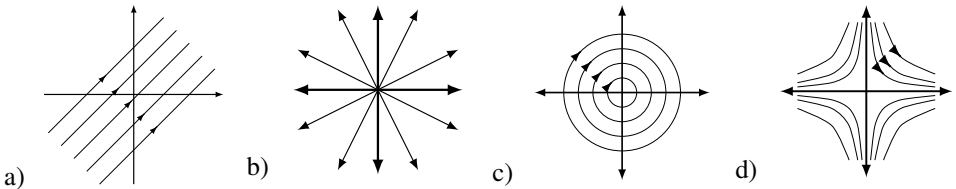# 2011 XE

AI24BTECH11003 - Badde Vijaya Sreyas

Common Data for Questions 19 and 20
A flow has velocity field given by $\overrightarrow{V} = 2x\hat{i} - 2y\hat{j}$

1) The velocity potential $\phi(x, y)$ for the flow is

    a) $2x - 2y+$ const   b) $2xy+$ const   c) $x^2 + y^2+$ const   d) $x^2 - y^2+$ const

2) The streamlines for the velocity field look like

a)   b)   c)   d)

Common Data for questions 21 and 22
Two flat parallel plates are separated by a small gap h filled with an incompressible fluid of viscosity μ. Assume that the length and width of the plates to be much larger than the gap h. The top plate moves horizontally while the bottom plate is held stationary. The magnitude of difference between the shear stress at the top and bottom walls is found to be $\Delta\tau$.

3) The velocity of the top plate is

    a) $\frac{h\Delta\tau}{2\mu}$ b) $\frac{h\Delta\tau}{\mu}$ c) $\frac{2h\Delta\tau}{\mu}$ d) $\frac{3h\Delta\tau}{2\mu}$

4) If a finite width slender object is introduced parallel to the plates in the middle of the gap, the time at which it would have rotated clockwise by 90° would be

    a) $\frac{2\pi\mu}{\Delta\tau}$ b) $\frac{\pi\mu}{\Delta\tau}$ c) $\frac{2\pi\mu}{3\Delta\tau}$ d) $\frac{\pi\mu}{4\Delta\tau}$

5) Which of the following pairs of crystal structures can have the same packing fraction of 0.74?

    a) FCC and BCC   b) HCP and BCC   c) FCC and HCP   d) BCC and BCT

6) Which one of the following is NOT CORRECT?

a) An edge dislocation can cross slip   c) A screw dislocation can cross slip
b) An edge dislocation can glide   d) An edge dislocation can climb

7) Which of the following is NOT CORRECT?
   a) Working of lead at $25°C$ is hot working
   b) Working of tungsten at $1000°C$ is hot working
   c) Working of lead at $-100°C$ is cold working
   d) Working of tungsten at $25°C$ is cold working

8) Which one of the following is NOT a ceramic?

   a) SiC   b) MgO   c) TiB_2 d) TiAl

9) If the average degree of polymerization of a polyvinyl chloride (PVC) polymer is 2000, then its average molecular weight (in $\frac{g}{mol}$) is

   a) 125000   b) 119000   c) 56000   d) 2000

10) Which one of the following materials has the lowest coefficient of thermal expansion?

   a) Superalloy   b) Super Invar   c) Spinel   d) α-brass

11) The color of a metal is determined by the wavelength distribution of the radiation that is

   a) diffracted   b) transmitted   c) reflected   d) refracted

12) Nickel ferrite is

   a) antiferromagnetic b) ferromagnetic   c) diamagnetic   d) ferrimagnetic

13) The oxide scale responsible for the excellent corrosion resistance of stainless steels is

   a) Cr_2O_3 b) NiO c) Fe_2O_3 d) Al_2O_3