humayun's tomb and briefly note its main architectural features. (14)  
(b) Briefly write the concept of Mughal garden and its main features. Use sketches. (8)
  7. (a) State your opinion regarding the spatial articulation, architectural features applied in Jahangiri Mahals plans and elevations. (12)  
(b) Draw the layout plan of Taj Mahal complex and briefly describe the zoning of the complex. (10)
  8. Write brief notes on: (Use sketches)
    - (a) Planning features of Shahjahanabad (11)
    - (b) Akbar's tomb at Sikandra (11)
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BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 B. Arch. Examinations 2014-2015

Sub : **HUM 315** (Logic and Philosophy)

Full Marks : 140

Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

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

1. (a) Discuss the importance of studying logic. (10)
- (b) What is meant by deductive argument and inductive argument? Explain with examples. (13 1/3)
  
2. (a) "All reasoning is thinking, but all thinking is not reasoning" – Discuss. (8)
- (b) What are the differences between truth and validity? (5)
- (c) How can an argument be valid if the premises and conclusion are false? Explain with example. (10 1/3)
  
3. (a) What is fallacy? (4)
- (b) Write the differences between formal fallacy and informal fallacy. (9)
- (c) Discuss any five types of fallacies. (10 1/3)
  
4. (a) What is categorical syllogism? (4)
- (b) What are the rules of syllogism? Discuss. (13 1/3)
- (c) Define synthetic judgement and analytic judgement. (6)

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

5. (a) What is philosophy? (5)
- (b) Discuss the relationship between philosophy and architecture. (13 1/3)
- (c) What do you mean by engineering ethics? (5)

**HUM 315/ARCH**

6. (a) Show the distinction between materialism and idealism. (7)  
(b) What are the sources of knowledge? Discuss in details. (8  $\frac{1}{3}$ )  
(c) Explain the moral argument of Immanuel Kant. (8)
7. (a) Define idea and its classification after Descartes. (4)  
(b) What are the arguments provided by John Locke against the innate ideas? (13  $\frac{1}{3}$ )  
(c) Define metaphysics and aesthetics. (6)
8. (a) Why is Thales called the father of philosophy? (10)  
(b) "Man is the measure of all things" – Explain and evaluate this statement after Plato. (13  $\frac{1}{3}$ )
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Sub : **ME 363** (Building Services II : Mechanical Equipment)

Full Marks : 140

Time : 3 Hours

The figures in the margin indicate full marks.

Use supplied Refrigeration and Air Conditioning Hand Book.

USE SEPARATE SCRIPTS FOR EACH SECTION

**SECTION – A**

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

1. (a) What is meant by five-minute peak? Draw the curve of a typical arrival rate at an office building in terms of time. (5 1/3)

(b) For a 17 story building with a lobby 20 ft and other typical floors 10 ft, determine the following to transfer 130 persons during 5-min peak morning in-rush, assuming 2500 @ 700 fpm elevators. (10)

- (i) Elevator round-trip time
- (ii) Handling Capacity
- (iii) Number of elevators required

Use Table 4.6 and Chart 4 for necessary data as follows:

**Table 4.6 Time value per upper floor stop as well as lobby time factor related to car loading**

Car Size and Loading	2000 lb	2500 lb	3000 lb	3500 lb	4000 lb
	19	12	16	19	22
Lobby Time*	16	20	23	25	26
Upper Floor Time	8.7	9.5	9.6	9.8	10.0

\* Rounded off to nearest second.

← Table 4.6 for Question 1(b)

Chart 4 for Question 1(b)

**Chart 4. Approximate probable stop values for various car loadings and upper floor stops**

Upper floors served	Passengers per trip						
	10	12	14	16	18	20	22
18	8	9	10	11	12	13	13
16	8	9	10	10	11	12	12
14	7	8	9	9	10	11	11
12	7	8	9	9	10	10	10
10	6	7	8	8	9	9	9
8	6	6	7	7	8	8	8
6	5	5	6	6	7	7	7

Probable stops

(c) What are the 3 main component units of a moving ramp or of an escalator? Draw and label a typical escalator to show its standard space requirements. (8)



