#TestName:

OLTS-1718-JEEM 2018 **SAMPLE PAPER** –**FULL TEST**

#Time:

180 minutes

#Language:

English

#Attempts:

0

#StartDate:

#EndDate:

#TestPause:

Yes

#Review:

Yes

#ShowCorrectAnswers:

Yes

#SectionShuffle:

No

#QuestionShuffle:

No

#AnswerShuffle:

No

#CourseId:

#TestType:

Full

#Syllabus:

#ScheduleId:

#Section:

Physics

#SerialNo:

1

#Subject:

Physics

#SubSection:

SMCQ Single Correct

#SubSectionSerialNo:

1

#MarksPerQuestion:

4

#NegativeMarks:

1

#QuestionType:

SMCQ

#QuestionSerialNo:

1

#Question:

In a two slit experiment with monochromatic light, fringes are obtained on a screen placed at some distance from the slits. If the screen is moved by #equation\[5 \times {10^{ - 2}}\]equation#m towards the slits the change in fringe width is #equation\[3 \times {10^{ - 5}}\]equation#m. If the distance between the slits is #equation\[{10^{ - 3}}\]equation#m, the wavelength of light used is

#Option1:

4000 Å

#Option2:

5550 Å

#Option3:

6000 Å

#Option4:

6500 Å

#Answer:

Option3

#Solution:

#equation\[W = \frac{{\lambda D}}{d}\]equation#; DW = #equation\[\frac{{\lambda \Delta D}}{d}\]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

P120512

#ConceptIds:

1520

#QuestionType:

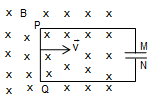
SMCQ

#QuestionSerialNo:

2

#Question:

A rod PQ is connected to the capacitor plates. The rod is placed in a magnetic field (B) directed downward perpendicular to the plane of the paper. If the rod is pulled out of magnetic field with velocity v as shown in figure.



#Option1:

plate M will be positively charged

#Option2:

plate N will be positively charged

#Option3:

both plates will be similarly charged

#Option4:

no charge will be collected on plates

#Answer:

Option1

#Solution:

#equation\[\varepsilon = {\rm{B}}\ell {\rm{v}}\]equation#develops across rod PQ.

By Lenz’s law, plate M get positively charged.

#Level:

Conceptual, Easy

#ConceptCode:

P120403

#ConceptIds:

1499

#QuestionType:

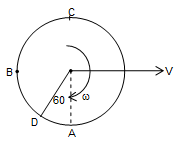
SMCQ

#QuestionSerialNo:

3

#Question:

A rigid body is rolling without slipping on the horizontal surface



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column – I** | | | **Column – II** | |
| (A) | Velocity at point A i.e. VA | (P) | | #equation\[V\sqrt 2 \]equation# |
| (B) | Velocity at point B i.e. VB | (Q) | | Zero |
| (C) | Velocity at point C i.e. VC | (R) | | V |
| (D) | Velocity at point D i.e. VD | (S) | | 2V |

#Option1:

A ® P, B® Q, C ® R, D ® S

#Option2:

A ® Q, B® P, C ® S, D ® R

#Option3:

A® R, B® P, C ® S, D ® R

#Option4:

A® S, B® R, C ® P, D ® Q

#Answer:

Option2

#Solution:

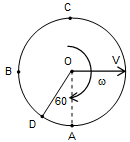
Using:

#equation\[{\vec v\_{A/o}} = \vec w \times (\overrightarrow {OA} )\]equation#

#equation\[{\vec v\_A} = {\vec v\_o} + \vec w \times (\overrightarrow {OA} )\]equation#

Þ#equation\[{v\_A} = 0,\;\;{v\_B} = |v\hat i + wR\hat j| = v\sqrt 2 \]equation#m/s.

Vc = 2v ; VD = v.



#Level:

Conceptual, Moderate

#ConceptCode:

P110710

#ConceptIds:

1421

#QuestionType:

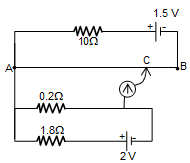
SMCQ

#QuestionSerialNo:

4

#Question:

In the figure, AB is a uniform wire of length 100 cm whose resistance is 5#equation\[\Omega \]equation#. If galvanometer reads zero, then AC =



#Option1:

10cm

#Option2:

20cm

#Option3:

40cm

#Option4:

80cm

#Answer:

Option3

#Solution:

#equation\[{V\_{AC}} = 2 \times \left( {\frac{{0.2}}{{1.8 + 0.2}}} \right)\]equation#…(i)

Also, VAC = #equation\[(1.5)\;\left( {\frac{5}{{15}}} \right)\;\left( {\frac{\ell }{{100}}} \right)\]equation#…(ii)

#Level:

Conceptual, Moderate

#ConceptCode:

P120207

#ConceptIds:

1483

#QuestionType:

SMCQ

#QuestionSerialNo:

5

#Question:

An inductor coil stores energy U when a current i is passed through it and dissipates energy at the rate of P. The time constant of the circuit when this coil is connected across a battery of zero internal resistance is

#Option1:

#equation$\frac{{4U}}{P}$equation#

#Option2:

#equation$\frac{U}{P}$equation#

#Option3:

#equation$\frac{{2U}}{P}$equation#

#Option4:

#equation$\frac{{2P}}{U}$equation#

#Answer:

Option3

#Solution:

i2R = P (1) #equation\[\frac{{L{i^2}}}{2} = U\]equation# (2)

ÞTime constant = #equation\[\frac{L}{R} = \frac{{2U}}{P}\]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

P120407

#ConceptIds:

1503

#QuestionType:

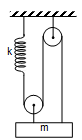
SMCQ

#QuestionSerialNo:

6

#Question:

For a system in equilibrium as shown in figure elongation in spring will be



#Option1:

#equation\[\frac{{2mg}}{k}\]equation#

#Option2:

#equation\[\frac{{mg}}{k}\]equation#

#Option3:

#equation\[\frac{{mg}}{{2k}}\]equation#

#Option4:

#equation\[\frac{{mg}}{{3k}}\]equation#

#Answer:

Option4

#Solution:

Kx = #equation\[\frac{{Mg}}{3}\]equation# ; x = #equation\[\frac{{Mg}}{{3k}}\]equation#

#Level:

Analytical, Easy

#ConceptCode:

P110401

#ConceptIds:

1388

#QuestionType:

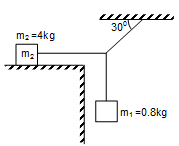
SMCQ

#QuestionSerialNo:

7

#Question:

The system shown is just on the verge of slipping. The coefficient of static friction between the block and the table top is



#Option1:

0.5

#Option2:

0.95

#Option3:

0.15

#Option4:

0.35

#Answer:

Option4

#Solution:

T sin30° = m1g & T cos30° = #equation\[\mu \]equation#m2g

tan30° = #equation\[\frac{{{m\_1}}}{{\mu {m\_2}}}\]equation#Þ#equation\[{\mu \_{\rm{2}}}\]equation#= #equation\[\frac{{{m\_1}}}{{{m\_2}\;\tan {{30}^o}}}\]equation#= 0.35

#Level:

Analytical, Easy

#ConceptCode:

P110404

#ConceptIds:

1391

#QuestionType:

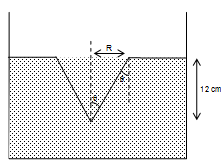
SMCQ

#QuestionSerialNo:

8

#Question:

A fish looking up through the water sees the outside world contained in a circular horizon. If the refractive index of water is 4/3 and the fish is 12 cm below the surface, the radius of this circle in cm is



#Option1:

#equation\[36\sqrt 5 \]equation#

#Option2:

#equation\[4\sqrt 5 \]equation#

#Option3:

#equation\[36\sqrt 7 \]equation#

#Option4:

#equation\[36/\sqrt 7 \]equation#

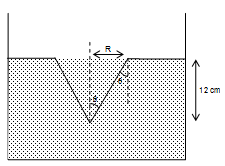
#Answer:

Option4

#Solution:

#equation\[\theta = {\theta \_{\rm{C}}}\]equation#(critical angle)

#equation\[\frac{R}{{12}} = \tan {\theta \_C}\]equation#



#Level:

Conceptual, Moderate

#ConceptCode:

P120507

#ConceptIds:

1515

#QuestionType:

SMCQ

#QuestionSerialNo:

9

#Question:

A ball falls from a height h0. There are n collisions with the earth. If after n collisions the ball rises to a height hn, then coefficient of restitution e is given by

#Option1:

#equation\[{e^n} = \sqrt {\frac{{{h\_n}}}{{{h\_0}}}} \]equation#

#Option2:

#equation\[{e^n} = \sqrt {\frac{{{h\_0}}}{{{h\_n}}}} \]equation#

#Option3:

#equation\[ne = \sqrt {\frac{{{h\_n}}}{{{h\_0}}}} \]equation#

#Option4:

#equation\[\sqrt n \,e = \sqrt {\frac{{{h\_n}}}{{{h\_0}}}} \]equation#

#Answer:

Option1

#Solution:

After first impact

(0)2 – #equation\[{\left( {e\sqrt {2gh} } \right)^2}\]equation#= 2(–g)h1

Þh1 = e2h

Þh2 = e2h1 = e4h

Þhn = e2nh

#Level:

Conceptual, Moderate

#ConceptCode:

P110604

#ConceptIds:

1408

#QuestionType:

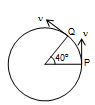
SMCQ

#QuestionSerialNo:

10

#Question:

A particle is moving in a circle of radius r with constant v. The change in velocity in moving from P to Q is



#Option1:

2v cos 20o

#Option2:

2v sin 20o

#Option3:

2v cos 40o

#Option4:

2v sin 40o

#Answer:

Option2

#Solution:

#equation\[\left| {{{\vec v}\_Q} - {{\vec v}\_P}} \right| = \sqrt {{v^2} + {v^2} - 2{v^2}\cos 40} \]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

P110306

#ConceptIds:

1381

#QuestionType:

SMCQ

#QuestionSerialNo:

11

#Question:

Two rods are of same material and have same length and area. Heat #equation\[\Delta {\rm{R}}\]equation#flow through them in 12 minutes, when they joined side by side. If now both the rods are joined in parallel, then in what time (in minutes) the same amount of heat #equation\[\Delta {\rm{R}}\]equation#will flow.

