#TestName:

**OLTS-1718-BITSAT 2018 SAMPLE PAPER**

#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:

Physics

#SubSectionSerialNo:

1

#MarksPerQuestion:

3

#NegativeMarks:

1

#QuestionType:

SMCQ

#QuestionSerialNo:

1

#Question:

If vectors P, Q and R have magnitude 5, 12 and 13 units and #equation\[\vec P + \vec Q = \vec R\]equation#, the angle between Q and R is

#Option1:

#equation\[{\cos ^{ - 1}}\frac{5}{{12}}\]equation#

#Option2:

#equation\[{\cos ^{ - 1}}\frac{5}{{13}}\]equation#

#Option3:

#equation\[{\cos ^{ - 1}}\frac{{12}}{{13}}\]equation#

#Option4:

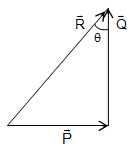
#equation\[{\cos ^{ - 1}}\frac{7}{{13}}\]equation#

#Answer:

Option3

#Solution:

cos q = #equation\[\frac{Q}{R}\]equation#



#Level:

Conceptual, Moderate

#ConceptCode:

P110201

#ConceptIds:

1373

#QuestionType:

SMCQ

#QuestionSerialNo:

2

#Question:

A person walking at the rate of 3km/hour, the rain appears to fall vertically when he increase his to speed 6 km/hr it appears to meet him at angle of 450 with vertical. The speed of rain is

#Option1:

#equation\[3\sqrt 2 \,\,km/hr\]equation#

#Option2:

#equation\[\frac{3}{{\sqrt 2 }}\,\,km/hr\]equation#

#Option3:

#equation\[6\sqrt 2 \,\,km/hr\]equation#

#Option4:

#equation\[2\sqrt 3 \,\,km/hr\]equation#

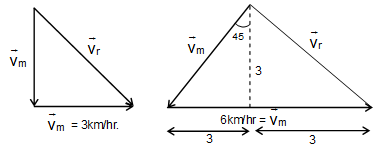
#Answer:

Option1

#Solution:

#equation\[{\vec v\_r}\]equation# should be same in both the situations.

Thus, #equation\[\left| {{{\vec v}\_r}} \right|\]equation# #equation\[3\sqrt 2 \]equation#km/hr.



#Level:

Analytical, Difficult

#ConceptCode:

P110309

#ConceptIds:

1384

#QuestionType:

SMCQ

#QuestionSerialNo:

3

#Question:

A particle is projected from ground At a height of 0.4 m from the ground, the velocity of a projectile in vector form is #equation\[\mathop v\limits^ \to \,\, = \,\,(6\hat i\, + \,2\hat j)\]equation#m/s (the x-axis is horizontal and y-axis is vertically upwards). The angle of projection is (g = 10 m/s2) :

#Option1:

45°

#Option2:

60°

#Option3:

30°

#Option4:

tan–1(3/4)

#Answer:

Option3

#Solution:

Let u be the initial speed of the particle

Then v2 = u2 – 2gh

or u2 = v2 + 2gh

or

#equation\[u\_x^2\, + \,u\_y^2\]equation#= #equation\[v\_x^2\,\, + \,v\_y^2\, + \,2gh\]equation#

(vx = ux)

or #equation\[u\_y^2\]equation#

=#equation\[\,v\_y^2\, + \,2gh\]equation#

or #equation\[u\_y^2\]equation#

= (2)2 + (2) (10) (0.4) = 12

\ uy

= #equation\[\sqrt {12} \]equation# or #equation\[2\sqrt 3 \,\,m/s\]equation#

and ux

= vy = 6 m/s

\ tan q

= #equation\[\frac{{{u\_y}}}{{{u\_x}}}\]equation# = #equation\[\frac{{2\sqrt 3 }}{6}\,\, = \,\,\frac{1}{{\sqrt 3 }}\]equation#

or q = 30°

#Level:

Analytical, Difficult

#ConceptCode:

P110304

#ConceptIds:

1379

#QuestionType:

SMCQ

#QuestionSerialNo:

4

#Question:

A spring has a length l1 when tension in it is n1(in N). It has a length l2 when tension is n2 (in N). Find its spring constant:

#Option1:

#equation\[\frac{{({n\_2}{l\_2}--{n\_1}{l\_1})}}{{({l\_1}--{l\_2})}}\]equation#

#Option2:

#equation\[\frac{{({n\_1}--{n\_2})}}{{({l\_1}--{l\_2})}}\]equation#

#Option3:

#equation\[\frac{{({n\_2}--{n\_1})}}{{({l\_1}--{l\_2})}}\]equation#

#Option4:

#equation\[\frac{{({n\_1}{l\_1}--{n\_2}{l\_2})}}{{({l\_1}--{l\_2})}}\]equation#

#Answer:

Option2

#Solution:

n1 = k(l1 – l)

Where l is its natural length

n2 = k(l2 – l)

#equation\[\frac{{{n\_1}}}{{{n\_2}}}\]equation# = #equation\[\frac{{({l\_1} - l)}}{{({l\_2} - l)}}\]equation#

On solving, l = #equation\[\frac{{{n\_1}{l\_2} - {n\_2}{l\_1}}}{{({n\_1} - {n\_2})}}\]equation#

Now, n1 = k[(l1 – l)]

= #equation\[k\left[ {{l\_1} - \frac{{({n\_1}{l\_2} - {n\_2}{l\_1})}}{{({n\_1} - {n\_2})}}} \right]\]equation#

k = #equation\[\frac{{({n\_1} - {n\_2})}}{{({l\_1} - {l\_2})}}\]equation#

#Level:

Ultimate, Moderate

#ConceptCode:

P110403

#ConceptIds:

1390

#QuestionType:

SMCQ

#QuestionSerialNo:

5

#Question:

A block of mass 2 kg rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is 0.7. The frictional force on the block is

#Option1:

9.8 N

#Option2:

#equation\[0.7\, \times \,9.8 \times \,\sqrt 3 \,N\]equation#

#Option3:

#equation\[9.8 \times \,\sqrt 3 \,N\]equation#

#Option4:

0.7 × 9.8 N

#Answer:

Option1

#Solution:

Since, mmg cos q > mg sin q

\ Force of friction is f

= mg sin q = 2 × 9.8  sin 30° = 2  9.8  #equation\[\frac{1}{2}\]equation# = 9.8 N

#Level:

Conceptual, Easy

#ConceptCode:

P110404

#ConceptIds:

1391

#QuestionType:

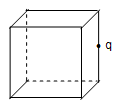
SMCQ

#QuestionSerialNo:

6

#Question:

The total flux of electric lines of forces of a charge q placed at the mid point of the edge of a side of rectangular box, as shown in figure through the box is



#Option1:

#equation\[\frac{q}{{2{ \in \_o}}}\]equation#

#Option2:

#equation\[\frac{q}{{4{ \in \_o}}}\]equation#

#Option3:

#equation\[\frac{q}{{8{ \in \_o}}}\]equation#

#Option4:

#equation\[\frac{q}{{16{ \in \_o}}}\]equation#

#Answer:

Option2

#Solution:

The charge q is completely closed by four identical given box. Therefore, the required

flux = #equation\[\frac{1}{4}\;\frac{q}{{{ \in \_o}}}\]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

P120106

#ConceptIds:

1467

#QuestionType:

SMCQ

#QuestionSerialNo:

7

#Question:

A thin uniform rod of mass 1 kg and length 2 m is free to rotate about its upper end. When it is at rest, it receives an impulse of 10 Ns at its lowest point, normal to its length. The value of angular velocity of rod just after impact is

#Option1:

10 rad/s

#Option2:

15 rad/s

#Option3:

20 rad/s

#Option4:

25 rad/s

#Answer:

Option2

#Solution:

JL = Iw; w= #equation\[\frac{{JL}}{I} = \frac{{10 \times 2}}{{\frac{{1 \times {2^2}}}{3}}} = \frac{{60}}{4} = 15\]equation# rad/s

#Level:

Analytical, Moderate

#ConceptCode:

P110704

#ConceptIds:

1415

#QuestionType:

SMCQ

#QuestionSerialNo:

8

#Question:

Which of the following quantities do not change when an ohmic resistor connected to a battery is heated due to the current?

