

National Testing Agency

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Chemical thermal and Polymer Engineering

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Sub-Section Id :	611987965
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 61198734362 Question Type : MCQ Option Shuffling : No
Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No
Option Orientation : Vertical

For a reversible adiabatic process, the total entropy change is :

- (1) $\Delta S^t > 0$
- (2) $\Delta S^t < 0$
- (3) $\Delta S^t = 0$
- (4) $\Delta S^t \geq 0$

Options :

- 611987135401. 1
- 611987135402. 2
- 611987135403. 3
- 611987135404. 4

Question Number : 2 Question Id : 61198734363 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which one of the equation is **not** correct for the first law of thermodynamics ?

- (1) $dH = dU + d(PV)$
- (2) $\Delta U = Q + W$
- (3) $dU = dq + dw$
- (4) $\Delta U = Q + \Delta W$

Options :

- 611987135405. 1
- 611987135406. 2
- 611987135407. 3
- 611987135408. 4

Question Number : 3 Question Id : 61198734364 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Gibbs free energy is defined as :

- (1) $G = U - TS$
- (2) $G = U + TS$
- (3) $G = H - TS$
- (4) $G = H + TS$

Options :

- 611987135409. 1
- 611987135410. 2
- 611987135411. 3

611987135412. 4

Question Number : 4 Question Id : 61198734365 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Pick out the wrong statement :

- (1) Addition polymer is formed by chain growth Polyⁿ.
- (2) Condensation polymer is formed by step growth polymerization
- (3) Teflon is a copolymer
- (4) Bakelite is a thermo-setting polymer

Options :

611987135413. 1

611987135414. 2

611987135415. 3

611987135416. 4

Question Number : 5 Question Id : 61198734366 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

5 moles of phthalic acid is mixed with 4 moles of glycerol to make a polyester by condensation polymerization. The average functionality for this mixture of monomers is :

- (1) 2.22
- (2) 2.00
- (3) 2.44
- (4) 1.55

Options :

611987135417. 1

611987135418. 2

611987135419. 3

611987135420. 4

Question Number : 6 Question Id : 61198734367 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The number average degree of polymerization of polystyrene is 1000, then the number average molecular weight of polystyrene is :

- (1) 1.03×10^5
- (2) 2.03×10^5
- (3) 9.6×10^4
- (4) 10^3

Options :

- 611987135421. 1
- 611987135422. 2
- 611987135423. 3
- 611987135424. 4

Question Number : 7 Question Id : 61198734368 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The incorporation of carbon black in rubber compounding does not improve the :

- (1) Modulus
- (2) Hardness
- (3) Processibility
- (4) Weather resistant

Options :

- 611987135425. 1
- 611987135426. 2
- 611987135427. 3
- 611987135428. 4

Question Number : 8 Question Id : 61198734369 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The role of stearic acid and ZnO (Zinc Oxide) in rubber vulcanization is :

- (1) Crosslinker
- (2) Accelerator Activator
- (3) Plasticizer
- (4) Antioxidant

Options :

- 611987135429. 1
- 611987135430. 2

611987135431. 3

611987135432. 4

Question Number : 9 Question Id : 61198734370 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the polymer is a rubber ?

- (1) Polystyrene
- (2) Polyester
- (3) Polymethyl methacrylate
- (4) Polybutadiene

Options :

611987135433. 1

611987135434. 2

611987135435. 3

611987135436. 4

Question Number : 10 Question Id : 61198734371 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The electrolyte salt that is mostly used in Li-ion batteries is :

- (1) Na BF_4
- (2) Na PF_6
- (3) Li PF_6
- (4) Li Cl_4

Options :

611987135437. 1

611987135438. 2

611987135439. 3

611987135440. 4

Question Number : 11 Question Id : 61198734372 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The membrane fouling that can be reduced by the modification of membrane surface :

- (1) Increasing hydrophobicity
- (2) Increasing surface roughness
- (3) Increasing hydrophilicity
- (4) Decreasing pore sizes

Options :

- 611987135441. 1
- 611987135442. 2
- 611987135443. 3
- 611987135444. 4

Question Number : 12 Question Id : 61198734373 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Nitrogenous base which is absent in DNA but present in RNA :

- (1) Thymine
- (2) Uracil
- (3) Adenine
- (4) Guanine

Options :

- 611987135445. 1
- 611987135446. 2
- 611987135447. 3
- 611987135448. 4

Question Number : 13 Question Id : 61198734374 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Enzyme specificity is determined by which macromolecule :

- (1) Protein
- (2) Lipid
- (3) Carbohydrate
- (4) Nucleic Acid

Options :

- 611987135449. 1
- 611987135450. 2
- 611987135451. 3

611987135452. 4

Question Number : 14 Question Id : 61198734375 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Highest Oxygen transfer efficiency is offered by which bioreactor ?