**ME 363/ARCH**

2. (a) Differentiate between various types of door opening for elevators. (5 1/3)
- (b) With sequential sketches, show how the total time of an elevator trip is calculated by breaking down its components for a two-stop elevator 10 ft apart. (10)
- (c) Compare the different arrangements for 6 elevator car groupings. (8)
3. (a) What are the 3 essential requirements to start a fire? To extinguish combustion what are the standard methods? (5 1/3)
- (b) Mention the names of any 5 types of portable fire extinguishers. Draw and label a first-aid type fire extinguisher. (10)
- (c) What type of fire extinguisher should be used in case of fire in a power plant having oil fired boilers? Why this type of extinguisher could be used without the need for a breathing apparatus? (8)
4. Estimate the cooling load for a computer room of 30 students in Bangladesh (24° N latitude) with the following data: (23 1/3)

Dimension : East-West 12 m, North-South 8 m, height 3.5 m

Highest time/month : 1800 hrs/June

Roof : Type 5, without suspended, 25 mm wood, 50 mm insulation

Walls : 254 mm brick with 12.7 mm plaster both sides

1 Door : 1.25 m × 2.2 m (height) × 25 mm (thick) ply wood

2 Windows : 2.0 m × 1.25 (height) × 3 mm cellular glass

Lights : 250 Watts/ CLF = 0.07

Ventilation : 7.5 litres/person

Assume no heat transfer through floor, North and East walls; door and windows in South only. Use the Tables and Chart(s) provided.

**SECTION – B**

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

The charts, if used, must be attached to the answer script.

5. (a) With neat sketch differentiate a refrigerator and a heat pump. (8)
- (b) Write the expressions for the performance factor of a refrigerator and a heat pump and then make a relation among them. (7)
- (c) A cold storage is to be maintained at  $-5^{\circ}\text{C}$  while the surroundings are at  $35^{\circ}\text{C}$ . The heat leakage from the surroundings into the cold storage is estimated to be 29 kW. The actual COP of the refrigeration plant is one third of an ideal plant working between the same temperatures. Find the power required to drive the plant. (8 1/3)

**ME 363/ARCH**

6. (a) With neat sketch differentiate an induced draft and a force draft cooling tower. (10)

(b) A refrigeration system operating on a vapor compression cycle with R134a has a cooling capacity of 7.5 kW. The refrigerant enters the compressor as saturated vapor at 0.2 MPa and is compressed isentropically to 1.5 MPa. The refrigerant leaves the condenser at saturated liquid and expands adiabatically through an expansion device. (13 1/3)

- (i) Draw the T-S diagram for the cycle and determine
- (ii) the mass flow rate of the refrigerant
- (ii) the quality of the refrigerant at the end of the throttling process
- (iv) the power input to the compressor
- (v) the COP

7. (a) With neat sketch, compare terminal reheat and dual duct system. (10)

(b) Using the psychrometric chart, fill the required values in the blank spaces of the table given below: (13 1/3)

Sl. No.	T <sub>db</sub> (°C)	T <sub>wb</sub> (°C)	% RH	T <sub>dp</sub> (°C)	Sp. humidity kg/kg dry air	Sp. vol <sup>m</sup> (m <sup>3</sup> /kg)
1	31	18				
2	31		60			
3	30				0.012	
4		18		24		
5			60	25		

8. (a) If 250 litres/h of outside air at 35°C T<sub>db</sub> and 24°C t<sub>wb</sub> is mixed with 750 litres/h of return air at 27°C T<sub>db</sub> and 50% RH, find the following properties of the mixture (10)

- (i) T<sub>db</sub> (ii) T<sub>wb</sub> (iii) T<sub>dp</sub> (iv) ω

(b) Draw a schematic diagram of an AHU and label it. (7)

(c) With neat sketch describe a fan coil unit. (6 1/3)

