

University of Mumbai
Online Examination 2020

Program: BE Chemical Engineering

Curriculum Scheme: Revised 2012

Examination: Third Year Semester V

Course Code: CHC 503

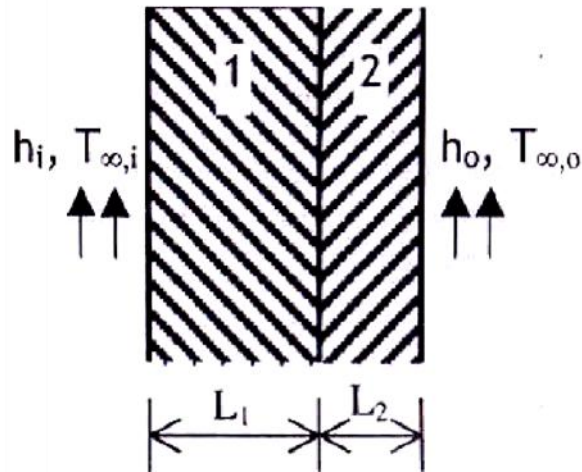
Course Name: Heat Transfer Operations-I (HTO-I)

Time: 1 hour

Max. Marks: 50

Note to the students:- All Questions are compulsory and carry equal marks .

Q1.	In a case of one dimensional heat conduction in a medium with constant properties, T is the temperature at position x , at time t . Then is proportional to:
Option A:	$\frac{T}{x}$
Option B:	$\frac{\partial T}{\partial x}$
Option C:	$\frac{\partial^2 T}{\partial x \partial t}$
Option D:	$\frac{\partial^2 T}{\partial^2 x}$
Q2.	Consider steady-state heat conduction across the thickness in a plane composite wall (as shown in the figure) exposed to convection conditions on both sides.



Given: $h_i = 20 \text{ W/m}^2\text{K}$; $h_o = 50 \text{ W/m}^2\text{K}$; $T_{\infty,i} = 20^\circ\text{C}$; $T_{\infty,o} = -2^\circ\text{C}$; $k_1 = 20 \text{ W/mK}$; $k_2 = 50 \text{ W/mK}$; $L_1 = 0.30 \text{ m}$ and $L_2 = 0.15 \text{ m}$. Assuming negligible contact resistance between the wall surfaces, the interface temperature, T (in $^\circ\text{C}$), of the two walls will be

Option A:	- 0.50
Option B:	2.75
Option C:	3.75
Option D:	4.50
Q3.	It is proposed to coat a 1 mm diameter wire with enamel paint ($k = 0.1 \text{ W/mK}$) to increase heat transfer with air. If the air side heat transfer coefficient is $100 \text{ W/m}^2\text{K}$, then optimum thickness of enamel paint should be:
Option A:	0.25 mm
Option B:	0.5 mm
Option C:	1 mm
Option D:	2 mm
Q4.	Thermal diffusivity of a substance is:
Option A:	Inversely proportional to thermal conductivity
Option B:	Directly proportional to thermal conductivity
Option C:	Directly proportional to the square of thermal conductivity
Option D:	Inversely proportional to the square of thermal conductivity
Q5.	Heat transfer in liquid and gases takes place by
Option A:	Conduction
Option B:	Convection
Option C:	Radiation
Option D:	Conduction and convection

Q6.	which quantity signifies the ratio of temperature gradient at the surface to a reference temperature gradient?
Option A:	Reynolds number
Option B:	Nusselt number
Option C:	Fourier number
Option D:	Stanton number
Q7.	For a given value of Nusselt number, the convective surface coefficient h is directly proportional to
Option A:	Length
Option B:	Mass
Option C:	Thermal conductivity
Option D:	Density
Q8.	What is Nusselt number?
Option A:	$C_p \cdot \mu/k$
Option B:	$h \cdot D/k$
Option C:	$h \cdot C_p/\mu$
Option D:	$C_p \cdot \mu/h$
Q9.	The ratio of heat flow rate by convection to flow rate by conduction is known as
Option A:	Stanton number
Option B:	Graetz number
Option C:	Fourier number
Option D:	Peclet number
Q10.	Boiling is a-----operation.
Option A:	Convection
Option B:	Conduction
Option C:	Radiation.
Option D:	Drying
Q11.	When heat is added to a liquid from a submerged solid surface, its called
Option A:	Nucleate boiling
Option B:	Film boiling
Option C:	Pool boiling
Option D:	Transition Boiling.
Q12.	Commercial boilers are designed to operate at a temperature drop,
Option A:	Less than Critical Temperature drop.
Option B:	More than critical temperature drop.
Option C:	At critical temperature drop.
Option D:	Infinite critical temperature drop.