- (1) Packed bed Reactor
- (2) Bubble column
- (3) Air lift reactor
- (4) Stirred tank reactor

Options :

611987135453. 1

611987135454. 2

611987135455. 3

611987135456. 4

Question Number : 15 Question Id : 61198734376 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The definition of emissivity is :

- (1) Ratio of Radioactive heat transfer to convective heat transfer
- (2) Ratio of absorbed Radiation to reflected radiation
- (3) Ratio of emitted energy to absorbed energy
- (4) Ratio of radiation emitted by any surface to that emitted by black body at constant temperature.

Options :

611987135457. 1

611987135458. 2

611987135459. 3

611987135460. 4

Question Number : 16 Question Id : 61198734377 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In a furnace, operated at high temperature, radiation mode of heat transfer takes over conduction and convection due to :

- (1) Radiative power changes according to fourth power of temp.
- (2) Low thermal conductivity
- (3) Increase in temperature reduces convective coefficient
- (4) Insulation provided by air

Options :

- 611987135461. 1
- 611987135462. 2
- 611987135463. 3
- 611987135464. 4

Question Number : 17 Question Id : 61198734378 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Comparing the convective heat transfer coefficient of turbulent flow with that of laminar flow is :

- (1) At edge its zero
- (2) Does not depend on Velocity
- (3) Mixing losses reduce it
- (4) Better fluid mixing enhances it

Options :

- 611987135465. 1
- 611987135466. 2
- 611987135467. 3
- 611987135468. 4

Question Number : 18 Question Id : 61198734379 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which is the biggest consumer of fresh water ?

- (1) Power plant
- (2) Agriculture
- (3) Industry
- (4) Municipal

Options :

- 611987135469. 1
- 611987135470. 2

611987135471. 3

611987135472. 4

Question Number : 19 Question Id : 61198734380 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

One Petrol vehicle runs 15 km in 1 litre of petrol. The cost of petrol is approximately 90 INR per litre. One Electric Vehicle takes 0.15 kWh to cover 1 km on Electricity (cost of 1 kWh is 10 INR). The cost of running EV compared to petrol vehicle is cheaper by :

- (1) Two times
- (2) Five times
- (3) Six times
- (4) Four times

Options :

611987135473. 1

611987135474. 2

611987135475. 3

611987135476. 4

Question Number : 20 Question Id : 61198734381 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

How much CO is released by one Cigarette in mg/hr ?

- (1) 70
- (2) 150
- (3) 86
- (4) 125

Options :

611987135477. 1

611987135478. 2

611987135479. 3

611987135480. 4

Question Number : 21 Question Id : 61198734382 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Friction factor in smooth pipe having turbulent flow mainly changes due to :

- (1) Diameter of pipes
- (2) Reynold number
- (3) Temperature gradient
- (4) Roughness of pipe

Options :

- 611987135481. 1
- 611987135482. 2
- 611987135483. 3
- 611987135484. 4

Question Number : 22 Question Id : 61198734383 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Bernoulli's Equation is applied to :

- (1) Rotational Flow
- (2) Streamline Inviscid steady flow
- (3) Unsteady Incompressible flow
- (4) Steady Viscous flow

Options :

- 611987135485. 1
- 611987135486. 2
- 611987135487. 3
- 611987135488. 4

Question Number : 23 Question Id : 61198734384 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Venturi meter are better at flow measurement than orifice meter due to :

- (1) Smooth contraction and low energy losses
- (2) Long throat length
- (3) Coefficient of discharge on Higher Side
- (4) High Pressure Loss

Options :

- 611987135489. 1
- 611987135490. 2
- 611987135491. 3

611987135492. 4

Question Number : 24 Question Id : 61198734385 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Select what can be determined using Fenske equation:

- (1) Reflux Ratio
- (2) Location of Feed Stage
- (3) Minimum Number of Theoretical stages
- (4) Number of actual stages

Options :

611987135493. 1

611987135494. 2

611987135495. 3

611987135496. 4

Question Number : 25 Question Id : 61198734386 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Henry's Law deviation happens when :

- (1) Low pressure and solubility of gases
- (2) Non polar Liquid
- (3) Chemical Reaction between solvent and gas
- (4) Gases dissolve at room temperature

Options :

611987135497. 1

611987135498. 2

611987135499. 3

611987135500. 4

Question Number : 26 Question Id : 61198734387 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Gas absorption rate can be increased by :

- (1) Decreasing the driving force
- (2) Rapid solubility of gas
- (3) Low mass transfer Coefficient
- (4) Decrease in interfacial area

Options :

- 611987135501. 1
- 611987135502. 2
- 611987135503. 3
- 611987135504. 4

Question Number : 27 Question Id : 61198734388 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The amount of air theoretically required for the combustion of methane gas as compared to good quality of coal is :

- (1) higher
- (2) lower
- (3) equal
- (4) Not predictable

Options :

- 611987135505. 1
- 611987135506. 2
- 611987135507. 3
- 611987135508. 4

Question Number : 28 Question Id : 61198734389 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A fuel containing 64% Carbon by weight is burnt with fresh air. If 100 kg of the fuel is burnt, the amount of CO₂ that will be produced, approximately :

- (1) 235
- (2) 258
- (3) 440
- (4) 300

Options :

- 611987135509. 1

611987135510. 2

611987135511. 3

611987135512. 4

Question Number : 29 Question Id : 61198734390 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The large difference between the gross calorific and the net calorific value of a gaseous fuel is mainly due to the content of :

- (1) high moisture
- (2) high ash contents
- (3) low hydrogen
- (4) high hydrogen

Options :

611987135513. 1

611987135514. 2

611987135515. 3

611987135516. 4

Question Number : 30 Question Id : 61198734391 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Factors that increase diffusion rate in solids :

- (1) Smaller atomic radius
- (2) At lower temperature
- (3) More vacancies
- (4) By increasing crystallinity

Options :

611987135517. 1

611987135518. 2

611987135519. 3

611987135520. 4

Question Number : 31 Question Id : 61198734392 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following is a 2D nano materials ?

- (1) Carbon nanotube
- (2) Graphene
- (3) Fullerene
- (4) Polyaniline fibre

Options :

- 611987135521. 1
- 611987135522. 2
- 611987135523. 3
- 611987135524. 4

Question Number : 32 Question Id : 61198734393 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A material with high fracture toughness is :

- (1) Brittle glass
- (2) Rubber
- (3) Porous ceramic
- (4) Hardened steel

Options :

- 611987135525. 1
- 611987135526. 2
- 611987135527. 3
- 611987135528. 4

Question Number : 33 Question Id : 61198734394 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : As per the 2nd law of thermodynamics, the total entropy change of any thermodynamics process is either zero or greater than zero.

Reason (R) : The entropy measures the randomness of a process.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)
- (3) (A) is correct but (R) is not correct
- (4) (A) is not correct but (R) is correct

Options :

611987135529. 1

611987135530. 2

611987135531. 3

611987135532. 4

Question Number : 34 Question Id : 61198734395 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Styrene-butadiene is a copolymer.

Reason (R) : It is formed by condensation polymerization.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)
- (3) (A) is correct but (R) is not correct
- (4) (A) is not correct but (R) is correct

Options :

611987135533. 1

611987135534. 2

611987135535. 3

611987135536. 4

Question Number : 35 Question Id : 61198734396 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No

Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Mostly by stretching NR (Natural Rubber) polymer chains increases.

Reason (R) : Consist of cis-1, 4 isoprene chains structure.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)
- (3) (A) is correct but (R) is not correct
- (4) (A) is not correct but (R) is correct

Options :

611987135537. 1

611987135538. 2

611987135539. 3

611987135540. 4

Question Number : 36 Question Id : 61198734397 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : To enhance the conductivity of polyaniline, it is doped with protonic acid.