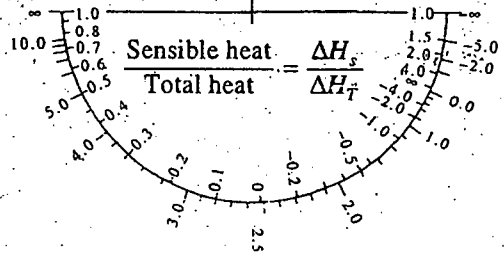
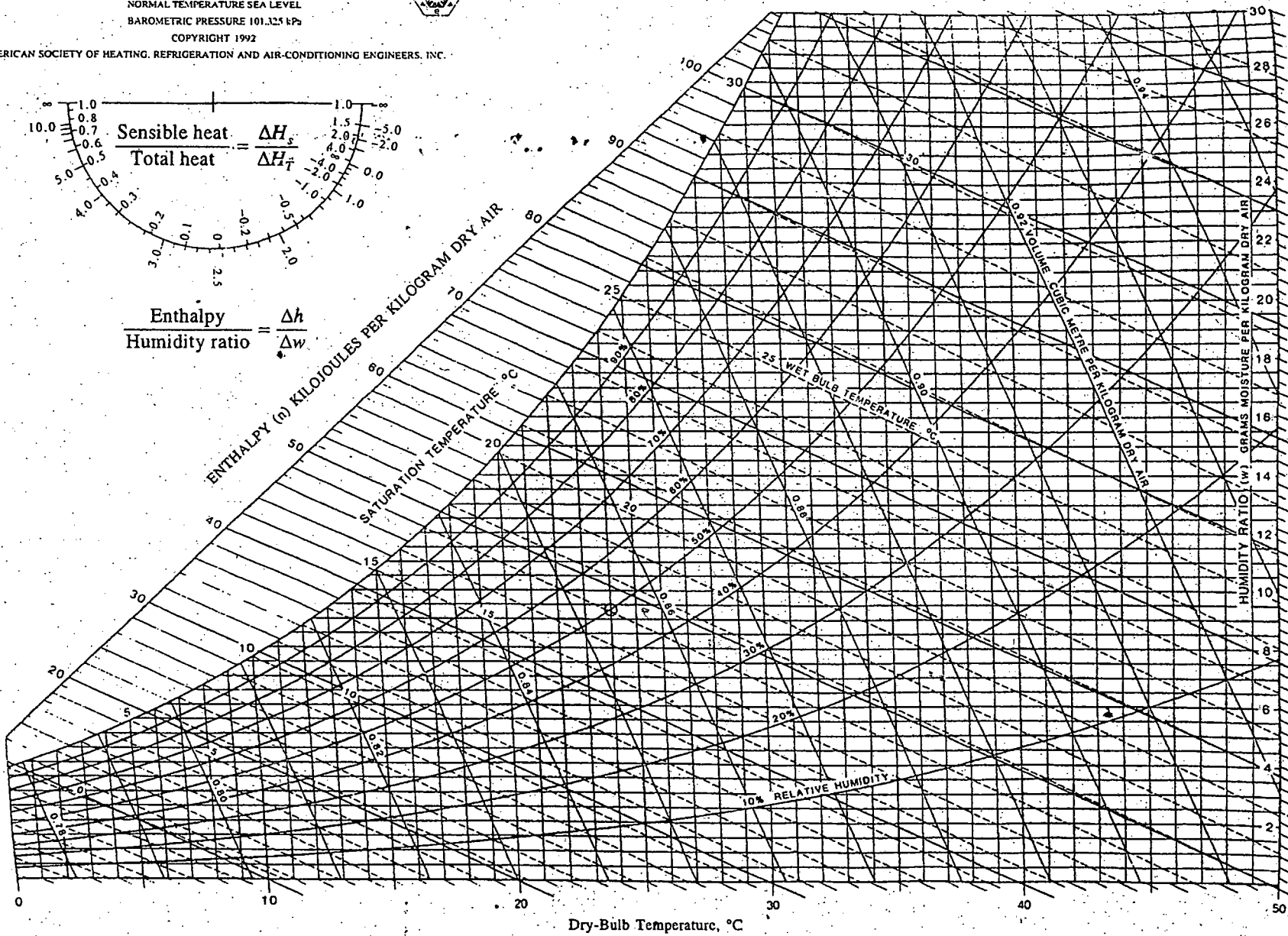
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ASHRAE PSYCHROMETRIC CHART NO. 1

NORMAL TEMPERATURE SEA LEVEL  
BAROMETRIC PRESSURE 101.325 kPa

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AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-CONDITIONING ENGINEERS, INC.