#Option1:

1

#Option2:

2

#Option3:

3

#Option4:

4

#Answer:

Option3

#Solution:

New resistance becomes (2R)

Þ Then time taken = #equation\[\frac{H}{{Power}} = \frac{H}{{\frac{{{{(\Delta T)}^2}}}{{2R}}}}\]equation#= 12 min

Resistance is parallel becomes (R/2)

Þ Time taken = #equation\[\frac{H}{{\frac{{{{(\Delta T)}^2}}}{{R/2}}}}\]equation# = 3min.

#Level:

Analytical, Moderate

#ConceptCode:

P111207

#ConceptIds:

1453

#QuestionType:

SMCQ

#QuestionSerialNo:

12

#Question:

What change in surface energy will be noticed when a drop of radius R splits up into 1000 droplets of radius r, surface tension of T?

#Option1:

#equation\[4\pi {R^2}T\]equation#

#Option2:

#equation\[32\pi {R^2}T\]equation#

#Option3:

#equation\[3\pi {R^2}T\]equation#

#Option4:

#equation\[36\pi {R^2}T\]equation#

#Answer:

Option4

#Solution:

#equation\[\Delta {\rm{U}}\]equation#= Uf – Ui = (1000) #equation\[\left[ {4\pi {{\left( {\frac{R}{{10}}} \right)}^2}T} \right]\]equation#– 4#equation\[\pi \]equation#R2T = 36#equation\[\pi \]equation#R2T

#Level:

Analytical, Easy

#ConceptCode:

P111010

#ConceptIds:

1438

#QuestionType:

SMCQ

#QuestionSerialNo:

13

#Question:

A train of mass M is moving on a circular track of radius R with constant speed v. The length of train is half the perimeter of track. The linear momentum of the train will be

#Option1:

0

#Option2:

2Mn/#equation\[\pi \]equation#

#Option3:

MvR

#Option4:

Mv

#Answer:

Option2

#Solution:

Total momentum = #equation\[\int\limits\_{\theta \; = - 90}^{ + 90} {(dm)v\;\cos \theta } \]equation#

dm = #equation\[\frac{M}{{\pi R}} \times Rd\theta \]equation#

Total momentum = #equation\[\int {\frac{M}{{\pi R}}vRd\theta \;\cos \theta = \frac{{2Mv}}{\pi }} \]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

P110602

#ConceptIds:

1406

#QuestionType:

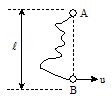
SMCQ

#QuestionSerialNo:

14

#Question:

Two balls A & B both of mass m & connected by a light inextensible string of length #equation\[2\ell \]equation#. Whole system is on a frictionless horizontal table. Ball B is given a velocity u (as shown) #equation$ \bot $equation#r to AB. The velocity of ball A just after the string becomes taut is



#Option1:

#equation\[\frac{{u\sqrt 3 }}{4}\]equation#

#Option2:

#equation\[u\sqrt 3 \]equation#

#Option3:

#equation\[\frac{{u\sqrt 3 }}{2}\]equation#

#Option4:

#equation\[\frac{u}{2}\]equation#

#Answer:

Option1

#Solution:

Applying momentum conservation in the direction of string

#equation\[mu\frac{{\sqrt 3 }}{2}\]equation# = 2 mv Þ#equation\[v = \frac{{\sqrt 3 }}{4}(u)\]equation#

#Level:

Conceptual, Difficult

#ConceptCode:

P110603

#ConceptIds:

1407

#QuestionType:

SMCQ

#QuestionSerialNo:

15

#Question:

A hydrogen atom and a#equation\[L{i^{ + + }}\]equation# ions are both in the second excited state. If #equation\[{\ell \_H}\]equation# and #equation\[{\ell \_{Li}}\]equation# are their respective electronic angular momenta, and #equation\[{E\_H}\]equation# and #equation\[{E\_{Li}}\]equation# their respective energies, then

#Option1:

#equation\[{\ell \_H} > {\ell \_{Li}}\,\,\,and\,\,\,\left| {{E\_H}} \right| > \left| {{E\_{Li}}} \right|\]equation#

#Option2:

#equation\[{\ell \_H} = {\ell \_{Li}}\,\,\,and\,\,\,\left| {{E\_H}} \right| < \left| {{E\_{Li}}} \right|\]equation#

#Option3:

#equation\[{\ell \_H} = {\ell \_{Li}}\,\,\,and\,\,\,\left| {{E\_H}} \right| > \left| {{E\_{Li}}} \right|\]equation#

#Option4:

#equation\[{\ell \_H} < {\ell \_{Li}}\,\,\,and\,\,\,\left| {{E\_H}} \right| < \left| {{E\_{Li}}} \right|\]equation#

#Answer:

Option2

#Solution:

According to Bohr’s atomic model.

#Level:

Analytical, Moderate

#ConceptCode:

P120604

#ConceptIds:

1528

#QuestionType:

SMCQ

#QuestionSerialNo:

16

#Question:

A siren placed at a railway platform is emitting sound of frequency 5 kHz. A passenger is sitting in a moving train. A records a frequency of 5.5 kHz when the train approaches the siren. During his return journey in a different train B he records the frequency of 6 kHz while approaching the same siren. The ratio of velocity of train B to train A is

#Option1:

#equation\[\frac{{242}}{{252}}\]equation#

#Option2:

#equation\[\frac{5}{6}\]equation#

#Option3:

2

#Option4:

#equation\[\frac{{11}}{6}\]equation#

#Answer:

Option3

#Solution:

Using Doppler’s effect to calculate apparent frequency.

#Level:

Analytical, Moderate

#ConceptCode:

P111307

#ConceptIds:

1461

#QuestionType:

SMCQ

#QuestionSerialNo:

17

#Question:

Two electrons are moving with the same speed V. One electron enters a region of uniform electric field while the other enters a region of uniform magnetic field. After sometime if the de Broglie wavelength of the two are #equation\[{\lambda \_1}\,\,and\,\,{\lambda \_2}\]equation#, then (select the best alternative)

#Option1:

#equation\[{\lambda \_1} = {\lambda \_2}\]equation#

#Option2:

#equation\[{\lambda \_1} > {\lambda \_2}\]equation#

#Option3:

#equation\[{\lambda \_1} > {\lambda \_2}\,\,or\,\,{\lambda \_1} < {\lambda \_2}\]equation#

#Option4:

#equation\[{\lambda \_1} > {\lambda \_2}\,\,or\,\,{\lambda \_1} < {\lambda \_2}\;or\;{\lambda \_1} = {\lambda \_2}\]equation#

#Answer:

Option4

#Solution:

For electron in electric field, magnitude of its momentum may increase, decrease or remain constant w.r.t. initial value.

#Level:

Conceptual, Easy

#ConceptCode:

P120603

#ConceptIds:

1527

#QuestionType:

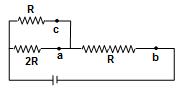
SMCQ

#QuestionSerialNo:

18

#Question:

Referring to the shown circuit, the current will be minimum in



#Option1:

a

#Option2:

b

#Option3:

c

#Option4:

same in all the branches

#Answer:

Option1

#Solution:

#equation\[{{\rm I}\_a} = \frac{{3V}}{{15R}},\,\,{{\rm I}\_b} = \frac{{3V}}{{5R}}\]equation#

#equation\[{{\rm I}\_c} = \frac{{6V}}{{15R}}.\]equation#

#Level:

Analytical, Easy

#ConceptCode:

P120204

#ConceptIds:

1480

#QuestionType:

SMCQ

#QuestionSerialNo:

19

#Question:

A body of mass m rises to a height h = R/5 from the surface of earth, where R is the radius of earth. If g is the acceleration due to gravity at the surface of earth the increase in potential energy is

#Option1:

(1/6) mgh

#Option2:

(5/6) mgh

#Option3:

(6/7) mgh

#Option4:

mgh

#Answer:

Option2

#Solution:

#equation\[\Delta U = - \frac{{GmM}}{{(6R/5)}} - \left( {\frac{{ - GmM}}{R}} \right)\]equation#

#Level:

Analytical, Easy

#ConceptCode:

P110903

#ConceptIds:

1426

#QuestionType:

SMCQ

#QuestionSerialNo:

20

#Question:

Unit vector perpendicular to vectors #equation\[\vec A = - 3\hat i - 2\hat j - 3\hat k\]equation# and #equation\[\vec B = 2\hat i + 4\hat j + 6\hat k\]equation# both is

#Option1:

#equation\[\frac{{3\hat j - 2\hat k}}{{\sqrt {13} }}\]equation#

#Option2:

#equation\[\frac{{3\hat j - 2\hat j}}{{\sqrt {13} }}\]equation#

#Option3:

#equation\[\frac{{ - 3\hat j + \hat k}}{{\sqrt {10} }}\]equation#

#Option4:

#equation\[\frac{{\hat i + 3\hat j - \hat k}}{{\sqrt {13} }}\]equation#

#Answer:

Option1

#Solution:

#equation\[\hat C = \frac{{\vec A \times \vec B}}{{\left| {\vec A \times \vec B} \right|}}\]equation#

#Level:

Analytical, Easy

#ConceptCode:

P110203

#ConceptIds:

1375

#QuestionType:

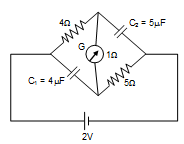
SMCQ

#QuestionSerialNo:

21

#Question:

In the circuit shown, the cell is ideal with emf = 2V. The resistance of the coil of the galvanometer G = 1#equation\[\Omega \]equation#. Then



#Option1:

No current flows in G.

#Option2:

0.2 A current flow in G.

#Option3:

Potential difference across C1 = 1.2

#Option4:

Potential difference across C2 = 2 V.

#Answer:

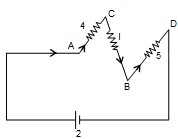
Option2

#Solution:

No current will flow through the capacitor.

#equation\[{V\_{{C\_1}}}\]equation# = VAB = (I) (#equation\[{\rm{5}}\Omega \]equation#) = 1 V

#equation\[{V\_{{C\_2}}}\]equation#= VCD = (I) (6) = 1.2 V.