Reason (R) : Protonation creates polarons along the polyaniline chains in amine groups.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)
- (3) (A) is correct but (R) is not correct
- (4) (A) is not correct but (R) is correct

Options :

611987135541. 1

611987135542. 2

611987135543. 3

611987135544. 4

Question Number : 37 Question Id : 61198734398 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No

Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Our diet supplies us with important amino acids.

Reason (R) : Essential Amino acids are not synthesized by human body.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)
- (3) (A) is correct but (R) is not correct
- (4) (A) is not correct but (R) is correct

Options :

611987135545. 1

611987135546. 2

611987135547. 3

611987135548. 4

Question Number : 38 Question Id : 61198734399 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Resistance occurring due to fouling in Heat Exchanger impacts the overall Heat Transfer Coefficient.

Reason (R) : Fouling result in additional layer of thermal resistance in Heat Exchanger.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)
- (3) (A) is correct but (R) is not correct
- (4) (A) is not correct but (R) is correct

Options :

611987135549. 1

611987135550. 2

611987135551. 3

611987135552. 4

Question Number : 39 Question Id : 61198734400 Question Type : MCQ Option Shuffling : No

Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Industrial Water Discharge is lowered when using close-loop water system.

Reason (R) : No further water treatment system is required.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**
- (2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**
- (3) **(A)** is correct but **(R)** is not correct
- (4) **(A)** is not correct but **(R)** is correct

Options :

- 611987135553. 1
- 611987135554. 2
- 611987135555. 3
- 611987135556. 4

Question Number : 40 Question Id : 61198734401 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : When flow is laminar in a circular pipe. Darcy friction factor varies inversely to Reynold Number

Reason (R) : There is linear distribution of shear stress and velocity profile is parabolic.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**
- (2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**
- (3) **(A)** is correct but **(R)** is not correct
- (4) **(A)** is not correct but **(R)** is correct

Options :

- 611987135557. 1
- 611987135558. 2
- 611987135559. 3
- 611987135560. 4

Question Number : 41 Question Id : 61198734402 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Multicomponent gas mixture can be separated via selective absorption.

Reason (R) : Absorbing Liquid offers different solubilities for various components.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**
- (2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**
- (3) **(A)** is correct but **(R)** is not correct
- (4) **(A)** is not correct but **(R)** is correct

Options :

- 611987135561. 1
- 611987135562. 2
- 611987135563. 3
- 611987135564. 4

Question Number : 42 Question Id : 61198734403 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : The presence of nitrogen during the combustion of a fuel ensure that the complete combustion of fuel takes place.

Reason (R) : The air content 23% of oxygen and 77% of Nitrogen by weight.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**
- (2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**
- (3) **(A)** is correct but **(R)** is not correct
- (4) **(A)** is not correct but **(R)** is correct

Options :

- 611987135565. 1
- 611987135566. 2
- 611987135567. 3
- 611987135568. 4

Question Number : 43 Question Id : 61198734404 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : The Hall-Petch equation correlates yield strength and grain size.

Reason (R) : Yield strength decreases with decreasing grain shape and sizes.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**
- (2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**
- (3) **(A)** is correct but **(R)** is not correct
- (4) **(A)** is not correct but **(R)** is correct

Options :

- 611987135569. 1
- 611987135570. 2
- 611987135571. 3
- 611987135572. 4

Question Number : 44 Question Id : 61198734405 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Arrange the following based an entropy content of 1 kg of water at 100°C :

- A. Superheated vapor
- B. Saturated vapor
- C. Water vapor with 95% quality
- D. Liquid water

Choose the **correct** answer from the options given below :

- (1) A, B, C, D
- (2) B, A, D, C
- (3) B, D, A, C
- (4) C, A, B, D

Options :

- 611987135573. 1
- 611987135574. 2
- 611987135575. 3
- 611987135576. 4

Question Number : 45 Question Id : 61198734406 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The polymer molecular weight is defined by the following terminology. Arrange them based on their order magnitude.