Q13.	In which type of boiling the fluid motion is induced by external means?
Option A:	Forced convection
Option B:	Pool
Option C:	Local
Option D:	Sub-cooled
Q14.	What is the use of fins in heat exchange equipment?
Option A:	To increase the heat transfer rate
Option B:	To decrease the heat transfer rate
Option C:	To keep constant heat transfer rate
Option D:	To decrease heat transfer area
Q15.	Which of the following has the lowest overall heat transfer coefficient?
Option A:	Air
Option B:	Molten sodium
Option C:	Water
Option D:	Dowtherm
Q16.	Double pipe heat exchangers are used
Option A:	When heat transfer area required is very high.
Option B:	When heat transfer area required is very low.
Option C:	Because it occupies less floor area.
Option D:	Because it is less costly.
Q17.	Tube side temperature in a shell and tube heat exchanger is normally measured by a constant volume
Option A:	hydrogen thermometer
Option B:	mercury in glass thermometer
Option C:	thermocouple
Option D:	radiation pyrometer
Q18.	In shell and tube heat exchanger, the shortest centre to centre distance between the adjacent tubes is
Option A:	called tube pitch
Option B:	called tube clearance
Option C:	is always less than diameter of tube
Option D:	baffle spacing
Q19.	The value of transmissivity may vary from
Option A:	0-1
Option B:	1-2
Option C:	3-4
Option D:	4-5

Q20.	Of the radiant energy 350W/m^2 incident upon a surface 250W/m^2 is absorbed, 60W/m^2 is reflected and the remainder is transmitted through the surface. Workout the value for absorptivity for the surface material
Option A:	0-1
Option B:	1-2
Option C:	3-4
Option D:	4-5
Q21.	Transmissivity is defined as
Option A:	Fraction of total energy transmitted by the body
Option B:	Fraction of total energy reflected by the body
Option C:	Fraction of total energy absorbed by the body
Option D:	Fraction of total energy absorbed and radiated by the body
Q22.	With an increase in wavelength, the monochromatic emissive power of a black body
Option A:	Increase
Option B:	Decreases
Option C:	Decreases, reaches a minimum and then increases
Option D:	Increases, reaches a maximum and then decreases
Q23.	A body through which all the incident radiations passes, is called
Option A:	Opaque body White body
Option B:	Black body
Option C:	Transparent body
Option D:	White body
Q24.	Reflectivity is defined as
Option A:	Fraction of total energy transmitted by the body
Option B:	Fraction of energy reflected by the body
Option C:	Fraction of total energy absorbed by the body
Option D:	Fraction of total energy absorbed and radiated by the body
Q25.	Let 220 W/m^2 of radiant energy is absorbed by a convex surface, 90 W/m^2 is reflected and 40 W/m^2 is transmitted through it. What is the value of absorptivity?
Option A:	0.72
Option B:	0.62
Option C:	0.52
Option D:	0.42

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Question	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	C
Q3.	B
Q4	B
Q5	B
Q6	B
Q7	C
Q8.	B

Q9.	D
Q10.	A
Q11.	C
Q12.	A
Q13.	A
Q14.	A
Q15.	A
Q16.	B
Q17.	C
Q18.	A
Q19.	A
Q20.	C
Q21.	A
Q22.	D
Q23.	C
Q24.	B
Q25.	B