#Option1:

drift speed

#Option2:

resistivity

#Option3:

resistance

#Option4:

number of free electrons

#Answer:

Option4

#Solution:

In ohmic resistor the number of free electrons is very large and independent of temperature.

#Level:

Conceptual, Easy

#ConceptCode:

P120201

#ConceptIds:

1477

#QuestionType:

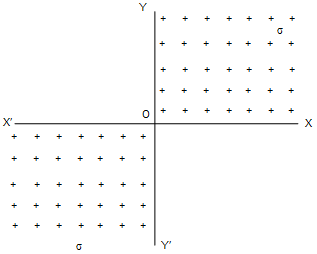
SMCQ

#QuestionSerialNo:

9

#Question:

Two rectangular infinite charged sheet each has surface charge density s are placed as shown in figure, then magnitude of electric field at point (0, 0, d) d is small, be



#Option1:

#equation\[\frac{\sigma }{{{ \in \_o}}}\]equation#

#Option2:

#equation\[\frac{\sigma }{{2{ \in \_o}}}\]equation#

#Option3:

#equation\[\frac{\sigma }{{4{ \in \_o}}}\]equation#

#Option4:

none of these

#Answer:

Option3

#Solution:

If all quadrant have same surface charged density s then electric field be #equation\[\frac{\sigma }{{2{ \in \_o}}}\]equation#. Hence, the required electric field be #equation\[\frac{1}{2} \times \frac{\sigma }{{2{ \in \_o}}}\]equation#.

#Level:

Analytical, Moderate

#ConceptCode:

P120106

#ConceptIds:

1467

#QuestionType:

SMCQ

#QuestionSerialNo:

10

#Question:

Suppose there is a hole in a copper plate. Upon heating the plate, diameter of hole would

#Option1:

increases

#Option2:

decreases

#Option3:

remains the same

#Option4:

none of these

#Answer:

Option1

#Solution:

Upon heating, distance between any two points on object increases.

#Level:

Conceptual, Easy

#ConceptCode:

P111201

#ConceptIds:

1447

#QuestionType:

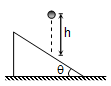
SMCQ

#QuestionSerialNo:

11

#Question:

A ball after falling through a distance h collides with an inclined plane of inclination q as shown. It moves horizontally after the impact. The co-efficient of restitution between inclined plane and ball is (inclined surface is friction less)



#Option1:

1

#Option2:

#equation\[{\tan ^2}\theta \]equation#

#Option3:

#equation\[{\cot ^2}\theta \]equation#

#Option4:

#equation\[{\sin ^2}\theta \]equation#

#Answer:

Option2

#Solution:

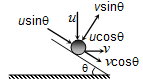
Impact takes place along the normal to the inclined plane

\

#equation\[u\sin \theta = v\cos \theta \]equation#

#equation\[v = u\,\tan \theta \]equation#

…(i)



#equation\[e = \frac{{v\sin \theta }}{{u\cos \theta }} = \frac{{u\tan \theta \cdot \sin \theta }}{{u\cos \theta }}\]equation#

#equation\[e = {\tan ^2}\theta \]equation#

#Level:

Ultimate, Difficult

#ConceptCode:

P110604

#ConceptIds:

1408

#QuestionType:

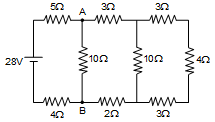
SMCQ

#QuestionSerialNo:

12

#Question:

Consider the circuit shown in the figure then,



#Option1:

the current in the 5W resistor is 2A.

#Option2:

the current in the 5W resistor is 1A.

#Option3:

the potential difference VA – VB is 18V.

#Option4:

the potential difference VA – VB is 5V.

#Answer:

Option1

#Solution:

The equivalent resistance across the cell = #equation\[\left[ {\left[ {(3 + 4 + 3)||\;10} \right]\; + 3 + 2} \right]||10 + 5 + 4\]equation# = 14W.

\ #equation\[{i\_{5\Omega }} = \frac{{28}}{{14}}\]equation# = 2A

\ VAB = 28 – 2(5 + 4) = 10 V.

#Level:

Analytical, Moderate

#ConceptCode:

P120204

#ConceptIds:

1480

#QuestionType:

SMCQ

#QuestionSerialNo:

13

#Question:

A very long uniformly charged rod falls with a constant velocity *V* through the center of a circular loop. Then the magnitude of induced emf in loop is (charge per unit length of rod = l)



#Option1:

#equation\[\frac{{{\mu \_0}}}{{2\pi }}\lambda {V^2}\]equation#

#Option2:

#equation\[\frac{{{\mu \_0}}}{2}\lambda {V^2}\]equation#

#Option3:

#equation\[\frac{{{\mu \_0}}}{{2\lambda }}V\]equation#

#Option4:

zero

#Answer:

Option4

#Solution:

fB = 0

Q #equation\[\vec B\; \bot \;\vec S\]equation#

\ #equation\[\frac{{d{\phi \_B}}}{{dt}}\]equation# = 0

#Level:

Conceptual, Easy

#ConceptCode:

P120402

#ConceptIds:

1498

#QuestionType:

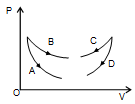
SMCQ

#QuestionSerialNo:

14

#Question:

Four curves A, B, C and D are drawn in the fig. for a given amount of gas. The curve which represent adiabatic and isothermal changes are



#Option1:

C and D respectively

#Option2:

D and C respectively

#Option3:

A and B respectively

#Option4:

B and A respectively

#Answer:

Option3

#Solution:

Isothermal process

P µ #equation\[\frac{1}{V}\]equation#.

Adiabatic process

P µ #equation\[\frac{1}{{{V^\gamma }}}\]equation#

Since g > 1, with rise in volume, pressure decreases more rapidly in adiabatic process.

#Level:

Conceptual, Moderate

#ConceptCode:

P111206

#ConceptIds:

1452

#QuestionType:

SMCQ

#QuestionSerialNo:

15

#Question:

A simple circuit contains an ideal battery and a resistance R. If a second resistor is placed in parallel with the first,

#Option1:

the potential across R will decrease

#Option2:

the current through R will decreased

#Option3:

the current delivered by the battery will increase

#Option4:

the power dissipated by R will increased

#Answer:

Option3

#Solution:

The net resistance across the cell is decreased to R/2 hence the current delivered by the battery will increase while potential across R will remain same.

#Level:

Conceptual, Moderate

#ConceptCode:

P120203

#ConceptIds:

1479

#QuestionType:

SMCQ

#QuestionSerialNo:

16

#Question:

A solid sphere of radius R is rolled by a force F acting at the top of the sphere as shown in the figure. There is no slipping and initially sphere is at rest. Then

Description: 16

#Option1:

Work done by force F when the center of mass moves a distance S is 2FS

#Option2:

Speed of the c.m. when c.m. moves a distance S is #equation\[\sqrt {\frac{{20}}{9}\frac{{RS}}{M}} \]equation#

#Option3:

Work done by the force F when c.m. moves a distance S is FS

#Option4:

Speed of the c.m. when c.m. moves a distance S is #equation\[\sqrt {\frac{{4RS}}{M}} \]equation#

#Answer:

Option1

#Solution:

When c.m. moves a distance S, distance covered by the point of application of force F is 2S, therefore work done = F(2S).