#Level:

Analytical, Moderate

#ConceptCode:

P120209

#ConceptIds:

1485

#QuestionType:

SMCQ

#QuestionSerialNo:

22

#Question:

A boat having length of 3 metres and breadth 2 metres is floating on a lake. The boat sinks by one cm when a man gets on it. The mass of the man is

#Option1:

60 kg

#Option2:

62 kg

#Option3:

72 kg

#Option4:

128 kg

#Answer:

Option1

#Solution:

mg = V#equation\[\rho \]equation#g

= 3 × 2 × (0.01 m) × (103 kg/m3) × 10

Mg = 600Þm = 60 kg

#Level:

Conceptual, Moderate

#ConceptCode:

P111002

#ConceptIds:

1430

#QuestionType:

SMCQ

#QuestionSerialNo:

23

#Question:

A solid cylinder is released from rest from the top of an inclined plane of inclination 60° where friction coefficient varies with distance x as m = #equation\[\frac{{2 - 3x}}{{\sqrt 3 }}.\]equation# Find the distance travelled by the cylinder on incline before it starts slipping.

#Option1:

1 m

#Option2:

#equation\[\frac{1}{2}m\]equation#

#Option3:

#equation\[\frac{1}{3}m\]equation#

#Option4:

#equation\[\frac{1}{{2\sqrt 3 }}m\]equation#

#Answer:

Option3

#Solution:

For rolling down the inclined.

f = #equation\[\frac{{mg\sin \theta }}{{I + \frac{I}{{m{R^2}}}}}\;;\;\;\mu = \frac{f}{N} = \frac{{2 - 3x}}{{\sqrt 3 }}\]equation#Þ*x*= #equation\[\frac{1}{3}m\]equation#.

#Level:

Conceptual, Moderate

#ConceptCode:

P110711

#ConceptIds:

1422

#QuestionType:

SMCQ

#QuestionSerialNo:

24

#Question:

A particle of change q and mass m starts moving from the origin under the action of an electric field #equation\[\vec E = {E\_0}\hat i\]equation#and magnetic field #equation\[\vec B = {B\_0}\hat i\]equation#with a velocity #equation\[\vec v = {v\_0}\hat j\]equation#. The speed of the particle will become 2v0 after time t:

#Option1:

#equation\[t = \frac{{2m{v\_0}}}{{q{E\_0}}}\]equation#

#Option2:

#equation\[t = \frac{{2Bq}}{{m{v\_0}}}\]equation#

#Option3:

#equation\[t = \frac{{\sqrt 3 \,\,Bq}}{{m{v\_0}}}\]equation#

#Option4:

#equation\[t = \frac{{\sqrt 3 \,\,m{v\_0}}}{{q{E\_0}}}\]equation#

#Answer:

Option4

#Solution:

Magnetic field will do no work. Work done by electric field =#equation\[\Delta {\rm{K}}\]equation#.

#Level:

Ultimate, Difficult

#ConceptCode:

P120303

#ConceptIds:

1488

#QuestionType:

SMCQ

#QuestionSerialNo:

25

#Question:

A tuning fork of frequency 280 Hz produces 10 beats per sec when sounded with a vibrating sonometer string. When the tension in the string increases slightly, it produces 11 beats per sec. The original frequency of the vibrating sonometer string is:

#Option1:

269 Hz

#Option2:

291 Hz

#Option3:

270 Hz

#Option4:

290 Hz

#Answer:

Option4

#Solution:

For sonometer f #equation$ \propto $equation##equation\[\sqrt T \]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

P111307

#ConceptIds:

1461

#QuestionType:

SMCQ

#QuestionSerialNo:

26

#Question:

A simple pendulum has time period T = 2s in air. If the whole arrangement is placed in a nonviscous liquid whose density is#equation\[\frac{1}{2}\]equation#times the density of bob. The time period of the simple pendulum in the liquid will be

#Option1:

#equation\[\frac{2}{{\sqrt 2 }}s\]equation#

#Option2:

4 s

#Option3:

#equation\[2\sqrt 2 \]equation#s

#Option4:

#equation\[4\sqrt 2 \]equation#s

#Answer:

Option3

#Solution:

#equation\[T = 2\pi \sqrt {\frac{\ell }{{{g\_{eff}}}}} \]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

P111104

#ConceptIds:

1444

#QuestionType:

SMCQ

#QuestionSerialNo:

27

#Question:

A monoatomic ideal gas expands at constant pressure with heat Q supplied. The fraction of Q, which goes as work done by the gas is

#Option1:

1

#Option2:

2/3

#Option3:

3/5

#Option4:

2/5

#Answer:

Option4

#Solution:

#equation\[\Delta {\rm{Q}} = {\rm{n}}{{\rm{C}}\_{\rm{p}}}\Delta {\rm{T}}\]equation#and#equation\[\Delta {\rm{U}} = {\rm{n}}{{\rm{C}}\_{\rm{v}}}\Delta {\rm{T}}\]equation#

#Level:

Analytical, Easy

#ConceptCode:

P111204

#ConceptIds:

1450

#QuestionType:

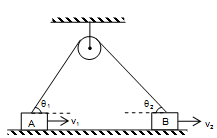
SMCQ

#QuestionSerialNo:

28

#Question:

Block are moving as shown. The ratio #equation\[{v\_1}/{v\_2}\]equation# is



#Option1:

#equation\[\frac{{\sin {\theta \_1}}}{{\sin {\theta \_2}}}\]equation#

#Option2:

#equation\[\frac{{\sin {\theta \_2}}}{{\sin {\theta \_1}}}\]equation#

#Option3:

#equation\[\frac{{\cos {\theta \_2}}}{{\cos {\theta \_1}}}\]equation#

#Option4:

#equation\[\frac{{\cos {\theta \_1}}}{{\cos {\theta \_2}}}\]equation#

#Answer:

Option3

#Solution:

#equation\[{{\rm{V}}\_{\rm{1}}}{\rm{cos}}{\theta \_{\rm{1}}} = {{\rm{V}}\_{\rm{2}}}{\rm{cos}}{\theta \_{\rm{2}}}\]equation#

#Level:

Conceptual, Difficult

#ConceptCode:

P110407

#ConceptIds:

1394

#QuestionType:

SMCQ

#QuestionSerialNo:

29

#Question:

A particle is given an initial speed ‘u’ inside a smooth fixed spherical shell of radius R = 1 m such that it is just able to complete the circle. Acceleration of the particle when its velocity is vertical, is



#Option1:

g#equation$\sqrt {10} $equation#

#Option2:

g

#Option3:

g#equation$\sqrt 2 $equation#

#Option4:

3 g

#Answer:

Option1

#Solution:

#equation\[a = \sqrt {a\_t^2 + a\_c^2} \]equation#

#Level:

Ultimate, Moderate

#ConceptCode:

P110507

#ConceptIds:

1404

#QuestionType:

SMCQ

#QuestionSerialNo:

30

#Question:

Two projectiles are thrown from the same point simultaneously with initial speeds u1 and u2 at angles #equation\[{\theta \_{\rm{1}}}\]equation# and #equation\[{\theta \_{\rm{2}}}\]equation# with horizontal respectively If#equation\[{{\rm{u}}\_{\rm{1}}}\,{\rm{sin}}\,{\theta \_{\rm{1}}} = {{\rm{u}}\_{\rm{2}}}\,{\rm{sin}}\,{\theta \_{\rm{2}}}\]equation#, then path of one projectile as seen from other will be

#Option1:

A parabola

#Option2:

A vertical straight line

#Option3:

A horizontal straight line

#Option4:

none of above

#Answer:

Option3

#Solution:

Vertical component of initial velocities are same. Hence, identical vertical motions.

#Level:

Conceptual, Moderate

#ConceptCode:

P110308

#ConceptIds:

***1383***

#Section:

Chemistry

#SerialNo:

2

#Subject:

Chemistry

#SubSection:

SMCQ Single Correct

#SubSectionSerialNo:

1

#MarksPerQuestion:

4

#NegativeMarks:

1

#QuestionType:

SMCQ

#QuestionSerialNo:

31

#Question:

Which of the following orbital has the highest number of radial nodes?

#Option1:

4s

#Option2:

4px

#Option3:

#equation\[4\,{d\_{{x^2} - {y^2}}}\]equation#

#Option4:

#equation\[4{d\_{{z^2}}}\]equation#

#Answer:

Option1

#Solution:

The no. of radial nodes = (n - #equation$\ell $equation# -1).

#Level:

Conceptual, Moderate

#ConceptCode:

C110106

#ConceptIds:

1139

#QuestionType:

SMCQ

#QuestionSerialNo:

32

#Question:

Which of the following property is identical for NH3 and NF3?

#Option1:

Bond angle

#Option2:

Dipole moment

#Option3:

Bond order

#Option4:

Basic strength

#Answer:

Option3

#Solution:

The bond order of both molecules is one.

#Level:

Ultimate, Moderate

#ConceptCode:

C110306

#ConceptIds:

1158

#QuestionType:

SMCQ

#QuestionSerialNo:

33

#Question:

Which of the following characteristic of an ideal gas does not depend on temperature?

#Option1:

R.M.S velocity

#Option2:

Kinetic energy

#Option3:

Vapour density

#Option4:

Liquification

#Answer:

Option3

#Solution:

#equation\[Vapour\,\,density\, = \frac{{Molecular\,\,mass}}{2}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

C111205

#ConceptIds:

1217

#QuestionType:

SMCQ

#QuestionSerialNo:

34

#Question:

Which of the following atom has the highest value of first ionization energy?

#Option1:

Na

#Option2:

K

#Option3:

Mg

#Option4:

Al

#Answer:

Option3

#Solution:

Due to more penetrating nature of 3s orbital.

#Level:

Analytical, Easy

#ConceptCode:

C110702

#ConceptIds:

1182

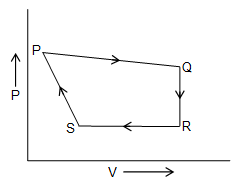
#QuestionType:

SMCQ

#QuestionSerialNo:

35

#Question:



An irreversible cyclic process has been represented in the above figure. Along which path, the work done due to expansion of the system is zero?