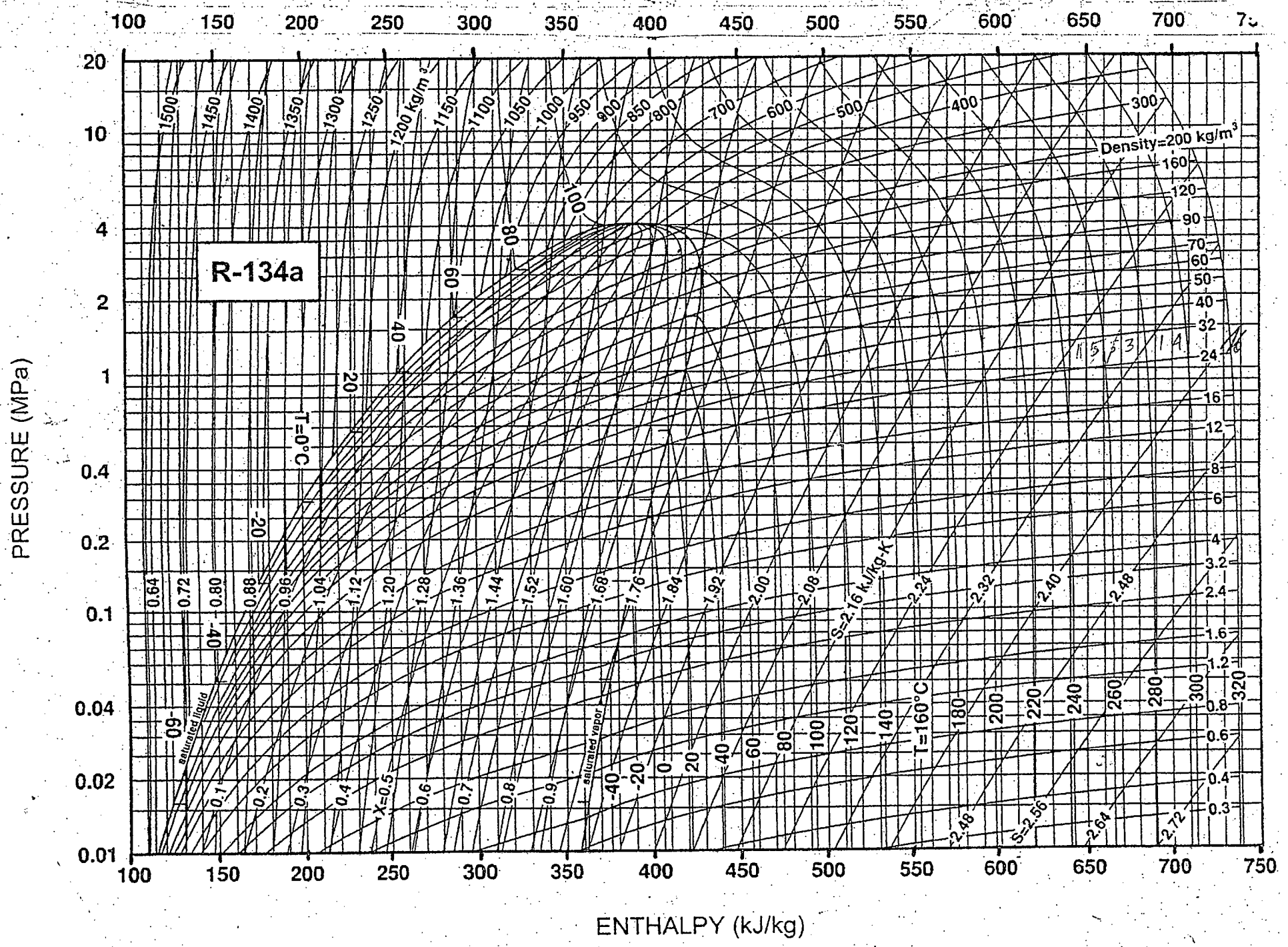


$$\frac{\text{Enthalpy}}{\text{Humidity ratio}} = \frac{\Delta h}{\Delta w}$$

= 4 =

FIGURE 12.4 Psychrometry chart for normal temperature.

Source: ASHRAE Psychrometric chart No. 1 at page 6.11 from ASHRAE Handbook of Fundamentals (1997). Also available in other editions of ASHRAE Handbook of Fundamentals.



Pressure-Enthalpy Diagram for Refrigerant 134a

$\rho = 5 =$

$\rho = 5 =$