#Level:

Conceptual, Moderate

#ConceptCode:

P110710

#ConceptIds:

1421

#QuestionType:

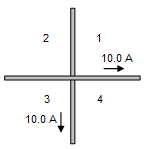
SMCQ

#QuestionSerialNo:

17

#Question:

Two very long, straight wires carrying, currents as shown in fig. Out of the four quadrant shown in the figure, in which quadrant the magnetic field is zero at some point.



#Option1:

1

#Option2:

2

#Option3:

3

#Option4:

none of these

#Answer:

Option2

#Solution:

In second quandrent #equation\[\vec B\]equation#due to current along x-axis is downward while #equation\[\vec B\]equation# due to other current   
is upward.

#Level:

Conceptual, Easy

#ConceptCode:

P120301

#ConceptIds:

1486

#QuestionType:

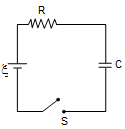
SMCQ

#QuestionSerialNo:

18

#Question:

As situation shown in figure the maximum value of rate of energy stored in the capacitor after the switch is closed



#Option1:

#equation\[\frac{{{\xi ^2}}}{{2R}}\]equation#

#Option2:

#equation\[\frac{{{\xi ^2}}}{{4R}}\]equation#

#Option3:

#equation\[\frac{{{\xi ^2}}}{{8R}}\]equation#

#Option4:

none of these

#Answer:

Option2

#Solution:

Required value = #equation\[{\left( {{V\_C} \cdot {i\_C}} \right)\_{\max }} = \frac{\xi }{2}\; \cdot \;\frac{\xi }{{2R}} = \frac{{{\xi ^2}}}{{4R}}\]equation#

#Level:

Ultimate, Difficult

#ConceptCode:

P120209

#ConceptIds:

1485

#QuestionType:

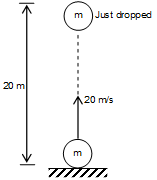
SMCQ

#QuestionSerialNo:

19

#Question:

The mass collide in air stick together. After how much time combined mass will fall to the ground (calculate the time from the starting when the motion was started)



#Option1:

#equation\[\left( {1 + \sqrt 2 } \right)s\]equation#

#Option2:

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

#Option3:

#equation\[\left( {2 + \sqrt 2 } \right)s\]equation#

#Option4:

none of these

#Answer:

Option4

#Solution:

Collision will occur after 1 sec.

Just before collision velocity of each object will be 10 m/sec.

Just after collision velocity of combined system will be zero.

So, time taken to reach ground = #equation\[(\sqrt 3 + 1)\]equation#sec.

#Level:

Ultimate, Moderate

#ConceptCode:

P110606

#ConceptIds:

1410

#QuestionType:

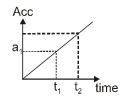
SMCQ

#QuestionSerialNo:

20

#Question:

Acceleration time graph of a particle is shown. Work done by all the forces acting on the particle on the particle of mass m in time interval from t1 to t2 while a1 is the acceleration at time t1, is given by:



#Option1:

#equation\[\frac{{ma\_1^2}}{{4{t\_1}}}(t\_2^3--t\_1^3)\]equation#

#Option2:

#equation\[\frac{{ma\_1^2}}{{8t\_1^2}}(t\_2^4--t\_1^4)\]equation#

#Option3:

#equation\[\frac{{ma\_1^2}}{{4t\_1^2}}(t\_2^4--t\_1^4)\]equation#

#Option4:

#equation\[\frac{{m{a\_1}}}{{2{t\_1}}}(t\_2^2--t\_1^2)\]equation#

#Answer:

Option2

#Solution:

W = Kf – Ki

= #equation\[\frac{1}{2}m\left( {v\_f^2 - v\_i^2} \right)\]equation#

= #equation\[\frac{1}{2}m\left[ {{{\left( {\frac{1}{2}{a\_2}{t\_2}} \right)}^2} - {{\left( {\frac{1}{2}{a\_1}{t\_1}} \right)}^2}} \right]\]equation#

= #equation\[\frac{1}{8}m\left[ {\frac{{t\_2^4}}{{t\_1^2}}a\_1^2 - a\_1^2t\_1^2} \right]\left( {Since,\,\,{a\_2} = \frac{{{t\_2}}}{{{t\_1}}}{a\_1}} \right)\]equation# = #equation\[\frac{{ma\_1^2}}{{8t\_1^2}}(t\_2^4 - t\_1^4)\]equation#

#Level:

Ultimate, Difficult

#ConceptCode:

P110502

#ConceptIds:

1399

#QuestionType:

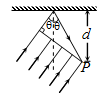
SMCQ

#QuestionSerialNo:

21

#Question:

A plane wave front of light is incident on a plane mirror. Intensity is maximum at P when



#Option1:

#equation\[\cos \theta = \frac{\lambda }{{2d}}\]equation#

#Option2:

#equation\[\cos \theta = \frac{{3\lambda }}{{4d}}\]equation#

#Option3:

#equation\[\sec \theta - \cos \theta = \frac{{3\lambda }}{{4d}}\]equation#

#Option4:

#equation\[\sec \theta - \cos \theta = \frac{\lambda }{{2d}}\]equation#

#Answer:

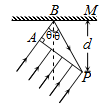
Option2

#Solution:

#equation\[BP = \frac{{MP}}{{\cos \theta }}\]equation#

#equation\[AB = BP\cos 2\theta = \frac{{MP}}{{\cos \theta }}\cos 2\theta \]equation#

#equation\[AB + BP = n\lambda + \frac{\lambda }{2}\]equation#



#equation\[\frac{{d\cos 2\theta }}{{\cos \theta }} + \frac{d}{{\cos \theta }} = \frac{d}{{\cos \theta }}(2{\cos ^2}\theta - 1 + 1) = 2d\cos \theta = n\lambda + \frac{\lambda }{2}\]equation#

for n = 1, #equation\[\cos \theta = \frac{{3\lambda }}{{4d}}\]equation#

#Level:

Ultimate, Difficult

#ConceptCode:

P120512

#ConceptIds:

1520

#QuestionType:

SMCQ

#QuestionSerialNo:

22

#Question:

The image of an object, formed by a plano-convex lens at a distance of 8 m behind the lens, is real and is one-third the size of the object. The wavelength of light inside the lens is #equation\[\frac{2}{3}\]equation# times the wavelength in free space. The radius of the curved surface of the lens is

#Option1:

1 m

#Option2:

2 m

#Option3:

3 m

#Option4:

6 m

#Answer:

Option3

#Solution:

m = #equation\[\frac{3}{2}\]equation# ; V = 8 ; m = #equation\[\frac{1}{3}\]equation#

1 + m = #equation\[\frac{V}{f} = \frac{V}{{2R}}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

P120504

#ConceptIds:

1512

#QuestionType:

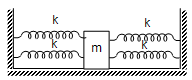
SMCQ

#QuestionSerialNo:

23

#Question:

Time period of mass m for small oscillation is



#Option1:

#equation$2\pi \sqrt {\frac{{4k}}{m}} $equation#

#Option2:

#equation$2\pi \sqrt {\frac{m}{k}} $equation#

#Option3:

#equation$2\pi \sqrt {\frac{m}{{4k}}} $equation#

#Option4:

#equation$2\pi \sqrt {\frac{m}{{2k}}} $equation#

#Answer:

Option3

#Solution:

Upon displacing block by distance ‘x’.