#Option1:

PQ

#Option2:

QR

#Option3:

RS

#Option4:

SP

#Answer:

Option2

#Solution:

The volume does not change along Q ® R.

#Level:

Conceptual, Moderate

#ConceptCode:

C111902

#ConceptIds:

1266

#QuestionType:

SMCQ

#QuestionSerialNo:

36

#Question:

0.4 moles of ‘X’ and 0.2 moles of ‘Y’ are taken in a one litre vessel. After certain decomposition of ‘X’, the system attains equilibrium. The equilibrium concentrations of X and Y are identical. What is the value of ‘KC’ in #equation\[{\rm{mo}}{{\rm{l}}^{\rm{2}}}\,{{\rm{L}}^{--{\rm{2}}}}\]equation# unit?

#Option1:

#equation\[\frac{1}{{32}}\]equation#

#Option2:

#equation\[{\rm{36}} \times {\rm{1}}{0^{--{\rm{2}}}}\]equation#

#Option3:

#equation\[\frac{1}{{45}}\]equation#

#Option4:

Done

#Answer:

Option3

#Solution:

Initially 0.4 0.2

At equm 0.4 – x 0.2 + 2x x

Since, 0.4 – x = 0.2 + 2x

#equation\[\begin{array}{l}

\therefore \,\,x = \frac{{0.2}}{3}\\

\therefore \,{K\_C} = \frac{1}{{45}}

\end{array}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

C110402

#ConceptIds:

1164

#QuestionType:

SMCQ

#QuestionSerialNo:

37

#Question:

In which of the following solution mixture, common ion effect is observed?

#Option1:

NH4OH + HCl

#Option2:

NaCl + CH3COOH

#Option3:

NaHS + Na2S

#Option4:

KCN + H­2CO3

#Answer:

Option3

#Solution:

#equation\[{{\rm{S}}^{{\rm{2}}--}}\]equation#is the common ion.

#Level:

Conceptual, Difficult

#ConceptCode:

C110506

#ConceptIds:

1172

#QuestionType:

SMCQ

#QuestionSerialNo:

38

#Question:

Which of the following reagent can form a chiral product, upon treatment with CH3CH = CH2?

#Option1:

Br2/CCl4

#Option2:

HBr

#Option3:

HBr/(RCO)2O2

#Option4:

None of these

#Answer:

Option1

#Solution:

Fig. 17.PNG

#Level:

Conceptual, Moderate

#ConceptCode:

C111707

#ConceptIds:

1255

#QuestionType:

SMCQ

#QuestionSerialNo:

39

#Question:

The half-life of a first order reaction is 8 minute if the reaction starts with 0.4 M concentration of the reactant. What will be the half-life if it starts with 0.8 M concentration of the reactant?

#Option1:

4 minutes

#Option2:

16 minutes

#Option3:

2 minutes

#Option4:

None of these

#Answer:

Option4

#Solution:

Half-life of first order reactions do not depend on concentration of reactants.

#Level:

Analytical, Difficult

#ConceptCode:

C110604

#ConceptIds:

1176

#QuestionType:

SMCQ

#QuestionSerialNo:

40

#Question:

Which compound is not formed when sodium metal

is exposed to air?

#Option1:

NaOH

#Option2:

Na3N

#Option3:

NaHCO3

#Option4:

Na2CO3

#Answer:

Option2

#Solution:

Sodium does not form nitride.

#Level:

Conceptual, Moderate

#ConceptCode:

C110803

#ConceptIds:

1188

#QuestionType:

SMCQ

#QuestionSerialNo:

41

#Question:

The simplest acid formed by heating H3BO3 is

#Option1:

H2BO2

#Option2:

HBO2

#Option3:

H2B4O7

#Option4:

H2BO

#Answer:

Option2

#Solution:

H3BO3 HBO2

#Level:

Conceptual, Easy

#ConceptCode:

C111505

#ConceptIds:

1236

#QuestionType:

SMCQ

#QuestionSerialNo:

42

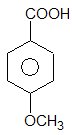
#Question:

The strongest acid out of the following is:

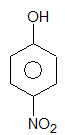
#Option1:

Fig. 18.PNG

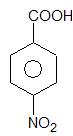
#Option2:



#Option3:



#Option4:



#Answer:

Option4

#Solution:

Electron withdrawing groups increase acidic strength as compared to releasing groups.

#Level:

Analytical, Difficult

#ConceptCode:

C111302

#ConceptIds:

1224

#QuestionType:

SMCQ

#QuestionSerialNo:

43

#Question:

Which is one of the products of above reaction?

#Option1:

Be(OH)2

#Option2:

CaSO3

#Option3:

BeH2

#Option4:

CaO

#Answer:

Option1

#Solution:

CA2

#Level:

Analytical, Easy

#ConceptCode:

C111002

#ConceptIds:

1202

#QuestionType:

SMCQ

#QuestionSerialNo:

44

#Question:

Which of the following is not a green house gas?

#Option1:

CO2

#Option2:

CH4

#Option3:

O3

#Option4:

None

#Answer:

Option3

#Solution:

O3 is not present in the lower atmosphere to trap heat.

#Level:

Conceptual, Easy

#ConceptCode:

C120909

#ConceptIds:

1340

#QuestionType:

SMCQ

#QuestionSerialNo:

45

#Question:

In the common salt structure, which particle is present in the octahedral voids of the unit cell?

#Option1:

Na+

#Option2:

#equation\[{\rm{C}}{{\rm{l}}^--}\]equation#

#Option3:

Na

#Option4:

Cl2

#Answer:

Option1

#Solution:

Cation is present at octahedral voids of rock salt structure.

#Level:

Conceptual, Moderate

#ConceptCode:

C120304

#ConceptIds:

1291

#QuestionType:

SMCQ

#QuestionSerialNo:

46

#Question:

Which of the following solution has the highest boiling point? [Assume complete ionization of salts]

#Option1:

0.5 m CaCl2

#Option2:

0.3 m AlCl3

#Option3:

0.4 m Al2(SO4)3

#Option4:

0.8 m C6H12O6

#Answer:

Option3

#Solution:

#equation\[\Delta {{\rm{T}}\_{\rm{b}}} = {{\rm{K}}\_{\rm{b}}} \times {\rm{i}} \times {\rm{m}}\]equation#

\#equation\[\Delta {{\rm{T}}\_{\rm{b}}}\alpha {\rm{i}} \times {\rm{m}}\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

C120608

#ConceptIds:

1314

#QuestionType:

SMCQ

#QuestionSerialNo:

47

#Question:

Which of the following solution has the highest value of molar conductance?

#Option1:

NaCl

#Option2:

HCl

#Option3:

KCl

#Option4:

LiCl

#Answer:

Option2

#Solution:

H+ has exceptionally the highest molar conductance.

#Level:

Analytical, Easy

#ConceptCode:

C120507

#ConceptIds:

1304

#QuestionType:

SMCQ

#QuestionSerialNo:

48

#Question:

Which electrolyte can easily coagulate a negatively charged colloid?

#Option1:

CaSO4

#Option2:

AlCl3

#Option3:

KNO3

#Option4:

Mg(NO3)2

#Answer:

Option2

#Solution:

Due to high charge density of Al3+ in AlCl3.

#Level:

Analytical, Moderate

#ConceptCode:

C121302

#ConceptIds:

1365

#QuestionType:

SMCQ

#QuestionSerialNo:

49

#Question:

The most suitable process for the extraction of copper from CuSO4 solution is:

#Option1:

hydrometallurgy

#Option2:

smelting

#Option3:

electrolysis

#Option4:

self-reduction

#Answer:

Option1

#Solution:

is known as hydrometallurgy.

#Level:

Conceptual, Moderate

#ConceptCode:

C120704

#ConceptIds:

1319

#QuestionType:

SMCQ

#QuestionSerialNo:

50

#Question:

Which of the following complex can show ionization isomerism?

#Option1:

Na2[Zn(CN)4]

#Option2:

[Cr(NH3)5Cl]Br

#Option3:

Co2(CO)8

#Option4:

[Cu(en)2]SO4

#Answer:

Option2

#Solution:

Cl and Br can exchange their positions.

#Level:

Conceptual, Easy

#ConceptCode:

C120102

#ConceptIds:

1275

#QuestionType:

SMCQ

#QuestionSerialNo:

51

#Question:

Which is most reactive towards aq. KOH through SN1 path?

#Option1:

CH3 – CH = CH – Cl

#Option2:

CH3 – CH = CH – CH2Cl

#Option3:

CH2 = CH – CH2 – CH2Cl

#Option4:

Fig. 22.PNG

#Answer:

Option2

#Solution:

Allylic carbocations are more stable than the vinylic and primary ones.

#Level:

Ultimate, Moderate

#ConceptCode:

C121201

#ConceptIds:

6852

#QuestionType:

SMCQ

#QuestionSerialNo:

52

#Question:

Which of the following compound of nitrogen can form the highest number of acids, when treated with water?

#Option1:

NO

#Option2:

N2O4

#Option3:

N2O3

#Option4:

N2O5

#Answer:

Option2

#Solution:

N2O4 is a mixed anhydride

N­2O3 and N2O5 form one acid each, NO does not form acid.

#Level:

Analytical, Moderate

#ConceptCode:

C120805

#ConceptIds:

1326

#QuestionType:

SMCQ

#QuestionSerialNo:

53

#Question:

Which of the following ether does not react with HI?

#Option1:

Fig. 23.PNG

#Option2:

Fig. 24.PNG

#Option3:

Fig. 25.PNG

#Option4:

Fig. 26.PNG

#Answer:

Option2

#Solution:

Phenyl carbocations are not formed.

#Level:

Conceptual, Moderate

#ConceptCode:

C121204

#ConceptIds:

1355

#QuestionType:

SMCQ

#QuestionSerialNo:

54

#Question:

Which can undergo disproportionation reaction with conc. NaOH?

#Option1:

CH3CH2OH

#Option2:

HCHO

#Option3:

CH3CH2Cl

#Option4:

CH3COOH

#Answer:

Option2

#Solution:

HCHO

#Level:

Conceptual, Difficult

#ConceptCode:

C121201

#ConceptIds:

6852

#QuestionType:

SMCQ

#QuestionSerialNo:

55

#Question:

The organic product of above reaction is:

#Option1:

Fig. 27.PNG

#Option2:

CH3CH = CHCH3

#Option3:

CH3CH2CH2CH3

#Option4:

CH3CH2COOH + HCOOH

#Answer:

Option3

#Solution:

Clemmenson reduction takes place.