- A. $\bar{M}_v$ (Viscosity average molecular weight)
- B. $\bar{M}_n$ (Number average molecular weight)
- C. $\bar{M}_z$ (z - average molecular weight)
- D. $\bar{M}_w$ (Weight-average molecular weight)

Choose the **correct** answer from the options given below :

- (1) D, C, B, A
- (2) C, D, A, B
- (3) D, A, C, B
- (4) B, C, A, D

Options :

- 611987135577. 1
- 611987135578. 2
- 611987135579. 3
- 611987135580. 4

Question Number : 46 Question Id : 61198734407 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Arrange in the order of ascending order :

- A. Melting temperature (T_M)
- B. Glass Transition temperature (T_g)
- C. Brittle temperature (T_B)
- D. Softening temperature (T_s)

Choose the **correct** answer from the options given below :

- (1) C, B, D, A
- (2) B, C, D, A
- (3) B, C, A, D
- (4) D, B, A, C

Options :

- 611987135581. 1

611987135582. 2

611987135583. 3

611987135584. 4

Question Number : 47 Question Id : 61198734408 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Arrange the following based on the enthalpy content of one kg of water at constant temperature:

- A. Superheated water vapor
- B. Saturated water vapor
- C. Sub-cooled water
- D. Water vapor with 50% quality
- E. Saturated water

Choose the **correct** answer from the options given below :

- (1) A, D, B, C, E
- (2) A, B, D, E, C
- (3) D, A, B, C, E
- (4) B, C, E, A, D

Options :

611987135585. 1

611987135586. 2

611987135587. 3

611987135588. 4

Question Number : 48 Question Id : 61198734409 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Cellular Respiration (Aerobic) follows below sequence :

- A. Oxidative Phosphorylation
- B. Pyruvate Oxidation
- C. TCA cycle
- D. Glycolysis

Choose the **correct** answer from the options given below :

- (1) A, D, C, B
- (2) B, C, A, D
- (3) C, D, B, A
- (4) D, B, C, A

Options :

- 611987135589. 1
- 611987135590. 2
- 611987135591. 3
- 611987135592. 4

Question Number : 49 Question Id : 61198734410 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Finned surface heat transfer occurs in below sequence :

- A. Total heat transfer is computed
- B. Fin geometry is calculated
- C. Fin efficiency is determined
- D. Fin heat transfer equation is applied

Choose the **correct** answer from the options given below :

- (1) A, D, C, B
- (2) B, C, D, A
- (3) D, B, C, A
- (4) A, D, B, C

Options :

- 611987135593. 1
- 611987135594. 2
- 611987135595. 3
- 611987135596. 4

Question Number : 50 Question Id : 61198734411 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Pollution prevention is aided by Energy Integration according to the following steps :

- A. Minimum energy targets are identified
- B. Composite curves are constructed
- C. Heat exchanger network is designed
- D. Process stream data is collected

Choose the **correct** answer from the options given below :

- (1) C, A, B, D
- (2) D, B, A, C
- (3) B, A, C, D
- (4) C, B, A, D

Options :

- 611987135597. 1
- 611987135598. 2
- 611987135599. 3
- 611987135600. 4

Question Number : 51 Question Id : 61198734412 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Pump head is selected according to following sequence :

- A. Use pump characteristic curve
- B. Determine system losses
- C. Plot system curve
- D. Identify operating point

Choose the **correct** answer from the options given below :

- (1) A, C, D, B
- (2) B, C, A, D
- (3) B, D, C, A
- (4) A, C, B, D

Options :

- 611987135601. 1
- 611987135602. 2
- 611987135603. 3
- 611987135604. 4

Question Number : 52 Question Id : 61198734413 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No

Option Orientation : Vertical

Mass transfer happens in packed tower according to following sequence :

- A. Diffusion happening in films
- B. Equilibrium Approach
- C. Generation of Interfacial area
- D. Contact of gas liquid

Choose the **correct** answer from the options given below :

- (1) D, C, A, B
- (2) B, D, A, C
- (3) C, A, D, B
- (4) A, B, C, D

Options :

- 611987135605. 1
- 611987135606. 2
- 611987135607. 3
- 611987135608. 4

Question Number : 53 Question Id : 61198734414 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Arrange in their decreasing order of molecular weight :

- A. Monomer
- B. Oligomer
- C. Crosslinked Polymer
- D. Un-crosslinked Polymer

Choose the **correct** answer from the options given below :

- (1) A, B, C, D
- (2) B, A, D, C
- (3) C, D, A, B
- (4) C, D, B, A

Options :