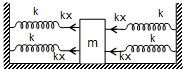
Fnet = –4kx = ma

#equation\[a = - \left( {\frac{{4k}}{m}} \right)x\]equation#

Þ

w = #equation\[\sqrt {\frac{{4k}}{m}} \]equation#

T = #equation\[\frac{{2\pi }}{\omega }\]equation#



#Level:

Conceptual, Moderate

#ConceptCode:

P111104

#ConceptIds:

1444

#QuestionType:

SMCQ

#QuestionSerialNo:

24

#Question:

When the electron in a hydrogen atom jumps from the second orbit to the first orbit, the wavelength of the radiation emitted is l. When the electron jumps from the third to the first orbit, the wavelength of the radiation emitted as

#Option1:

#equation\[\frac{9}{4}\lambda \]equation#

#Option2:

#equation\[\frac{4}{9}\lambda \]equation#

#Option3:

#equation\[\frac{{27}}{{32}}\lambda \]equation#

#Option4:

#equation\[\frac{{32}}{{27}}\lambda \]equation#

#Answer:

Option3

#Solution:

#equation\[\frac{{hc}}{\lambda } = R\left( {\frac{1}{{{1^2}}} - \frac{1}{{{2^2}}}} \right) = \frac{3}{4}R\]equation# …(i)

#equation\[\frac{{hc}}{{\lambda '}} = R\left( {\frac{1}{{{1^2}}} - \frac{1}{{{3^2}}}} \right) = \frac{8}{9}R\]equation# …(ii)

#equation\[\frac{{\lambda '}}{\lambda } = \frac{3}{4} \times \frac{9}{8}\]equation#, #equation\[\lambda ' = \frac{{27}}{{32}}\lambda \]equation#

#Level:

Analytical, Moderate

#ConceptCode:

P120604

#ConceptIds:

1528

#QuestionType:

SMCQ

#QuestionSerialNo:

25

#Question:

A body of mass m is suspended from rubber cord with force constant K. The maximum distance over which the body can be pulled down for the body’s oscillation to remain harmonic is

#Option1:

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

#Option2:

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

#Option3:

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

#Option4:

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

#Answer:

Option2

#Solution:

Since rubber cord cannot be compressed (it slacks). Hence required distance = #equation\[\frac{{mg}}{k}\]equation#.

#Level:

Conceptual, Easy

#ConceptCode:

P111102

#ConceptIds:

1442

#QuestionType:

SMCQ

#QuestionSerialNo:

26

#Question:

In the Young’s double slit experiment using a monochromatic light of wavelength l, the path difference (in terms of an integer n) corresponding to any point having half the peak intensity is

#Option1:

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

#Option2:

#equation\[(2n + 1)\frac{\lambda }{4}\]equation#

#Option3:

#equation\[(2n + 1)\frac{\lambda }{8}\]equation#

#Option4:

#equation\[(2n + 1)\frac{\lambda }{{16}}\]equation#

#Answer:

Option2

#Solution:

Df = #equation\[\frac{{2\pi }}{\lambda }\Delta x\]equation#= #equation\[(2n + 1)\frac{\pi }{2}\]equation#

#Level:

Analytical, Easy

#ConceptCode:

P120510

#ConceptIds:

1518

#QuestionType:

SMCQ

#QuestionSerialNo:

27

#Question:

A current passes through an ohmic conductor of non-uniform cross section. Which of the following quantities are independent of the cross-section?

#Option1:

the charge crossing in a given time interval

#Option2:

drift speed

#Option3:

current density

#Option4:

none of these

#Answer:

Option1

#Solution:

Q Current is independent of area of cross section.

\ #equation\[\int {idt} \]equation# is also independent of area of cross section number of free electron present volume is very large and independent of area of cross section.

#Level:

Conceptual, Easy

#ConceptCode:

P120201

#ConceptIds:

1477

#QuestionType:

SMCQ

#QuestionSerialNo:

28

#Question:

Two soap bubbles of radii 3 cm and 2 cm come in contact and stick to each other. The radius of curvature of common surface is

#Option1:

3 cm

#Option2:

4 cm

#Option3:

5 cm

#Option4:

6 cm

#Answer:

Option4

#Solution:

Pressure difference between the two bubbles = #equation\[\frac{{4T}}{R}\]equation#.

#equation\[\left( {{P\_o} + \frac{{4T}}{{{r\_1}}}} \right) - \left( {{P\_o} + \frac{{4T}}{{{r\_2}}}} \right) = \frac{{4T}}{R}\]equation#

#equation\[\frac{1}{R} = \frac{1}{{{r\_1}}} - \frac{1}{{{r\_2}}}\]equation#

r1 = 2 cm, r2 = 3 cm

\ R = 6 cm.

#Level:

Analytical, Moderate

#ConceptCode:

P111009

#ConceptIds:

1437

#QuestionType:

SMCQ

#QuestionSerialNo:

29

#Question:

If #equation$\theta $equation# is the angle with horizontal with which a projectile must be fired to escape from earth’s gravitational pull then

#Option1:

#equation${0^o} \le \theta < {45^o}$equation#

#Option2:

#equation${0^o} \le \theta \le {180^o}$equation#

#Option3:

#equation$\theta = {90^o}$equation#

#Option4:

#equation$\theta = {45^o}$equation#

#Answer:

Option2

#Solution:

#equation\[{V\_e} = \sqrt {\frac{{2GM}}{R}} \]equation# (independent of direction of projection)

#Level:

Conceptual, Easy

#ConceptCode:

P110904

#ConceptIds:

1427

#QuestionType:

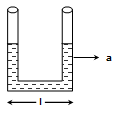
SMCQ

#QuestionSerialNo:

30

#Question:

A U-tube containing a liquid moves with an acceleration a along the horizontal direction joining the two vertical limbs. The separation between these limbs is l. The difference in their liquid levels is



#Option1:

#equation\[\frac{{a\ell }}{{2g}}\]equation#

#Option2:

#equation\[\frac{{2a\ell }}{g}\]equation#

#Option3:

#equation\[\frac{{a\ell }}{g}\]equation#

#Option4:

l tan#equation\[\left( {\frac{a}{g}} \right)\]equation#

#Answer:

Option3

#Solution:

tan q = #equation\[\frac{a}{g} = \frac{h}{\ell }\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

P111004

#ConceptIds:

1432

#QuestionType:

SMCQ

#QuestionSerialNo:

31

#Question:

Which of the following statement is incorrect about a planet rotating around the sun in   
an elliptic orbit:

#Option1:

its mechanical energy is constant

#Option2:

its angular momentum is constant

#Option3:

its areal velocity is constant

#Option4:

its time period is proportional to r3. (r being semi major axis)

#Answer:

Option4

#Solution:

T2 µ r3

#Level:

Conceptual, Easy

#ConceptCode:

P110905

#ConceptIds:

1428

#QuestionType:

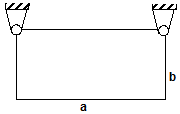
SMCQ

#QuestionSerialNo:

32

#Question:

A rectangular plate of mass m and dimensions a´b is held in the vertical plane by two hinge supports as shown in the figure. When one support is removed the reaction at the other support is



#Option1:

vertical

#Option2:

horizontal

#Option3:

Both vertical and horizontal

#Option4:

zero

#Answer:

Option3

#Solution:

Centre of mass of plate has both horizontal and vertical accelerations when released

#Level:

Conceptual, Easy

#ConceptCode:

P110705

#ConceptIds:

1416

#QuestionType:

SMCQ

#QuestionSerialNo:

33

#Question:

A transverse wave is described by the equation #equation\[y = {y\_0}\,\,\,\,\sin \,2\pi \,(ft - \frac{x}{\lambda })\]equation# The maximum particle velocity is equal to four times the wave velocity if

#Option1:

#equation$\lambda = \pi {y\_0}/4$equation#

#Option2:

#equation$\lambda = \pi {y\_0}/2$equation#

#Option3:

#equation$\lambda = \pi {y\_0}$equation#

#Option4:

#equation$\lambda = 2\pi {y\_0}$equation#

#Answer:

Option2

#Solution:

Given:

#equation\[{\left. {\frac{{\partial y}}{{\partial t}}} \right|\_{\max }} = 4\left( {\frac{\omega }{k}} \right)\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

P111301

#ConceptIds:

1455

#QuestionType:

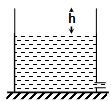
SMCQ

#QuestionSerialNo:

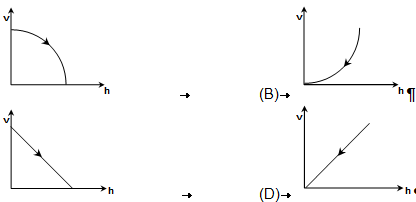
34

#Question:

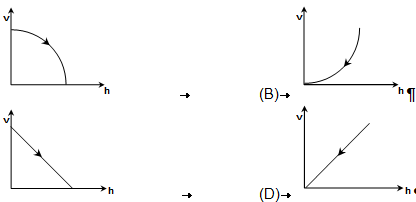
A rectangular tank is filled completely with water. A hole at its bottom is unplugged. The graph between the velocity of efflux (through a small hole) vs depth of water h from the top of tank.



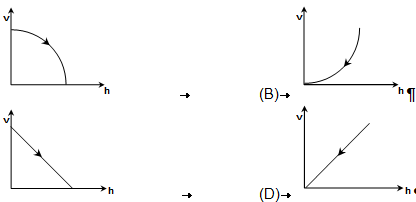
#Option1:



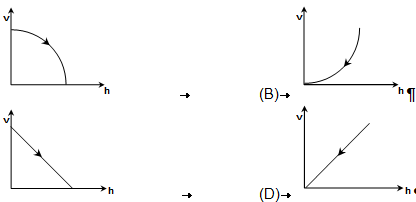
#Option2:



#Option3:



#Option4:



#Answer:

Option1

#Solution:

#equation\[v = \sqrt {2g(H - h)} \]equation#

H is height of container.

#Level:

Conceptual, Easy

#ConceptCode:

P111006

#ConceptIds:

1434

#QuestionType:

SMCQ

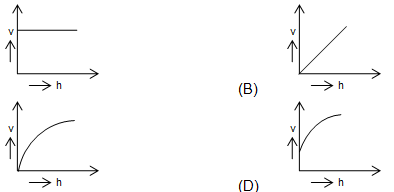
#QuestionSerialNo:

35

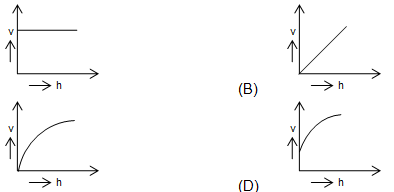
#Question:

A uniform rope having mass m hangs vertically from a rigid support. A transverse wave pulse is produced at the lower end. The speed v of wave pulse varies with height h from the lower end as

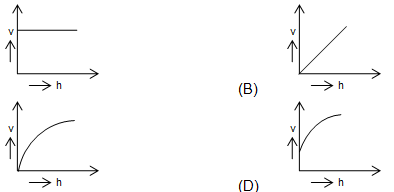
#Option1:



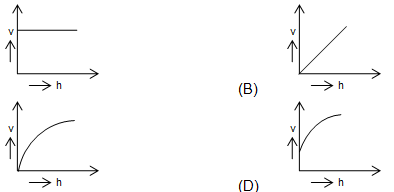
#Option2:



#Option3:



#Option4:



#Answer:

Option3

#Solution:

#equation\[V = \sqrt {\frac{T}{\mu }} \]equation#

Tension (T) is increasing uniformly from bottom to top.

#Level:

Conceptual, Moderate

#ConceptCode:

P111301

#ConceptIds:

1455

#QuestionType:

SMCQ

#QuestionSerialNo:

36

#Question:

A uniform wire of cross-sectional area A and Young’s modulus Y is stretched within the elastic limit. If S is the stress in the wire, the elastic energy density stored in the wire in terms of the given parameters is

#Option1:

#equation$\frac{S}{{2Y}}$equation#

#Option2:

#equation$\frac{{2Y}}{{{S^2}}}$equation#

#Option3:

#equation$\frac{{{S^2}}}{{2Y}}$equation#

#Option4:

#equation$\frac{{{S^2}}}{Y}$equation#

#Answer:

Option3

#Solution:

Energy density = #equation\[\frac{1}{2} \times stress \times strain = \frac{1}{2} \times stress \times \frac{{stress}}{Y}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

P111101

#ConceptIds:

1441

#QuestionType:

SMCQ

#QuestionSerialNo:

37

#Question:

The power radiated by a black body is P, and it radiates maximum energy around the wavelength l0. If the temperature of black body is now changed so that it radiates maximum energy around a wavelength#equation\[\frac{{3{\lambda \_0}}}{4}\]equation#, the new power radiated by it will be

#Option1:

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

#Option2:

#equation\[\frac{{16}}{9}\]equation#P

#Option3:

#equation\[\frac{{64}}{{27}}\]equation#P

#Option4:

#equation\[\frac{{256}}{{81}}.\]equation#P

#Answer:

Option4

#Solution:

Wein’s Displacement law

lm µ #equation\[\frac{1}{T}\]equation#

Stefan’s law

#equation\[U = e\sigma A{T^4}\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

P111208

#ConceptIds:

1454

#QuestionType:

SMCQ

#QuestionSerialNo:

38

#Question:

A body cools from 800C from 600C in two minutes. The time it take to cool from 600C to 400C, when temperature of the surrounding is 100C, will be:

#Option1:

2 ln2

#Option2:

#equation\[2\left[ {\frac{{\ln \left( {5/3} \right)}}{{\ln \left( {7/5} \right)}}} \right]\]equation#

#Option3:

#equation\[2\left[ {\frac{{\ln \left( {6/5} \right)}}{{\ln \left( {7/5} \right)}}} \right]\]equation#

#Option4:

#equation\[2\left[ {\frac{{\ln \left( {7/5} \right)}}{{\ln \left( {3/2} \right)}}} \right]\]equation#

#Answer:

Option2

#Solution:

Newton’s law of cooling

#equation\[\frac{{dT}}{{dt}}\]equation# = –K(T – To) ; #equation\[\frac{{dT}}{{T - {T\_o}}}\]equation#= –k dt

#equation\[\int\limits\_{80}^{60} {\frac{{dT}}{{T - 10}}} \]equation# = –k(2)

…(1)

#equation\[\int\limits\_{60}^{40} {\frac{{dT}}{{T - 10}}} \]equation# = –k(t)

…(2)

#Level:

Analytical, Difficult

#ConceptCode:

P111208

#ConceptIds:

1454

#QuestionType:

SMCQ

#QuestionSerialNo:

39

#Question:

A particle of mass *m* is moving in a field where the potential energy is given by #equation\[U(x) = {U\_0}(1 - \cos ax)\]equation#, where *U*0 and *a* are constants and *x* is the displacement from mean position . Choose the incorrect option (for small oscillations).