#Level:

Conceptual, Moderate

#ConceptCode:

C121201

#ConceptIds:

6852

#QuestionType:

SMCQ

#QuestionSerialNo:

56

#Question:

Reactant ‘X’ in the above reaction is:

#Option1:

CH3CH2CONH2

#Option2:

CH3CH2NO2

#Option3:

CH3CONH2

#Option4:

CH3CH2CH2NO2

#Answer:

Option1

#Solution:

It is Hoffmann’s degradation reaction.

#Level:

Analytical, Moderate

#ConceptCode:

C121207

#ConceptIds:

1358

#QuestionType:

SMCQ

#QuestionSerialNo:

57

#Question:

The incorrect statement regarding sucrose is:

#Option1:

it is a disachharide

#Option2:

it is a reducing sugar

#Option3:

it does not undergo mutarotation

#Option4:

it forms glucose and fructose on hydrolysis

#Answer:

Option2

#Solution:

It is a non-reducing sugar.

#Level:

Ultimate, Difficult

#ConceptCode:

C121602

#ConceptIds:

6868

#QuestionType:

SMCQ

#QuestionSerialNo:

58

#Question:

Sucrolose is a/an

#Option1:

antidepressant drug

#Option2:

food preservator

#Option3:

artificial sweetner

#Option4:

disinfectant

#Answer:

Option3

#Solution:

It is an artificial sweetner.

#Level:

Conceptual, Easy

#ConceptCode:

C121702

#ConceptIds:

6870

#QuestionType:

SMCQ

#QuestionSerialNo:

59

#Question:

The product of above reaction is a/an

#Option1:

Aldehyde

#Option2:

Alcohol

#Option3:

Ether

#Option4:

Nitro compound

#Answer:

Option2

#Solution:

CH3

#Level:

Conceptual, Easy

#ConceptCode:

C121208

#ConceptIds:

6853

#QuestionType:

SMCQ

#QuestionSerialNo:

60

#Question:

Bakelite contains

#Option1:

cyclohexane ring

#Option2:

benzene ring

#Option3:

cyclopentane ring

#Option4:

pyridine ring

#Answer:

Option2

#Solution:

The monomers of bakelite are PhCHO and HCHO.

#Level:

Conceptual, Moderate

#ConceptCode:

C121211

#ConceptIds:

6856

#Section:

Mathematics

#SerialNo:

3

#Subject:

Mathematics

#SubSection:

SMCQ Single Correct

#SubSectionSerialNo:

1

#MarksPerQuestion:

4

#NegativeMarks:

1

#QuestionType:

SMCQ

#QuestionSerialNo:

61

#Question:

#equation\[\int\limits\_\pi ^{10\pi } {\left| {\sin \,x} \right|\,dx = } \]equation#

#Option1:

20

#Option2:

8

#Option3:

10

#Option4:

18

#Answer:

Option4

#Solution:

#equation\[I = 9 \times \int\limits\_0^\pi {\left| {\sin \,x} \right|\,dx} \]equation#

#equation\[ = 18\,\int\limits\_0^{\pi /2} {\sin \,x\,dx = 18} \]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M120808

#ConceptIds:

1082

#QuestionType:

SMCQ

#QuestionSerialNo:

62

#Question:

If n balls are distributed into m boxes, so that each ball is equally likely to fall in any box, the probability that a specified box will contain r balls is

#Option1:

#equation\[\frac{{^n{C\_r}{{\left( {m - 1} \right)}^{n - r}}}}{{^n{C\_m}}}\]equation#

#Option2:

#equation\[\frac{{^n{P\_r}{{\left( {m - 1} \right)}^{n - r}}}}{{^n{C\_m}}}\]equation#

#Option3:

#equation\[\frac{{^n{C\_r}{{\left( {m - 1} \right)}^{n - r}}}}{{{m^n}}}\]equation#

#Option4:

#equation\[\frac{{^n{C\_r}{{\left( {m - 1} \right)}^{n - r}}}}{{{n^m}}}\]equation#

#Answer:

Option3

#Solution:

The total number of ways of distributing n balls into m boxes is #equation\[{m^n}\]equation# which are assumed to be equally likely.

Since r balls which should go to the specified box can be chosen in #equation\[^n{C\_r}\]equation# ways and for any such way the remaining (n – r) balls can be distributed to the#equation\[{\left( {{\rm{m}}--{\rm{1}}} \right)^{{\rm{n}}--{\rm{r}}}}\]equation#ways.

#equation\[\therefore \]equation#The number of favourable cases #equation\[ = \left( {\begin{array}{\*{20}{c}}

n\\

r

\end{array}} \right){\left( {m - 1} \right)^{n - r}}\]equation#

#equation\[\therefore \]equation##equation\[P\left( A \right) = \frac{{\left( {\begin{array}{\*{20}{c}}

n\\

r

\end{array}} \right){{\left( {m - 1} \right)}^{n - r}}}}{{{m^n}}}\]equation#

[where A is the event that a specified box will contain r balls]

#Level:

Ultimate, Moderate

#ConceptCode:

M121301

#ConceptIds:

1114

#QuestionType:

SMCQ

#QuestionSerialNo:

63

#Question:

The probability that at least one of the events A and B occur is 0.4. If A and B be occur simultaneously with probability 0.1, then probability of #equation\[{A^C}\]equation# or #equation\[{B^C}\]equation# is equal to

#Option1:

1.2

#Option2:

1.4

#Option3:

1.5

#Option4:

1.8

#Answer:

Option3

#Solution:

Given that #equation\[P\left( {A \cup B} \right) = 0.4\]equation# and #equation\[P\left( {A \cap B} \right) = 0.1\]equation#

#equation\[\therefore \;\;P\left( A \right) + P\left( B \right) - P\left( {A \cap B} \right) = 0.4\]equation#

or#equation\[P\left( A \right) + P\left( B \right) = 0.4 + 0.1 = 0.5\]equation#

or#equation\[1 - P\left( {{A^C}} \right) + 1 - P\left( {{B^C}} \right) = 0.5\]equation#

or#equation\[P\left( {{A^C}} \right) + P\left( {{B^C}} \right) = 2 - 0.5 = 1.5\]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

M121306

#ConceptIds:

1119

#QuestionType:

SMCQ

#QuestionSerialNo:

64

#Question:

#equation\[\mathop {\lim }\limits\_{x \to 0} \frac{{\sin \,\pi \left( {{{\cos }^2}\left( {\tan \left( {\sin \,x} \right)} \right)} \right)}}{{{x^2}}}\]equation#

#Option1:

#equation\[\pi \]equation#

#Option2:

#equation\[\frac{\pi }{4}\]equation#

#Option3:

#equation\[\frac{\pi }{2}\]equation#

#Option4:

#equation\[\frac{\pi }{3}\]equation#

#Answer:

Option1

#Solution:

#equation\[\mathop {\lim }\limits\_{x \to 0} \frac{{\sin \,\pi \left( {1 - {{\sin }^2}\left( {\tan \left( {\sin \,x} \right)} \right)} \right)}}{{{x^2}}}\]equation#

#equation\[ = \mathop {\lim }\limits\_{x \to 0} \frac{{\sin \left( {{{\sin }^2}\left( {\tan \,\left( {\sin \,x} \right)} \right)} \right)}}{x}\]equation##equation\[ = \pi \]equation#

#Level:

Analytical, Easy

#ConceptCode:

M110602

#ConceptIds:

945

#QuestionType:

SMCQ

#QuestionSerialNo:

65

#Question:

The real function #equation\[f\left( x \right) = {\cos ^{ - 1}}\sqrt {{x^2} + 3x + 1} + {\cos ^{ - 1}}\sqrt {{x^2} + 3x} \]equation# is defined on the set

#Option1:

#equation\[\left\{ {0,\,\,3} \right\}\]equation#

#Option2:

#equation\[\left( {0,\,\,3} \right)\]equation#

#Option3:

#equation\[\left\{ {0,\,\, - 3} \right\}\]equation#

#Option4:

(–3, 0)

#Answer:

Option3

#Solution:

Clearly #equation\[0 \le {x^2} + 3x + 1 \le 1\]equation# and #equation\[0 \le {x^2} + 3x \le 1\]equation#

#equation\[ \Rightarrow {x^2} + 3x = 0\]equation#

or#equation\[x = 0,\,\,x = - 3\]equation#

#Level:

Analytical, Easy

#ConceptCode:

M120303

#ConceptIds:

1041

#QuestionType:

SMCQ

#QuestionSerialNo:

66

#Question:

If #equation\[f\left( x \right) = 0\]equation# is a cubic equation with positive and distinct roots #equation\[\alpha ,\,\beta ,\,\gamma \]equation# such that #equation\[\beta \]equation# is H.M. of the roots of #equation\[f'\left( x \right) = 0\]equation#. Then #equation\[\left( {\alpha ,\,\beta ,\,\gamma } \right)\]equation# are in

#Option1:

A.P.

#Option2:

G.P.

#Option3:

H.P.

#Option4:

A.G.P.