- 611987135609. 1
- 611987135610. 2
- 611987135611. 3
- 611987135612. 4

Question Number : 54 Question Id : 61198734415 Question Type : MCQ Option Shuffling : No

Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For vapor-liquid equilibrium condition, in a close and single component system :

- A. $T^L = T^V$
- B. $T^L > T^V$
- C. $G^V > G^L$
- D. $G^V = G^L$
- E. $G^V < G^L$

Choose the **correct** answer from the options given below :

- (1) A and B only
- (2) B and C only
- (3) A and D only
- (4) A and E only

Options :

611987135613. 1

611987135614. 2

611987135615. 3

611987135616. 4

Question Number : 55 Question Id : 61198734416 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The extrusion processes cannot be used for the production of :

- A. filaments
- B. buckets
- C. TV-Cabinet
- D. Cables
- E. pipes

Choose the **correct** answer from the options given below :

- (1) A and D only
- (2) B and C only
- (3) D and E only
- (4) A and E only

Options :

611987135617. 1

611987135618. 2

611987135619. 3

Question Number : 56 Question Id : 61198734417 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The glass transition temperature of SBR can be increased by :

- A. increasing styrene content
- B. reducing crosslinking content
- C. increasing crosslinking content
- D. increasing butadiene content

Choose the **correct** answer from the options given below :

- (1) A and C only
- (2) A and B only
- (3) B and C only
- (4) A and D only

Options :

611987135621. 1

611987135622. 2

611987135623. 3

611987135624. 4

Question Number : 57 Question Id : 61198734418 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The green solvents are :

- A. Benzene
- B. Supercritical fluid (CO_2)
- C. Alcohol
- D. Water
- E. Acetone

Choose the **correct** answer from the options given below :

- (1) B and C only
- (2) B and E only
- (3) B and D only
- (4) A and D only

Options :

611987135625. 1

611987135626. 2

611987135627. 3

611987135628. 4

Question Number : 58 Question Id : 61198734419 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

- A. Hydrophobic interaction stabilize secondary structure
- B. Condensation reaction result in formation of peptide bond
- C. Protein tertiary structure occur due to disulfide bonds
- D. Physiological pH makes amino acid Zwitterion

Choose the **correct** answer from the options given below :

- (1) A and B only
- (2) B, C and D only
- (3) A, C and D only
- (4) A and C only

Options :

611987135629. 1

611987135630. 2

611987135631. 3

611987135632. 4

Question Number : 59 Question Id : 61198734420 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which statements are **correct** ?

- A. Steam Economy is decreased due to heat losses
- B. U is reduced due to resistance offered by fouling
- C. Viscous solutions cannot be handled by forced circulation evaporators
- D. LMTD offered by counter current flow is bigger than parallel flow in heat exchanger

Choose the **correct** answer from the options given below :

- (1) A, B and C only
- (2) B, C and D only
- (3) A, B and D only
- (4) C and D only

Options :

611987135633. 1

611987135634. 2

611987135635. 3

611987135636. 4

Question Number : 60 Question Id : 61198734421 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

During waste heat recovery :

- A. Carbon Dioxide emissions are impacted
- B. Operating cost is cut down
- C. Pollution Control is used in end

Choose the **correct** answer from the options given below :

- (1) A and B only
- (2) B and C only
- (3) A, B and C only
- (4) A and C only

Options :

611987135637. 1

611987135638. 2

611987135639. 3

611987135640. 4

Question Number : 61 Question Id : 61198734422 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

- A. The nature of centrifugal pump is dynamic
- B. When suction pressure is lower than vapour pressure cavitation happens
- C. The design of pump helps us in calculating NPSH
- D. Priming is important for positive displacement pump

Choose the **correct** answer from the options given below :

- (1) A, B and D only
- (2) B, C and D only
- (3) A, B and C only
- (4) A, C and D only

Options :

611987135641. 1

611987135642. 2

611987135643. 3

611987135644. 4

Question Number : 62 Question Id : 61198734423 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

- A. Mass Transfer Enhancement decreases HTU
- B. Linear Equilibrium in dilute systems are governed by Krenser equation
- C. Low liquid flow rate result in flooding
- D. Higher Driving force is provided by counter current operation

Choose the **correct** answer from the options given below :