#Option1:

the time period is #equation\[T = 2\pi \sqrt {\frac{m}{{a{U\_0}}}} \]equation#

#Option2:

the speed of particle is maximum at *x* = 0

#Option3:

the amplitude of oscillations is #equation$\frac{\pi }{a}$equation#

#Option4:

the time period is #equation\[T = 2\pi \sqrt {\frac{m}{{{a^2}{U\_0}}}} \]equation#

#Answer:

Option1

#Solution:

For small oscillation, #equation\[U(x) = {U\_o}(1 - \cos \;ax) \approx \frac{1}{2}{U\_o}{a^2}{x^2}\]equation#

\ #equation\[\frac{1}{2}m{\omega ^2}{x^2} = \frac{1}{2}{U\_o}{a^2}{x^2}\]equation#

\ #equation\[\omega = \sqrt {\frac{{{U\_o}{a^2}}}{m}} \]equation#

Umax at #equation\[x = \frac{\pi }{a}\]equation# ; \ #equation\[A = \frac{\pi }{a}\]equation#

and Umin at x = 0 (K.E)max­ ; \ Vmax is at x = 0.

#equation\[T = \frac{{2\pi }}{\omega } = 2\pi \sqrt {\frac{m}{{{a^2}{U\_o}}}} \]equation#

#Level:

Analytical, Difficult

#ConceptCode:

P111104

#ConceptIds:

1444

#QuestionType:

SMCQ

#QuestionSerialNo:

40

#Question:

If for a liquid in a vessel, force of cohesion is twice of adhesion, then choose the incorrect option.

#Option1:

the meniscus will be convex upwards

#Option2:

the angle of contact will be obtuse

#Option3:

the liquid will descend in the capillary tube

#Option4:

the liquid will wet the solid

#Answer:

Option4

#Solution:

Factual

#Level:

Conceptual, Easy

#ConceptCode:

P111010

#ConceptIds:

1438

#Section:

CHEMISTRY

#SerialNo:

2

#Subject:

Chemistry

#SubSection:

Chemistry

#SubSectionSerialNo:

1

#MarksPerQuestion:

3

#NegativeMarks:

1

#QuestionType:

SMCQ

#QuestionSerialNo:

41

#Question:

If the average translational kinetic energy of dioxygen gas (O2) is E kJ mol–1. What will be the average translational kinetic energy of mono-oxygen gas (O) at constant temperature in kJ mol–1 unit?

#Option1:

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

#Option2:

2E

#Option3:

E

#Option4:

4E

#Answer:

Option3

#Solution:

The average kinetic energy does not depend on the mass of gas. #equation\[\overline {{E\_k}} \]equation#=#equation\[\frac{3}{2}\]equation#RT for one mole of

an ideal gas.

#Level:

Conceptual , Moderate

#ConceptCode:

C111202

#ConceptIds:

1214

#QuestionType:

SMCQ

#QuestionSerialNo:

42

#Question:

What may be the set of quantum numbers (n, , m, s) for the highest energetic electron of

aluminum?

#Option1:

(3, 0, 0, #equation\[ + \frac{1}{2}\]equation#)

#Option2:

(3, 1, 0, #equation\[ - \frac{1}{2}\]equation#)

#Option3:

(3, 1, 2, #equation\[ + \frac{1}{2}\]equation#)

#Option4:

(3, 1, -2, #equation\[ + \frac{1}{2}\]equation#)

#Answer:

Option2

#Solution:

The highest energetic electron of Al is present in the 3p orbital.

#Level:

Conceptual, Easy

#ConceptCode:

C110106

#ConceptIds:

1139

#QuestionType:

SMCQ

#QuestionSerialNo:

43

#Question:

Which of the following molecule contains the strongest B-F bond?

#Option1:

BF3

#Option2:

#equation\[BF\_4^ - \]equation#

#Option3:

BF2H

#Option4:

BF2Cl

#Answer:

Option3

#Solution:

Due to maximum extent of p–p back bond.

#Level:

Analytical, Difficult

#ConceptCode:

C110306

#ConceptIds:

1158

#QuestionType:

SMCQ

#QuestionSerialNo:

44

#Question:

Which of the following property of a system does not change in an isothermal process?

#Option1:

Entropy

#Option2:

Internal energy

#Option3:

free energy

#Option4:

PV-work

#Answer:

Option2

#Solution:

Internal energy does not change at constant temperature.

#Level:

Conceptual , Moderate

#ConceptCode:

C111901

#ConceptIds:

1265

#QuestionType:

SMCQ

#QuestionSerialNo:

45

#Question:

Which of the following factor increases the yield of CO2 in the following reaction?

#Option1:

High temperature and low pressure

#Option2:

High temperature and high pressure

#Option3:

Low temperature and high pressure

#Option4:

Low temperature and low pressure

#Answer:

Option1

#Solution:

It is endothermic towards forward direction and no. of gaseous moles increases along

forward direction.

#Level:

Analytical , Moderate

#ConceptCode:

C110403

#ConceptIds:

1165

#QuestionType:

SMCQ

#QuestionSerialNo:

46

#Question:

500 ml of 0.4 M CH3COOH solution was mixed with 500 ml of 0.4 M NaOH solution. What is

the pH of the resulting solution? (Given Ka of CH3COOH) = 10–5) [log2 = 0.3010]

#Option1:

3.65

#Option2:

7

#Option3:

10.35

#Option4:

8.95

#Answer:

Option3

#Solution:

Hydrolysis of CH3COONa will take place.

pH = #equation\[\frac{1}{2}\left( {{p^{{K\_w}}} + \;{p^{{K\_a}}} + \;\log c} \right)\]equation#

= #equation\[\frac{1}{2}\]equation#(14 + 5 + log 0.2) = 10.35

#Level:

Conceptual , Moderate

#ConceptCode:

C110503

#ConceptIds:

1169

#QuestionType:

SMCQ

#QuestionSerialNo:

47

#Question:

The half life of a first order decomposition reaction is 2 min. What fraction of reactant will be

left after 16 min?

#Option1:

#equation\[\frac{1}{{{2^8}}}\]equation#

#Option2:

#equation\[\frac{1}{{{2^4}}}\]equation#

#Option3:

#equation\[\frac{1}{{{2^6}}}\]equation#

#Option4:

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

#Answer:

Option1

#Solution:

At = A0 #equation\[{\left( {\frac{1}{2}} \right)^n} = \;{A\_{0\;}} \times \;{\left( {\frac{1}{2}} \right)^{{\raise0.7ex\hbox{${16}$} \!\mathord{\left/

{\vphantom {{16} 2}}\right.\kern-\nulldelimiterspace}

\!\lower0.7ex\hbox{$2$}}}} = {A\_0}{\left( {\frac{1}{2}} \right)^8}\]equation#

 #equation\[\frac{{{A\_t}}}{{{A\_o}}} = {\left( {\frac{1}{2}} \right)^8} = \frac{1}{{{2^8}}}\]equation#

#Level:

Conceptual , Easy

#ConceptCode:

C110604

#ConceptIds:

1176

#QuestionType:

SMCQ

#QuestionSerialNo:

48

#Question:

Which of the following compound, on heating produces a colored gas?

#Option1:

LiNO3

#Option2:

NaNO3

#Option3:

KNO3

#Option4:

NH4NO3

#Answer:

Option1

#Solution:

NaNO3, KNO3 produce O2 on heating. NH4NO3 produces N2O. NO2 is colored gas.

#Level:

Analytical , Easy

#ConceptCode:

C110804

#ConceptIds:

1189

#QuestionType:

SMCQ

#QuestionSerialNo:

49

#Question:

Which of the following substance produces I2, upon reaction with KI in acidic medium?

#Option1:

NaOH

#Option2:

H2O2

#Option3:

HCl

#Option4:

D2O

#Answer:

Option2

#Solution:

2KI + H2SO4 + H2O2 K2SO4 + I2 + 2H2O

#Level:

Conceptual , Easy

#ConceptCode:

C111004

#ConceptIds:

1204

#QuestionType:

SMCQ

#QuestionSerialNo:

50

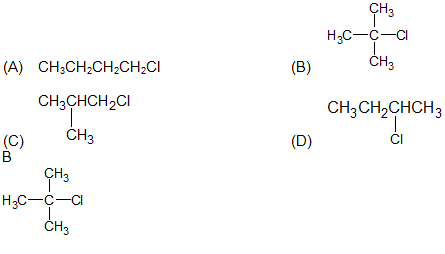
#Question:

Which of the following will form the most stable carbonium ion upon treatment with AgNO3?