#Answer:

Option2

#Solution:

#equation\[f\left( x \right) = \left( {x - \alpha } \right)\left( {x - \beta } \right)\left( {x - \gamma } \right)\]equation#

#equation\[f'\left( x \right) = 3{x^2} - 2x\left( {\alpha + \beta + \gamma } \right) + \alpha \beta + \alpha \gamma + \beta \gamma \]equation#

#equation\[\beta = \frac{{2\,{\alpha \_1}\,{\beta \_1}}}{{{\alpha \_1} + {\beta \_1}}}\]equation#(where#equation\[{\alpha \_1},\,{\beta \_1}\]equation# are the roots of #equation\[f'\left( x \right) = 0\]equation#)

also#equation\[\beta = \frac{{2\left( {\alpha \beta + \beta \gamma + \alpha \gamma } \right)}}{{2\left( {\alpha + \beta + \gamma } \right)}} \Rightarrow {\beta ^2} = \alpha \gamma \]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M110506

#ConceptIds:

943

#QuestionType:

SMCQ

#QuestionSerialNo:

67

#Question:

Let #equation\[f\left( x \right) = \left\{ {\begin{array}{\*{20}{c}}

{\left| x \right|}&{0 \le \left| x \right| \le 3}\\

1&{x = 0}

\end{array}} \right.\]equation# then at x = 0, #equation\[f\left( x \right)\]equation# has

#Option1:

a local maximum

#Option2:

no local maximum

#Option3:

a local minimum

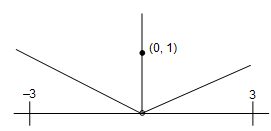
#Option4:

no extremum

#Answer:

Option1

#Solution:



#Level:

Conceptual, Easy

#ConceptCode:

M120605

#ConceptIds:

1067

#QuestionType:

SMCQ

#QuestionSerialNo:

68

#Question:

If #equation\[\sin \left( {x + y} \right) = \log \left( {x + y} \right)\]equation# then #equation\[\frac{{dy}}{{dx}} = \]equation#

#Option1:

1

#Option2:

–1

#Option3:

2

#Option4:

does not exist

#Answer:

Option2

#Solution:

#equation\[\cos \left( {x + y} \right).\,\left( {1 + \frac{{dy}}{{dx}}} \right) = \frac{1}{{\left( {x + y} \right)}}\,\left( {1 + \frac{{dy}}{{dx}}} \right)\]equation#

#equation\[ \Rightarrow \;\;\;\;1 + \frac{{dy}}{{dx}} = 0\]equation#or#equation\[\frac{{dy}}{{dx}} = - 1\]equation#

#Level:

Ultimate, Easy

#ConceptCode:

M120501

#ConceptIds:

1060

#QuestionType:

SMCQ

#QuestionSerialNo:

69

#Question:

The independent probabilities that A, B, C can solve the problem are #equation\[\frac{1}{2},\,\frac{1}{3},\,\frac{1}{4}\]equation# respectively. The probability that just two of them only solve the problem is

#Option1:

#equation\[\frac{3}{4}\]equation#

#Option2:

#equation\[\frac{2}{3}\]equation#

#Option3:

#equation\[\frac{1}{4}\]equation#

#Option4:

None of these

#Answer:

Option3

#Solution:

Given that #equation\[P\left( A \right) = \frac{1}{2},\,\,P\left( B \right) = \frac{1}{3},\,P\left( C \right) = \frac{1}{4}\]equation#

#equation\[\therefore \,\]equation# Probability that only two of them can solve the problem

#equation\[ = P\left( {A \cap B \cap {C^C}} \right) + P\left( {A \cap {B^C} \cap C} \right) + P\left( {{A^C} \cap B \cap C} \right)\]equation#

#equation\[ = \frac{1}{2}.\frac{1}{3}.\frac{3}{4} + \frac{1}{2}.\frac{2}{3}.\frac{1}{4} + \frac{1}{2}.\frac{1}{3}.\frac{1}{4} = \frac{6}{{24}} = \frac{1}{4}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M121304

#ConceptIds:

1117

#QuestionType:

SMCQ

#QuestionSerialNo:

70

#Question:

The maximum value of #equation\[f\left( x \right) = 3\,\sin \,x + 4\,\cos \,x + 10\]equation# can be

#Option1:

5

#Option2:

10

#Option3:

15

#Option4:

25

#Answer:

Option3

#Solution:

#equation\[ - 5 \le \sin \,x + 4\cos \,x \le 5\]equation#

#equation\[\therefore \;\;\;\;5 \le 3\,\sin \,x + 4\cos \,x + 10 \le 15\]equation#

#equation\[\therefore \;\;\;\;\,f\left( x \right) \le 15\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M111403

#ConceptIds:

1013

#QuestionType:

SMCQ

#QuestionSerialNo:

71

#Question:

The set of equation

#equation\[\lambda x - y + \left( {\cos \,\theta } \right)z = 0\]equation#

#equation\[3x + y + 2z = 0\]equation#

#equation\[\left( {\cos \,\theta } \right)x + y + 2z = 0\]equation#

#equation\[0 \le \theta < 2\pi ,\]equation#has non – trivial solutions

#Option1:

for no value of #equation\[\lambda \]equation# and #equation\[\theta \]equation#

#Option2:

for all values of #equation\[\lambda \]equation# and #equation\[\theta \]equation#

#Option3:

for all values of #equation\[\lambda \]equation# and only two values of #equation\[\theta \]equation#

#Option4:

for only one value of #equation\[\lambda \]equation# and all values of #equation\[\theta \]equation#

#Answer:

Option1

#Solution:

Determinant of coefficients

#equation\[ = \left| {\begin{array}{\*{20}{c}}

\lambda &{ - 1}&{\cos \,\theta }\\

3&1&2\\

{\cos \,\theta }&1&2

\end{array}} \right| = \cos \,\theta - {\cos ^2}\theta + 6\]equation#and this is positive for all #equation\[\theta \]equation# since #equation\[\left| {\cos \,\theta } \right| \le 1\]equation#. The only solution is therefore the trivial solution.

#Level:

Analytical, Moderate

#ConceptCode:

M111302

#ConceptIds:

1009

#QuestionType:

SMCQ

#QuestionSerialNo:

72

#Question:

Orthogonal trajectories of family of parabolas #equation\[{y^2} = 4a\left( {x + a} \right)\]equation# where ‘a’ is an arbitrary constant is

#Option1:

#equation\[a{x^2} = 4cy\]equation#

#Option2:

#equation\[{x^2} + {y^2} = {a^2}\]equation#

#Option3:

#equation\[y = c{e^{ - \frac{x}{{2a}}}}\]equation#

#Option4:

#equation\[axy = {c^2},\]equation#where c is a constant

#Answer:

Option3

#Solution:

#equation\[2y\,.\,\frac{{dy}}{{dx}} = 4a \Rightarrow \frac{{dy}}{{dx}} = \frac{{2a}}{y}\]equation#

For orthogonal trajectory,

#equation\[ - \frac{{dx}}{{dy}} = \frac{{2a}}{y} \Rightarrow \frac{{dy}}{y} = \int {\frac{{dy}}{y} = \int { - \frac{1}{{2a}}\,dx} } \]equation#

#equation\[ \Rightarrow \;\;\;\;lm\, = - \frac{x}{{2a}} + k\;\;\; \Rightarrow \;\;\;y = c{e^{ - \frac{x}{{2a}}}}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M120902

#ConceptIds:

1084

#QuestionType:

SMCQ

#QuestionSerialNo:

73

#Question:

If #equation\[\frac{{5{z\_1}}}{{7{z\_2}}}\]equation# is purely imaginary, then #equation\[\left| {\frac{{2{z\_1} + 3{z\_2}}}{{2{z\_1} - 3{z\_2}}}} \right| = \]equation#

#Option1:

#equation\[\frac{5}{7}\]equation#

#Option2:

#equation\[\frac{7}{5}\]equation#

#Option3:

#equation\[\frac{{25}}{{29}}\]equation#

#Option4:

1

#Answer:

Option4

#Solution:

Let #equation\[\frac{{5{z\_1}}}{{7{z\_2}}} = Ki\left( {K \in R} \right),\]equation# then #equation\[\frac{{{z\_1}}}{{{z\_2}}} = \left( {\frac{{7K}}{5}} \right)i\]equation#

Consider #equation\[\left| {\frac{{2{z\_1} + 3{z\_2}}}{{2{z\_1} - 3{z\_2}}}} \right| = \left| {\frac{{2\left( {\frac{{{z\_1}}}{{{z\_2}}}} \right) + 3}}{{2\left( {\frac{{{z\_1}}}{{{z\_2}}}} \right) - 3}}} \right| = \left| {\frac{{\frac{{14K}}{5}i + 3}}{{\frac{{14K}}{5}i - 3}}} \right| = 1\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M110302

#ConceptIds:

924

#QuestionType:

SMCQ

#QuestionSerialNo:

74

#Question:

The mean daily profit made by a shopkeeper in a month of 30 days was Rs. 350. If the mean profit for the first twenty days was Rs. 400, then the mean profit for the last 10 days would be

#Option1:

Rs. 200

#Option2:

Rs. 250

#Option3:

Rs. 800

#Option4:

Rs. 300

#Answer:

Option2

#Solution:

#equation\[30 \times 350 = 20 \times 400 + 10 \times x\]equation#

#equation\[ \Rightarrow \;\;\;\;\;10x = 10500 - 8000\;\;\; \Rightarrow \;\;\;10x = 2500 \Rightarrow x = 250\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M110501

#ConceptIds:

938

#QuestionType:

SMCQ

#QuestionSerialNo:

75

#Question:

Consider points A (3, 4) and B (7, 13). If P be a point on the line #equation\[y = x\]equation# such that PA + PB is minimum, then coordinates of P are

#Option1:

#equation\[\left( {\frac{{12}}{7},\,\,\frac{{12}}{7}} \right)\]equation#

#Option2:

#equation\[\left( {\frac{{13}}{7},\,\,\frac{{13}}{7}} \right)\]equation#

#Option3:

#equation\[\left( {\frac{{31}}{7},\,\,\frac{{31}}{7}} \right)\]equation#

#Option4:

(0, 0)

#Answer:

Option3

#Solution:

Consider a point A’, the image of A through y = x

#equation\[\therefore \]equation# Coordinates of #equation\[A' = \left( {4,\,\,3} \right)\]equation#

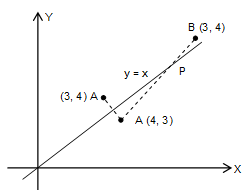
[Notice that A and B lie to the same side with respect to y = x].

Then #equation\[PA = PA'\]equation#

Thus, #equation\[PA + PB\]equation# is minimum, If #equation\[PA' + PB\]equation# is minimum, if #equation\[P,\,\,A',\,B\]equation# are collinear.

Now, AB is #equation\[y - 3 = \frac{{13 - 3}}{{7 - 4}}\left( {x - 4} \right) \Rightarrow 3y - 10x + 31 = 0\]equation#

It intersects #equation\[y = x\]equation#at #equation\[\left( {\frac{{31}}{7},\,\,\frac{{31}}{7}} \right)\]equation#, which is the required point P.