- (1) A, B and C only
- (2) B, C and D only
- (3) C and B only
- (4) A, B and D only

Options :

611987135645. 1

611987135646. 2

611987135647. 3

611987135648. 4

Question Number : 63 Question Id : 61198734424 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The highest temperature generally produced by the combustion of unit mass of a fuel depends upon :

- A. LCV
- B. Ash content
- C. Pressure in the furnace
- D. Amount of air supplied

Choose the **correct** answer from the options given below :

- (1) A and B only
- (2) A and D only
- (3) B and C only
- (4) A only

Options :

611987135649. 1

611987135650. 2

611987135651. 3

611987135652. 4

Question Number : 64 Question Id : 61198734425 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The conditions that accelerates creep failure in metals :

- A. By lowering temperature
- B. By decreasing applied stress
- C. By increasing applied stress
- D. By increasing temperature

Choose the **correct** answer from the options given below :

- (1) A and C only
- (2) D and A only
- (3) C and D only
- (4) A and B only

Options :

611987135653. 1

611987135654. 2

611987135655. 3

611987135656. 4

Question Number : 65 Question Id : 61198734426 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I

- A. Joule-Thomson expansion
- B. Phase equilibrium
- C. Irreversible process
- D. Adiabatic process

List - II

- I. $dq = 0$
- II. $H^{\text{final}} = H^{\text{initial}}$
- III. $G^{\text{I}} = G^{\text{II}}$
- IV. $S^{\text{initial}} < S^{\text{final}}$

Choose the **correct** answer from the options given below :

- (1) A-IV, B-III, C-II, D-I
- (2) A-IV, B-II, C-III, D-I
- (3) A-IV, B-I, C-III, D-II
- (4) A-II, B-III, C-IV, D-I

Options :

- 611987135657. 1
- 611987135658. 2
- 611987135659. 3
- 611987135660. 4

Question Number : 66 Question Id : 61198734427 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I	List - II
A. Polypropylene	I. Thermosetting polymer
B. Cellulose	II. Biodegradable polymer
C. Phenol-formaldehyde resin	III. Thermoplastic polymer
D. Nylon-6	IV. Natural polymer

Choose the **correct** answer from the options given below :

- (1) A-I, B-II, C-III, D-IV
- (2) A-III, B-IV, C-I, D-II
- (3) A-III, B-II, C-IV, D-I
- (4) A-II, B-III, C-I, D-IV

Options :

- 611987135661. 1
- 611987135662. 2
- 611987135663. 3
- 611987135664. 4

Question Number : 67 Question Id : 61198734428 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I	List - II
A. Fillers	I. Accelerator
B. Plasticizers	II. Crosslinker
C. Peroxide	III. Processibility
D. CBS	IV. Cost reduction

Choose the **correct** answer from the options given below :

- (1) A-I, B-II, C-III, D-IV
- (2) A-IV, B-III, C-II, D-I
- (3) A-III, B-IV, C-II, D-I
- (4) A-IV, B-II, C-III, D-I

Options :

- 611987135665. 1
- 611987135666. 2
- 611987135667. 3
- 611987135668. 4

Question Number : 68 Question Id : 61198734429 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I	List - II
A. % yield	I. low E-factor/High-atom economy
B. Ideal green process	II. Measure the product formed
C. E-factor	III. Mass of water/mass of product formed
D. Atom economy	IV. Determine the % reactants in the product formed

Choose the **correct** answer from the options given below :

- (1) A-III, B-I, C-II, D-IV
- (2) A-I, B-III, C-IV, D-II
- (3) A-IV, B-II, C-III, D-I
- (4) A-II, B-I, C-III, D-IV

Options :

- 611987135669. 1
- 611987135670. 2
- 611987135671. 3
- 611987135672. 4

Question Number : 69 Question Id : 61198734430 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I	List - II
A. Isoelectric point	I. Substrate binding region
B. Denaturation	II. Animal polysaccharide storage
C. Active site	III. Tertiary structure loss without breaking peptide bond
D. Glycogen	IV. pH which makes net protein charge

Choose the **correct** answer from the options given below :

- (1) A-IV, B-III, C-I, D-II
- (2) A-III, B-I, C-IV, D-II
- (3) A-II, B-IV, C-III, D-I
- (4) A-I, B-II, C-III, D-IV

Options :