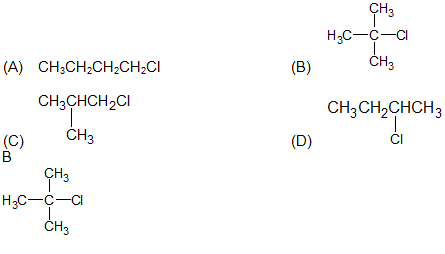
#Option1:

CH3CH2CH2CH2Cl

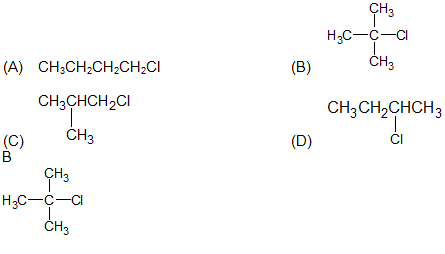
#Option2:



#Option3:



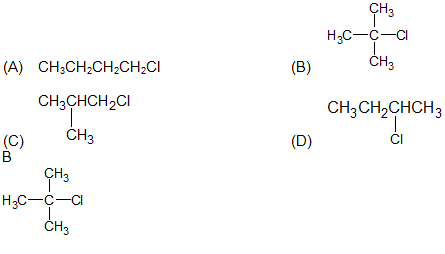
#Option4:



#Answer:

Option2

#Solution:



#Level:

Conceptual , Moderate

#ConceptCode:

C111303

#ConceptIds:

1225

#QuestionType:

SMCQ

#QuestionSerialNo:

51

#Question:

Description: 51

If the product yield of P, Q and R follows the order P>Q>R, then choose the correct

statement.

#Option1:

The melting point of ‘Q’ is higher than that of ‘P’ and ‘R’

#Option2:

The dipole moment of ‘P’ is the lowest

#Option3:

‘P’ boils at the highest temperature

#Option4:

‘Q’ forms a meso product upon treatment with Cl2/CCl4

#Answer:

Option2

#Solution:

P = trans-2-butene, Q = Cis-2-butene, R = 1-butene.

#Level:

Ultimate, Difficult

#ConceptCode:

C111705

#ConceptIds:

1253

#QuestionType:

SMCQ

#QuestionSerialNo:

52

#Question:

Description: 52

How many stereoisomer(s) is/are possible for the above compound?

#Option1:

12

#Option2:

4

#Option3:

8

#Option4:

10

#Answer:

Option3

#Solution:

The isomers are: Cis – Cis (d,)

Cis – trans (d, )

trans – trans (d, )

trans – Cis (d, )

#Level:

Ultimate, Difficult

#ConceptCode:

C111403

#ConceptIds:

1229

#QuestionType:

SMCQ

#QuestionSerialNo:

53

#Question:

For which of the following electrochemical cell, ECell = #equation\[E\_{Cell}^0\]equation#?

#Option1:

#equation\[Zn\left( s \right)|Z{n^{2 + }}\left( {2\;M} \right)||A{g^ + }\left( {2\;M} \right)|Ag\left( s \right)\]equation#

#Option2:

#equation\[Zn\left( s \right)|Z{n^{2 + }}\left( {0.01\;M} \right)||A{g^ + }\left( {0.1\;M} \right)|Ag\left( s \right)\]equation#

#Option3:

#equation\[Zn\left( s \right)|Z{n^{2 + }}\left( {0.1\;M} \right)||A{g^ + }\left( {0.1\;M} \right)|Ag\left( s \right)\]equation#

#Option4:

#equation\[Zn\left( s \right)|Z{n^{2 + }}\left( {0.4\;M} \right)||A{g^ + }\left( {0.04\;M} \right)|Ag\left( s \right)\]equation#

#Answer:

Option2

#Solution:

Ecell = #equation\[E\_{cell}^0 - \frac{{0.0591}}{2}\log \frac{{\left[ {Z{n^{2 + }}} \right]}}{{{{\left[ {A{g^ + }} \right]}^2}}}\]equation#

For Ecell = #equation\[E\_{cell}^0\]equation#, #equation\[\frac{{\left[ {Z{n^{2 + }}} \right]}}{{{{\left[ {A{g^ + }} \right]}^2}}}\]equation#= 1

#Level:

Conceptual , Moderate

#ConceptCode:

C120501

#ConceptIds:

1298

#QuestionType:

SMCQ

#QuestionSerialNo:

54

#Question:

Which of the following compound produce(s) a basic gas on heating?

#Option1:

NH4NO3

#Option2:

NH4Cl

#Option3:

NH4NO2

#Option4:

(NH4)2Cr2O7

#Answer:

Option2

#Solution:

#equation NH\_3Cl\xrightarrow\triangle NH\_3+HCl equation#

#Level:

Analytical , Moderate

#ConceptCode:

C120803

#ConceptIds:

1324

#QuestionType:

SMCQ

#QuestionSerialNo:

55

#Question:

NaCl + H2SO4  Product

Which is one of the products of above reaction?

#Option1:

HCl

#Option2:

Cl2

#Option3:

H2S

#Option4:

SCl2

#Answer:

Option1

#Solution:

#equation NaCl+H\_2SO\_4\xrightarrow\;NaHSO\_4+HCl equation#

#Level:

Conceptual , Easy

#ConceptCode:

C121008

#ConceptIds:

1348

#QuestionType:

SMCQ

#QuestionSerialNo:

56

#Question:

Which of the following metal contains the highest no. of unpaired electrons in +2 oxidation

state?

#Option1:

Zn

#Option2:

Mn

#Option3:

Cr

#Option4:

Co

#Answer:

Option2

#Solution:

Mn2+ has a 3d5 electron configuration containing five unpaired electrons.

#Level:

Analytical , Easy

#ConceptCode:

C120401

#ConceptIds:

1294

#QuestionType:

SMCQ

#QuestionSerialNo:

57

#Question:

Lanthanide contraction is displayed by

#Option1:

s-block elements

#Option2:

p-block elements

#Option3:

d-block elements

#Option4:

f-block elements

#Answer:

Option4

#Solution:

Due to poor shielding of f-orbitals

#Level:

Analytical , Moderate

#ConceptCode:

C120401

#ConceptIds:

1294

#QuestionType:

SMCQ

#QuestionSerialNo:

58

#Question:

Which of the following compound undergoes dehydration reaction, upon treatment with hot and conc. H2SO4?

#Option1:

CH3CH2CH2CHO

#Option2:

CH3CH2 OCH2CH3

#Option3:

CH3COCH3

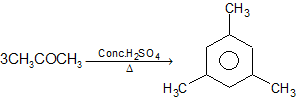
#Option4:

CH3CH2CH2COOCH3

#Answer:

Option3

#Solution:



#Level:

Ultimate, Difficult

#ConceptCode:

C121206

#ConceptIds:

1357

#QuestionType:

SMCQ

#QuestionSerialNo:

59

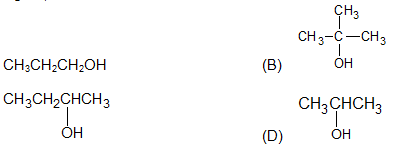
#Question:

Which of the following alcohol can form the maximum no. of alkenes, upon treatment with hot and con. H2SO4?

