

**University of Mumbai**  
**Online Examination 2020**

Program: BE Chemical Engineering

Curriculum Scheme: Revised 2016

Examination: Fourth Year Semester VIII

Course Code: CHC603

Course Name: Transport Phenomena

Q1.	The fluid forces considered in the Navier Stokes equation are
Option A:	Gravity, pressure and viscous
Option B:	Gravity, pressure and turbulent
Option C:	Pressure, viscous and turbulent
Option D:	Gravity, viscous and turbulent
Ans:	
Q2.	A Newtonian fluid is one which
Option A:	is frictionless and incompressible
Option B:	has a linear relationship between the magnitude of the applied shear stress and the resulting rate of deformation
Option C:	has a nonlinear relationship between the magnitude of the applied shear stress and the resulting rate of deformation
Option D:	is irrotational
Ans:	
Q3.	Fick's law of diffusion is NOT applicable to
Option A:	Diffusion in multi-component system, polymers and porous solids
Option B:	Diffusion through binary system
Option C:	Diffusion in biological systems
Option D:	Diffusion in chemical vapor deposition
Ans:	
Q4.	Which of the following is correct ?
Option	Rate = Driving force $\times$ Resistance

A:	
Option B:	Driving force = Rate $\times$ Resistance
Option C:	Resistance = Driving force $\times$ rate
Option D:	Rate = Resistance / Driving force
Ans:	
Q5.	Microscopic balances can be applied for
Option A:	Macroscopic scale
Option B:	Quantum scale
Option C:	Smaller scale of description than macroscopic, but larger than molecular one
Option D:	Molecular scale
Ans:	
Q6.	The shear stress at a point in a liquid is found to be $0.03 \text{ N/m}^2$ . The velocity gradient at the point is $0.15 \text{ s}^{-1}$ . What will be it's viscosity (in Poise)?
Option A:	20
Option B:	2
Option C:	0.2
Option D:	0.5
Ans:	
Q7.	A solution contains 0.3 moles of solute A, 0.2 moles of B and 0.5 moles of C. What will be the mole fraction of A in the mixture?
Option A:	1
Option B:	0.2
Option C:	0.3
Option D:	0.5
Ans:	
Q8.	Equation of Continuity is
Option	Mass balance equation

A:	
Option B:	Momentum balance equation
Option C:	Both mass and momentum balance equations
Option D:	Energy balance equation
Ans:	
Q9.	For what kind of mixtures $D_{AB}=D_{BA}$ holds?
Option A:	Ideal
Option B:	Real
Option C:	For both real and ideal
Option D:	This relation is never true
Ans:	
Q10.	What will be the velocity of the fluid in contact with the upper plate? If water flows between two plates of which the upper one is stationary and the lower one is moving with a velocity $V$ .
Option A:	$V$
Option B:	$V/2$
Option C:	$2V$
Option D:	$0$
Ans:	
Q11.	At what value of Prandtl number, the hydrodynamic and thermal boundary layers of a fluid flowing over a heated plate will be identical ?
Option A:	$1$
Option B:	$<1$
Option C:	$> 1$
Option D:	$2$
Ans:	
Q12.	Where does the maximum stress occur in case of laminar flow of incompressible fluid in a closed conduit of diameter, 'd'?
Option A:	at the centre

Option B:	at $d/4$ from the wall
Option C:	at $d/8$ from the wall
Option D:	at the wall
Ans:	
Q13.	Which number forms the connecting link between the temperature and concentration profiles?
Option A:	Prandtl number
Option B:	Schmidt number
Option C:	Fourier number
Option D:	Lewis number
Ans:	
Q14.	Navier-Stokes equation is useful in the analysis of _____ fluid flow problems.
Option A:	Non-viscous
Option B:	Viscous
Option C:	Turbulent
Option D:	Rotational
Ans:	
Q15.	With increase in temperature, the thermal conductivity of most liquids
Option A:	Increases
Option B:	Decreases
Option C:	Remain same
Option D:	First increases upto a certain temperature and then becomes constant
Ans:	
Q16.	The fluid which obeys Newton's law of viscosity is called ____
Option A:	Non-newtonian fluid
Option B:	Thixotropic fluid

Option C:	Dilatant fluid
Option D:	Newtonian fluid
Ans:	
Q17.	Shell energy balance is made over a thin slab or shell which is -----
Option A:	Parallel to the direction of the heat flow
Option B:	Perpendicular to the direction of the heat flow
Option C:	At an angle of 30 degree to the direction of heat flow
Option D:	At an angle of 45 degree to the direction of heat flow
Ans:	
Q18.	Mass transfer co-efficient (K) and diffusivity (D) are related according to film theory as
Option A:	$K \propto D$
Option B:	$K \propto 1/D$
Option C:	$K \propto D^{1.5}$
Option D:	$K \propto D^2$
Ans:	
Q19.	When the fluid flowing in a round pipe, shear stress -----
Option A:	remains constant over the cross-section
Option B:	varies parabolically across the cross-section
Option C:	is zero at the centre and varies linearly with the radius
Option D:	is zero at the wall and increases linearly to the centre
Ans:	
Q20.	According to Reynold's analogy, Stanton number is equal to
Option A:	$f/2$
Option B:	$f$
Option C:	$f^3$
Option D:	0

Ans:	
Q21.	Fick's second law of diffusion
Option A:	predicts how diffusion causes the concentration to change with respect to time.
Option B:	applicable only to diffusion through porous media and under steady state.
Option C:	applicable only when diffusivity is not constant.
Option D:	applicable only to tertiary systems and where diffusivity is constant.
Ans:	
Q22.	In case of laminar flow of a Newtonian fluid in a circular pipe, the ratio of average fluid velocity to the maximum velocity is
Option A:	0.66
Option B:	2
Option C:	1
Option D:	0.5
Ans:	
Q23.	Fourier's law applies to the heat transfer by
Option A:	Radiation
Option B:	Convection
Option C:	Conduction
Option D:	Commission
Ans:	
Q24.	The flow through a circular pipe is laminar. Now, the fluid through the pipe is replaced with a more viscous fluid and passed through the pipe again with the same velocity. What can we say about the nature of this flow?
Option A:	The flow will become turbulent
Option B:	The flow will be a transition flow
Option C:	The flow will remain laminar
Option D:	The Reynolds number of the earlier flow is required to answer this question

Ans:	
Q25.	Thermal diffusivity is given by
Option A:	$C_p/k$
Option B:	$h/C_p$
Option C:	$k / \rho C_p$
Option D:	$\rho C_p$
Ans:	