#Level:

Ultimate, Moderate

#ConceptCode:

M110701

#ConceptIds:

954

#QuestionType:

SMCQ

#QuestionSerialNo:

76

#Question:

#equation\[\mathop {\lim }\limits\_{x \to 0} \frac{{\log \left( {2 + {x^2}} \right) - \log \left( {2 - {x^2}} \right)}}{{{x^2}}} = k,\]equation#the value of k is

#Option1:

–1

#Option2:

2

#Option3:

1

#Option4:

0

#Answer:

Option3

#Solution:

#equation\[\mathop {\lim }\limits\_{x \to 0} \frac{1}{{{x^2}}}\left[ {\log \,\left( {2 + {x^2}} \right) - \log \left( {2 - {x^2}} \right)} \right]\]equation#

#equation\[ = \mathop {\lim }\limits\_{x \to 0} \frac{1}{{{x^2}}}\left[ {\log \left( {\frac{{2 + {x^2}}}{2}} \right) - \log \left( {\frac{{2 - {x^2}}}{2}} \right)} \right]\]equation#

#equation\[ = \mathop {\lim }\limits\_{x \to 0} \left[ {\log {{\left( {1 + \frac{{{x^2}}}{2}} \right)}^{1/{x^2}}} - \log {{\left( {1 - \frac{{{x^2}}}{2}} \right)}^{1/{x^2}}}} \right]\]equation#

#equation\[ = {{\mathop{\rm loge}\nolimits} ^{1/2}} - \log {e^{ - 1/2}} = \frac{1}{2} + \frac{1}{2} = 1\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M110607

#ConceptIds:

950

#QuestionType:

SMCQ

#QuestionSerialNo:

77

#Question:

The sum of the series #equation\[\frac{3}{{{1^2}\,.\,{2^2}}} + \frac{5}{{{2^2}\,.\,{3^2}}} + \frac{7}{{{3^2}\,.\,{4^2}}} + ....\infty \]equation# is equal to

#Option1:

1

#Option2:

0

#Option3:

–1

#Option4:

2

#Answer:

Option1

#Solution:

The given series is, #equation\[\sum\limits\_{r = 1}^\infty {\frac{{\left( {2r + 1} \right)}}{{{r^2}{{\left( {r + 1} \right)}^2}}} = \sum\limits\_{r = 1}^\infty {\frac{1}{{{r^2}}} - \sum\limits\_{r = 1}^\infty {\frac{1}{{{{\left( {r + 1} \right)}^2}}} = 1} } } \]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

M110505

#ConceptIds:

942

#QuestionType:

SMCQ

#QuestionSerialNo:

78

#Question:

If #equation\[f:\,R \to R,\,\,f\left( {x + y} \right) = f\left( x \right).\,f\left( y \right)\]equation#. If #equation\[f\left( 1 \right) = 1,\]equation# then #equation\[\sum\limits\_{k = 1}^n {f\left( k \right) = } \]equation#

#Option1:

n

#Option2:

#equation\[\frac{{n\left( {n + 1} \right)\left( {2n + 1} \right)}}{6}\]equation#

#Option3:

1

#Option4:

#equation\[\frac{{n\left( {n + 1} \right)}}{2}\]equation#

#Answer:

Option1

#Solution:

#equation\[f\left( 1 \right) = 1\,\, \Rightarrow \,\,f\left( 2 \right) = 1\;\; \Rightarrow \;\;f\left( 3 \right) = 1\]equation#

#equation\[f\left( r \right) = 1\,\forall \,r = 1,\,2,\,.....,n\]equation#

#equation\[\sum\limits\_{k = 1}^n {f\left( k \right)} = n\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M110502

#ConceptIds:

939

#QuestionType:

SMCQ

#QuestionSerialNo:

79

#Question:

If #equation\[f\left( x \right) = \left\{ {\begin{array}{\*{20}{c}}

{\frac{{\sin \left( {a + 1} \right)x + \sin \,x}}{x},}&{for\,\,x < 0}\\

c&{for\,x = 0}\\

{\frac{{{{\left( {x + b{x^2}} \right)}^{1/2}} - {x^{1/2}}}}{{b{x^{3/2}}}},}&{for\,\,x > 0}

\end{array}} \right.\]equation#

is continuous at x = 0, then a =

#Option1:

#equation\[\frac{3}{2}\]equation#

#Option2:

#equation\[\frac{{ - 3}}{2}\]equation#

#Option3:

#equation\[\frac{1}{4}\]equation#

#Option4:

#equation\[\frac{{ - 1}}{4}\]equation#

#Answer:

Option2

#Solution:

#equation\[f\left( {0 - 0} \right) = \mathop {\lim }\limits\_{h \to 0} \,f\left( {0 - h} \right)\]equation#

#equation\[ = \mathop {\lim }\limits\_{h \to 0} \frac{{\sin \left( {a + 1} \right)\left( { - h} \right) + \sin \left( { - h} \right)}}{{0 - h}} = \mathop {\lim }\limits\_{h \to 0} \frac{{\left( {a + 1 + 1} \right)\left( { - h} \right)}}{{\left( { - h} \right)}} = a + 2\]equation#

#equation\[f\left( {0 + 0} \right) = \mathop {\lim }\limits\_{h \to 0} f\left( {0 + h} \right) = \mathop {\lim }\limits\_{h \to 0} \frac{{{{\left( {h + b{h^2}} \right)}^{1/2}} - {h^{1/2}}}}{{b{h^{3/2}}}}\]equation#

#equation\[ = \mathop {\lim }\limits\_{h \to 0} \frac{{{b^{1/2}}\left[ {1 + \frac{{bh}}{2} - 1} \right]}}{{bh\,.\,{h^{1/2}}}} = \frac{1}{2}\]equation#

#equation\[\therefore \]equation#The given function is continuous #equation\[f\left( {0 - 0} \right) = f\left( {0 + 0} \right)\]equation#.

#equation\[\therefore \]equation##equation\[a + 2 = \frac{1}{2},\,\,a = - \frac{3}{2}\]equation#

#Level:

Ultimate, Easy

#ConceptCode:

M110601

#ConceptIds:

944

#QuestionType:

SMCQ

#QuestionSerialNo:

80

#Question:

If #equation\[f\left( x \right) = {x^n},\]equation# then the value of is given by

#Option1:

#equation\[^{2n}{C\_n}\]equation#

#Option2:

#equation\[^{2n}{C\_{n - 1}}\]equation#

#Option3:

#equation\[^{2n}{C\_{n + 1}}\]equation#

#Option4:

#equation\[^{2n}{C\_1}\]equation#

#Answer:

Option1

#Solution:

#equation\[f\left( x \right) = {x^n}\;\;\; \Rightarrow \;\;\;\frac{{{f^r}\left( 1 \right)}}{{r!}} = {\,^n}{C\_r}\]equation#

#equation\[\sum\limits\_{r = 0}^n {{{\left( {^n{C\_r}} \right)}^2} = {\,^{2n}}{C\_n}} \]equation#

#Level:

Ultimate, Moderate

#ConceptCode:

M110405

#ConceptIds:

937

#QuestionType:

SMCQ

#QuestionSerialNo:

81

#Question:

The locus of point of intersection of two perpendicular tangents to the circle #equation\[{x^2} + {y^2} = {r^2}\]equation# is

#Option1:

#equation\[{x^2} + {y^2} = 2{r^2}\]equation#

#Option2:

#equation\[{x^2} + {y^2} = 3{r^2}\]equation#

#Option3:

#equation\[{x^2} + {y^2} = 4{r^2}\]equation#

#Option4:

#equation\[{x^2} + {y^2} = 5{r^2}\]equation#

#Answer:

Option1

#Solution:

Required locus is director circle i.e. #equation\[{x^2} + {y^2} = 2{r^2}\]equation#.

#Level:

Conceptual, Easy

#ConceptCode:

M110806

#ConceptIds:

970

#QuestionType:

SMCQ

#QuestionSerialNo:

82

#Question:

The area of the smaller region bounded by the curves #equation\[{x^2} + {y^2} = 5\]equation# and #equation\[{y^2} = 4x\]equation# is

#Option1:

#equation\[\frac{\pi }{4} + \frac{1}{6}\]equation#

#Option2:

#equation\[\frac{\pi }{4} - \frac{1}{6}\]equation#

#Option3:

#equation\[2\left( {\frac{1}{3} - \frac{5}{2}{{\sin }^{ - 1}}\frac{2}{{\sqrt 5 }}} \right)\]equation#

#Option4:

#equation\[2\left( {\frac{1}{3} + \frac{5}{2}{{\sin }^{ - 1}}\frac{2}{{\sqrt 5 }}} \right)\]equation#

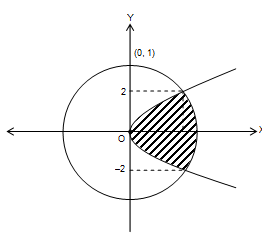
#Answer:

Option4

#Solution:

Area #equation\[ = \int\limits\_{ - 2}^2 {\left( {\sqrt {5 - {y^2}} - \frac{{{y^2}}}{4}} \right)} \,dy\]equation#

#equation\[ = 2\int\limits\_0^2 {\left( {\sqrt {5 - {y^2}} - \frac{{{y^2}}}{4}} \right)} \,dy = 2\left( {\frac{1}{3} + \frac{5}{2}{{\sin }^{ - 1}}\left( {\frac{2}{{\sqrt 5 }}} \right)} \right)\]equation#



#Level:

Analytical, Easy

#ConceptCode:

M121001

#ConceptIds:

1091

#QuestionType:

SMCQ

#QuestionSerialNo:

83

#Question:

If a, b, c are real, then #equation\[f\left( x \right) = \left| {\begin{array}{\*{20}{c}}

{x + {a^2}}&{ab}&{ac}\\

{ab}&{x + {b^2}}&{bc}\\

{ac}&{bc}&{x + {c^2}}

\end{array}} \right|\]equation# is decreasing is

#Option1:

#equation\[\left( { - \frac{2}{3}\left( {{a^2} + {b^2} + {c^2}} \right),\,0} \right)\]equation#

#Option2:

#equation\[\left( {0,\,\,\frac{2}{3}\left( {{a^2} + {b^2} + {c^2}} \right)} \right)\]equation#

#Option3:

#equation\[\left( {\frac{{{a^2} + {b^2} + {c^2}}}{3},\,\,0} \right)\]equation#

#Option4:

None of these

#Answer:

Option1

#Solution:

#equation\[f'\left( x \right) = \left| {\begin{array}{\*{20}{c}}

1&0&0\\

{ab}&{x + {b^2}}&{bc}\\

{ac}&{bc}&{x + {c^2}}

\end{array}} \right| + \left| {\begin{array}{\*{20}{c}}

{x + {a^2}}&{ab}&{ac}\\

0&1&0\\

{ac}&{bc}&{x + {c^2}}

\end{array}} \right| + \left| {\begin{array}{\*{20}{c}}

{x + {a^2}}&{ab}&{ac}\\

{ab}&{x + {b^2}}&{bc}\\

0&0&1

\end{array}} \right|\]equation#

#equation\[ = \left( {x + {b^2}} \right)\left( {x + {c^2}} \right) - {b^2}{c^2} + \left( {x + {a^2}} \right)\left( {x + {c^2}} \right) - {a^2}{c^2}\]equation#

#equation\[ + \left( {x + {a^2}} \right)\left( {x + {b^2}} \right) - {a^2}{b^2}\]equation#

#equation\[ = 3{x^2} + 2x\left( {{a^2} + {b^2} + {c^2}} \right)\]equation#

#equation\[f\left( x \right)\]equation# will be decreasing when #equation\[f'\left( x \right) < 0\]equation#

#equation\[ \Rightarrow \]equation##equation\[3{x^2} + 2x\left( {{a^2} + {b^2} + {c^2}} \right) < 0\]equation#

#equation\[ \Rightarrow \;\;\;\;\;x \in \left( { - \frac{2}{3}\left( {{a^2} + {b^2} + {c^2}} \right),\,\,0} \right)\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M120604

#ConceptIds:

1066

#QuestionType:

SMCQ

#QuestionSerialNo:

84

#Question:

If P (n):n2 + n is an odd integer. It is seen that truth of #equation\[P\left( n \right) \Rightarrow \]equation# the truth of #equation\[P\left( {n + 1} \right)\]equation#. Therefore, #equation\[P\left( n \right)\]equation# is true for all

#Option1:

#equation\[n > 1\]equation#

#Option2:

n

#Option3:

#equation\[n > 2\]equation#

#Option4:

none of these

#Answer:

Option4

#Solution:

The sufficient condition for the statement:

#equation\[P\left( n \right)\]equation# to be true for #equation\[n \ge a\]equation# is

(i) truth of #equation\[P\left( n \right) \Rightarrow \]equation# truth of #equation\[P\left( {n + 1} \right)\]equation#

#equation\[\therefore \;\;\;\;P\left( n \right)\]equation# must be true for all n but it is not so hence none of these.

#Level:

Conceptual, Easy

#ConceptCode:

M110401

#ConceptIds:

933

#QuestionType:

SMCQ

#QuestionSerialNo:

85

#Question:

If #equation\[y = \sqrt {\cos \,{x^2} + \sqrt {\cos \,{x^2} + \sqrt {\cos \,{x^2} + ......to\,\infty } } } \]equation#, then #equation\[\frac{{dy}}{{dx}}\]equation# is

#Option1:

#equation\[\frac{{ - \sin \,{x^2}}}{{x\left( {2y - 1} \right)}}\]equation#

#Option2:

#equation\[\frac{{ - 2x\,\sin \,{x^2}}}{{2y - 1}}\]equation#

#Option3:

#equation\[\frac{{ - \sin \,x}}{{2y - 1}}\]equation#

#Option4:

none of these

#Answer:

Option2

#Solution:

#equation\[y = \sqrt {\cos \,{x^2} + y} \Rightarrow {y^2} - y = \cos \,{x^2}\]equation#

#equation\[\therefore \,\,2y\frac{{dy}}{{dx}} - \frac{{dy}}{{dx}} = - \sin \,{x^2}\,.\,2x\]equation#

#equation\[ \Rightarrow \;\;\;\;\;\;\;\;\frac{{dy}}{{dx}} = \frac{{2x\,\sin \,{x^2}}}{{2y - 1}}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M120501

#ConceptIds:

1060

#QuestionType:

SMCQ

#QuestionSerialNo:

86

#Question:

Area lying between the curves #equation\[{y^2} = 4x\]equation# and #equation\[y = 2x\]equation# is

#Option1:

#equation\[\frac{2}{3}\]equation#

#Option2:

#equation\[\frac{1}{3}\]equation#

#Option3:

#equation\[\frac{1}{4}\]equation#

#Option4:

none of these

#Answer:

Option2

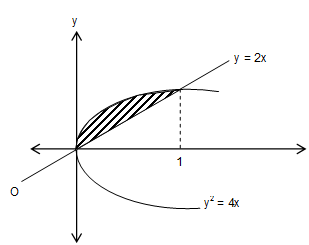
#Solution:

#equation\[{\left( {2x} \right)^2} = 4x \Rightarrow 4{x^2} = 4x\]equation#

#equation\[ \Rightarrow \;\;4{x^2} - 4x = 0\;\; \Rightarrow \;\;4x\left( {x - 1} \right) = 0 \Rightarrow x = 0,\,1\]equation#

Required are #equation\[ = \int\limits\_0^1 {\left( {2\sqrt x - 2x} \right)\,dx} \]equation#

#equation\[2.\frac{2}{3}\left. {{x^{3/2}} - {x^2}} \right|\_0^1 = \frac{4}{3} - 1 = \frac{1}{3}\,\]equation#



#Level:

Conceptual, Easy

#ConceptCode:

M121001

#ConceptIds:

1091

#QuestionType:

SMCQ

#QuestionSerialNo:

87

#Question:

If #equation\[f\left( x \right)\]equation# is a continuous function satisfying #equation\[f\left( x \right)f\left( {\frac{1}{x}} \right) = f\left( x \right) + f\left( {\frac{1}{x}} \right)\]equation#and #equation\[f\left( 1 \right) > 0\]equation#, then #equation\[\mathop {\lim }\limits\_{x \to 1} \,f\left( x \right)\]equation# is equal to

#Option1:

2

#Option2:

1

#Option3:

3

#Option4:

none of these

#Answer:

Option1

#Solution:

Since f is continuous function so,

#equation\[\mathop {\lim }\limits\_{x \to 1} \,f\left( x \right) = f\left( 1 \right)\]equation#

Put #equation\[x = 1\]equation# in the given equation we have

#equation\[{\left( {f\left( 1 \right)} \right)^2} = 2f\left( 1 \right),\]equation#so#equation\[f\left( 1 \right) = 0\]equation# or 2.

Since #equation\[f\left( 1 \right) > 0,\]equation# so #equation\[f\left( 1 \right) = 2\]equation#

#Level:

Conceptual, Difficult

#ConceptCode:

M120312

#ConceptIds:

1050

#QuestionType:

SMCQ

#QuestionSerialNo:

88

#Question:

Number of solution for #equation\[\cos \,x = \left| x \right|\]equation# is

#Option1:

1

#Option2:

0

#Option3:

2

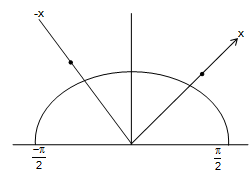
#Option4:

infinite

#Answer:

Option3

#Solution:



#Level:

Ultimate, Easy

#ConceptCode:

M111303

#ConceptIds:

1010

#QuestionType:

SMCQ

#QuestionSerialNo:

89

#Question:

The point among following which can have irrational coordinates with rational coordinates of triangle may be

#Option1:

Incentre

#Option2:

Circumcentre

#Option3:

Orthocentre

#Option4:

Centroid

#Answer:

Option1

#Solution:

#equation\[I = \left( {\frac{{a{x\_1} + b{x\_2} + c{x\_3}}}{{a + b + c}},\,\,\,\frac{{a{y\_1} + b{y\_2} + c{y\_3}}}{{a + b + c}}} \right)\]equation#

Since #equation\[a = \sqrt {{{\left( {{x\_2} - {x\_3}} \right)}^2} + {{\left( {{y\_2} - {y\_3}} \right)}^2}} \]equation# and so on sides may be irrational.

#Level:

Conceptual, Moderate

#ConceptCode:

M110701

#ConceptIds:

954

#QuestionType:

SMCQ

#QuestionSerialNo:

90

#Question:

If #equation\[^n{C\_r}\]equation# denotes the number of combinations of n things taken r at a time, then the expression #equation\[^n{C\_0} + \sum\limits\_{k = 0}^{n - 1} {{\,^{n + k}}{C\_{k + 1}}} \]equation# equals

#Option1:

#equation\[^{2n}{C\_{n - 1}}\]equation#

#Option2:

#equation\[^{2n}{C\_{n + 1}}\]equation#

#Option3:

#equation\[^{2n}{C\_n}\]equation#

#Option4:

#equation\[^n{C\_{n - 1}}\]equation#

#Answer:

Option3

#Solution:

#equation\[^n{C\_0} + \sum\limits\_{k = 0}^{n - 1} {^{n + k}{C\_{k + 1}}} = \left( {^n{C\_0} + {\,^n}{C\_1}} \right) + {\,^{n + 1}}{C\_2}\]equation#

#equation\[ + {\,^{n + 2}}{C\_3} + ...... + {\,^{n + n - 1}}{C\_n}\]equation#

#equation\[ = \left( {^{n + 1}{C\_1} + {\,^{n + 1}}{C\_2}} \right) + {\,^{n + 2}}{C\_3} + ....... + {\,^{2n - 1}}{C\_n}\]equation#

#equation\[ = \left( {^{n + 2}{C\_2} + {\,^{n + 2}}{C\_3}} \right) + ..... + {\,^{2n - 1}}{C\_n}\]equation#

Similarly, #equation\[^{2n - 1}{C\_{n - 1}} + {\,^{2n - 1}}{C\_n} = {\,^{2n}}{C\_n}\]equation#

#Level:

Ultimate, Difficult

#ConceptCode:

M110404

#ConceptIds:

936