611987135673. 1

611987135674. 2

611987135675. 3

611987135676. 4

Question Number : 70 Question Id : 61198734431 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I	List - II
A. Log mean Temperature Difference	I. Best way to achieve high LMTD
B. Resistance due to fouling	II. Kg of evaporated water per kg of steam
C. Heat Exchanger with Counter flow	III. Temperature dependent driving force for Heat Exchange
D. Economy of steam	IV. Reduction in Heat Exchange due to increased resistance

Choose the **correct** answer from the options given below :

- (1) A-III, B-IV, C-I, D-II
- (2) A-II, B-III, C-IV, D-I
- (3) A-IV, B-II, C-III, D-I
- (4) A-I, B-IV, C-III, D-II

Options :

611987135677. 1
611987135678. 2
611987135679. 3
611987135680. 4

Question Number : 71 Question Id : 61198734432 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I

- A. Pinch Analysis
- B. Intensification of process
- C. Replacing Catalytic Process
- D. Replacing Batch Process by Continuous

List - II

- I. Increase in yield & low emission
- II. Emission Reduction
- III. Decrease in Residence Time
- IV. Fuel Saving

Choose the **correct** answer from the options given below :

- (1) A-III, B-I, C-II, D-IV
- (2) A-II, B-III, C-IV, D-I
- (3) A-IV, B-III, C-II, D-I
- (4) A-I, B-IV, C-II, D-III

Options :

611987135681. 1
611987135682. 2
611987135683. 3
611987135684. 4

Question Number : 72 Question Id : 61198734433 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I	List - II
A. Newtonian Fluid	I. Variation in pressure due to weight of fluid
B. Capillarity	II. Strain rate and shear stress display a linear relation
C. Hydrostatic pressure	III. Point velocity measuring device
D. Pitot tube	IV. Movement of liquid in a narrow tube

Choose the **correct** answer from the options given below :

- (1) A-III, B-II, C-IV, D-I
- (2) A-IV, B-III, C-II, D-I
- (3) A-IV, B-II, C-III, D-I
- (4) A-II, B-IV, C-I, D-III

Options :

- 611987135685. 1
- 611987135686. 2
- 611987135687. 3
- 611987135688. 4

Question Number : 73 Question Id : 61198734434 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I	List - II
A. Schmidt Number	I. Special Entrainers Needed
B. Kundsens Diffusion Regime	II. Mass transfer resulting from turbulence
C. Eddy Diffusivity	III. Pore diameter comparison with mean free path
D. Azeotropic Batch Distillation	IV. Momentum Diffusivity to mass diffusivity ratio

Choose the **correct** answer from the options given below :

- (1) A-IV, B-III, C-II, D-I
- (2) A-I, B-IV, C-III, D-II
- (3) A-III, B-I, C-II, D-IV
- (4) A-IV, B-I, C-III, D-II

Options :

- 611987135689. 1
- 611987135690. 2
- 611987135691. 3
- 611987135692. 4

Question Number : 74 Question Id : 61198734435 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I	List - II
A. Natural gas	I. CH_4, H_2
B. Lurgi gas	II. CO, H_2
C. Producer gas	III. CH_4
D. Coke oven gas	IV. $\text{CO}, \text{N}_2, \text{H}_2$

Choose the **correct** answer from the options given below :

- (1) A-I, B-II, C-III, D-IV
- (2) A-II, B-III, C-IV, D-I
- (3) A-III, B-II, C-IV, D-I
- (4) A-I, B-IV, C-III, D-II

Options :

611987135693. 1

611987135694. 2

611987135695. 3

611987135696. 4

Question Number : 75 Question Id : 61198734436 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II.

List - I	List - II
A. Point defect	I. Polymers
B. Frankel defect	II. Ion displaced to interstitial side
C. Glass Transition Temperature	III. Cation-anion pair vacancy
D. Schotting defect	IV. Vacancy

Choose the **correct** answer from the options given below :

- (1) A-IV, B-II, C-I, D-III
- (2) A-II, B-III, C-I, D-IV
- (3) A-II, B-IV, C-I, D-III
- (4) A-IV, B-I, C-II, D-III

Options :

611987135697. 1

611987135698. 2

611987135699. 3

611987135700. 4