PARAKH For MM Board MTech Students

1) A person travelled 80 km in 6 hours. If the person travelled the first part with a uniform speed of 10 kmph and the remaining part with a uniform speed of 18 kmph.
What percentage of the total distance is travelled at a uniform speed of 10 kmph?
(A) 28.25
(B) 37.25
(C) 43.75
(D) 50.00

2) Titanium is produced commercially by _____
(A) Smelting reduction of TiO_2
(B) Thermal dissociation of TiH_2
(C) Reduction of $TiCl_4$ by Mg
(D) Reduction of TiO_2 by H_2

3) Four girls P, Q, R and S are studying languages in a University. P is learning French and Dutch. Q is learning Chinese and Japanese. R is learning Spanish and French. S is learning Dutch and Japanese.
Given that: French is easier than Dutch; Chinese is harder than Japanese; Dutch is easier than Japanese, and Spanish is easier than French.
Based on the above information, which girl is learning the most difficult pair of languages?
(A) P
(B) Q
(C) R
(D) S

4) Which one of the following Non Destructive Testing (NDT) techniques CANNOT be used to identify volume defects in the interior of a casting?
(A) Ultrasonic testing
(B) X-ray computed tomography
(C) Dye-penetrant testing
(D) Gamma ray radiography

5) A rhombus is formed by joining the midpoints of the sides of a unit square. What is the diameter of the largest circle that can be inscribed within the rhombus?
(A) $\frac{1}{\sqrt{2}}$
(B) $\frac{1}{2\sqrt{2}}$
(C) $\sqrt{2}$
(D) $2\sqrt{2}$

6) Mosquitoes pose a threat to human health. Controlling mosquitoes using chemicals may have undesired consequences. In Florida, authorities have used genetically modified mosquitoes to control the overall mosquito population. It remains to be seen if this novel approach has unforeseen consequences. Which one of the following is the correct logical inference based on the information in the above passage?

(A) Using chemicals to kill mosquitoes is better than using genetically modified mosquitoes because genetic engineering is dangerous

(B) Using genetically modified mosquitoes is better than using chemicals to kill mosquitoes because they do not have any side effects

(C) Both using genetically modified mosquitoes and chemicals have undesired consequences and can be dangerous

(D) Using chemicals to kill mosquitoes may have undesired consequences but it is not clear if using genetically modified mosquitoes has any negative consequence

7) While designing a material for high temperature application, which of the following characteristic(s)/attribute(s) is(are) desirable for achieving better creep resistance?

(A) Fine grain size

(B) FCC crystal structure

(C) High melting point

(D) Cold worked microstructure

8) A CNC worktable is driven in a linear direction by a lead screw connected directly to a stepper motor. The pitch of the lead screw is 5 mm. The stepper motor completes one full revolution upon receiving 600 pulses. If the worktable speed is 5 m/minute and there is no missed pulse, then the pulse rate being received by the stepper motor is

(A) 20 kHz

(B) 10 kHz

(C) 3 kHz

(D) 15 kHz

9) Assuming the material considered in each statement is homogeneous, isotropic, linear elastic, and the deformations are in the elastic range, which one or more of the following statement(s) is/are TRUE?

(A) A body subjected to hydrostatic pressure has no shear stress.

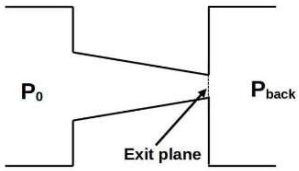
(B) If a long solid steel rod is subjected to tensile load, then its volume increases.

(C) Maximum shear stress theory is suitable for failure analysis of brittle materials

(D) If a portion of a beam has zero shear force, then the corresponding portion of the elastic curve of the beam is always straight

10) The figure shows a purely convergent nozzle with a steady, inviscid compressible flow of an ideal gas with constant thermophysical properties operating under

choked condition. The exit plane shown in the figure is located within the nozzle. If the inlet pressure (P0) is increased while keeping the back pressure (P_{back}) unchanged, which of the following statements is/are true?



(A) Mass flow rate through the nozzle will remain unchanged.
(B) Mach number at the exit plane of the nozzle will remain unchanged at unity.
(C) Mass flow rate through the nozzle will increase
(D) Mach number at the exit plane of the nozzle will become more than unity

PARAKH For CB Board MTech Students

1) Pipes P and Q can fill a storage tank in full with water in 10 and 6 minutes, respectively. Pipe R draws the water out from the storage tank at a rate of 34 litres per minute. P, Q and R operate at a constant rate.
If it takes one hour to completely empty a full storage tank with all the pipes operating simultaneously, what is the capacity of the storage tank (in litres)?
(A) 26.8
(B) 60.0
(C) 120.0
(D) 127.5

2) Given below are three statements and four conclusions drawn based on the statements.
Statement 1: Some engineers are writers.
Statement 2: No writer is an actor.
Statement 3: All actors are engineers.

Conclusion I: Some writers are engineers.
Conclusion II: All engineers are actors.
Conclusion III: No actor is a writer.
Conclusion IV: Some actors are writers.

Which one of the following options can be logically inferred?
(A) Only conclusion I is correct
(B) Only conclusion II and conclusion III are correct
(C) Only conclusion I and conclusion III are correct
(D) Either conclusion III or conclusion IV is correct

3) The binding free energy of a ligand to its receptor protein is −11.5 kJ mol-1 at 300 K. What is the value of the equilibrium binding constant?
Use R = 8.314 J mol-1 K-1.
(A) 0.01
(B) 1.0
(C) 4.6
(D) 103.5

4) In binomial nomenclature, the name of a bacterial strain is written with the first letter of _____ word(s) being capitalized.
(A) First
(B) Second
(C) Both First and Second
(D) Neither

5) Terpenoids are made of _____ units
(A) Amino acids
(B) Carbohydrates
(C) Isoprene
(D) Triacylglycerol

6) Among individuals in a human population, minor variations exist in nucleotide sequences of chromosomes. These variations can lead to gain or loss of sites for specific restriction enzymes. Which of the following technique is used to identify such variations?
(A) Polymerase dependent fragment insertion
(B) Real-time polymerase chain reaction
(C) Restriction fragment length polymorphism
(D) Reverse transcriptase polymerase chain reaction

7) Which of the following is NOT used for generating an optimal alignment of two nucleotide sequences?
(A) Gap penalties
(B) Match scores
(C) Mismatch scores
(D) Nucleotide composition

8) In soap manufacturing, the triglycerides present in oils and fats are hydrolyzed to mainly produce
(A) Fatty acids and glycerol
(B) Glycerol and paraffins
(C) Glycerol only
(D) Fatty acid only

9) Catalytic reforming is commonly used in the petroleum industry to improve fuel quality. The undesirable reaction in the catalytic reforming of naphtha is
(A) Hydrocracking of paraffins
(B) Dehydrogenation of naphthenes
(C) Isomerization of naphthenes
(D) Cyclization of paraffins

10) The reaction $A \rightarrow B$ is carried out isothermally on a porous catalyst. The intrinsic reaction rate is kC_A^2, where k is the rate constant and C_A is the concentration of A. If the reaction is strongly pore-diffusion controlled, the observed order of the reaction is
(A) 1
(B) 2
(C) ½
(D) 3/2