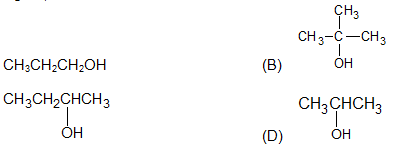
#Option1:

CH3CH2CH2OH

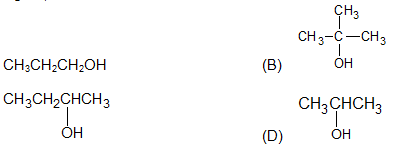
#Option2:



#Option3:



#Option4:



#Answer:

Option3

#Solution:

It will form 2-butene (cis and Trans) and 1-butene.

#Level:

Conceptual , Moderate

#ConceptCode:

C121203

#ConceptIds:

1354

#QuestionType:

SMCQ

#QuestionSerialNo:

60

#Question:

Which of the following is not a product of the given reaction?

#Option1:

CH3OH

#Option2:

C2H5OH

#Option3:

CH3I

#Option4:

C2H4

#Answer:

Option4

#Solution:



#Level:

Conceptual , Moderate

#ConceptCode:

C121204

#ConceptIds:

1355

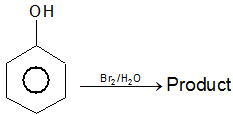
#QuestionType:

SMCQ

#QuestionSerialNo:

61

#Question:



How many maximum no. of bromine atoms(s) is/are present in the product of the above

reaction?

#Option1:

1

#Option2:

2

#Option3:

3

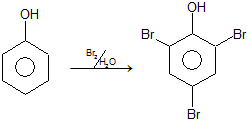
#Option4:

4

#Answer:

Option3

#Solution:



#Level:

Analytical , Moderate

#ConceptCode:

C121205

#ConceptIds:

1356

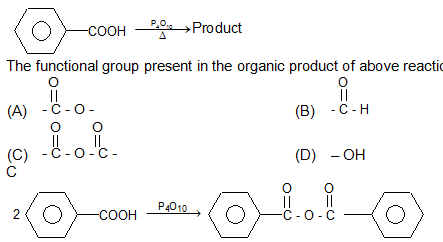
#QuestionType:

SMCQ

#QuestionSerialNo:

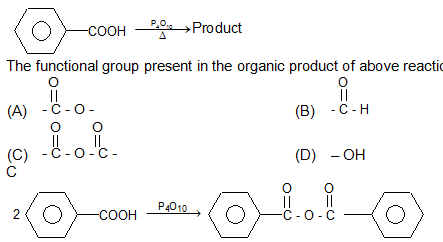
62

#Question:

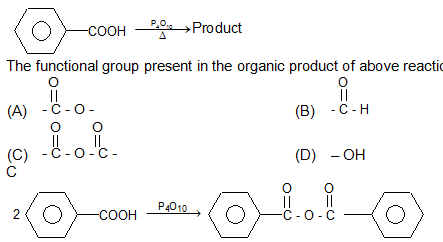


The functional group present in the organic product of above reaction is:

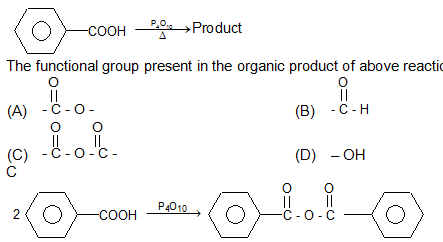
#Option1:



#Option2:



#Option3:



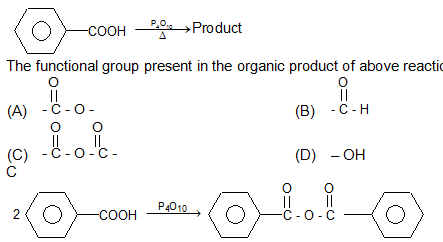
#Option4:

– OH

#Answer:

Option3

#Solution:



P4O10 is a strong dehydrating agent.

#Level:

Conceptual , Moderate

#ConceptCode:

C121207

#ConceptIds:

1358

#QuestionType:

SMCQ

#QuestionSerialNo:

63

#Question:

In the above reaction, ‘X’ should be

#Option1:

CH3CH2CH2NH2

#Option2:

CH3CH2NH2

#Option3:

CH3CH2CONH2

#Option4:

CH3CONH­2

#Answer:

Option2

#Solution:



#Level:

Analytical , Moderate

#ConceptCode:

C121208

#ConceptIds:

6853

#QuestionType:

SMCQ

#QuestionSerialNo:

64

#Question:

The polluted gas NO2 can be best absorbed by

#Option1:

benzene

#Option2:

CCl4

#Option3:

H2O

#Option4:

CS2

#Answer:

Option3

#Solution:

NO2 being polar, is dissolved in polar solvent.

#Level:

Conceptual , Easy

#ConceptCode:

C121401

#ConceptIds:

1367

#QuestionType:

SMCQ

#QuestionSerialNo:

65

#Question:

Which of the following compound will not give the test of nitrogen?

#Option1:

CH3CH2NH2

#Option2:

Description: 65 op

#Option3:

CH3CH2CH2CN

#Option4:

CH3CH = NNHCONH2

#Answer:

Option2

#Solution:

It does not contain carbon. Hence no CN– ion is formed.

#Level:

Analytical , Difficult

#ConceptCode:

C121501

#ConceptIds:

1368

#QuestionType:

SMCQ

#QuestionSerialNo:

66

#Question:

8 g of O2 gas occupied 5.6 L volume at 273 K and 1 atm pressure. What is the compressibility factor of the gas?

#Option1:

2.4

#Option2:

1

#Option3:

0.24

#Option4:

1.9

#Answer:

Option2

#Solution:

O2 behaves at an ideal gas under the given conditions for which z = 1.

#Level:

Analytical , Moderate

#ConceptCode:

C111202

#ConceptIds:

1214

#QuestionType:

SMCQ

#QuestionSerialNo:

67

#Question:

Which of the following orbital has no radial node?

#Option1:

4s

#Option2:

4p

#Option3:

4d

#Option4:

4f

#Answer:

Option4

#Solution:

No. of radial nodes = (n –  – 1)

For 4f, n –  – 1 = 4 – 3 – 1 = 0

#Level:

Conceptual , Moderate

#ConceptCode:

C110112

#ConceptIds:

1145

#QuestionType:

SMCQ

#QuestionSerialNo:

68

#Question:

What is the hybridization of nitrogen in NaNH2?

#Option1:

sp

#Option2:

sp2

#Option3:

sp3

#Option4:

sp2d

#Answer:

Option3

#Solution:

NaNH2 contain Na+ and #equation\[NH\_2^ - \]equation# ions. Nitrogen undergoes sp3 hybridization in it.

#Level:

Analytical , Easy

#ConceptCode:

C110305

#ConceptIds:

6846

#QuestionType:

SMCQ

#QuestionSerialNo:

69

#Question:

For which of the following reaction, H = E?

#Option1:



#Option2:



#Option3:



#Option4:



#Answer:

Option2

#Solution:

H = E + nRT

n = 0 for the reaction given in (B)

#Level:

Analytical , Moderate

#ConceptCode:

C111908

#ConceptIds:

1272

#QuestionType:

SMCQ

#QuestionSerialNo:

70

#Question:

The correct statement regarding hydrogenation reaction is:

#Option1:

removal of hydrogen takes place

#Option2:

sigma bonds are broken and pi-bonds are formed

#Option3:

heat is released in the reaction

#Option4:

bond energy of reactants is greater than that of products

#Answer:

Option3

#Solution:

Heat is released in hydrogenation reactions.

#Level:

Ultimate, Difficult

#ConceptCode:

C111908

#ConceptIds:

1272

#QuestionType:

SMCQ

#QuestionSerialNo:

71

#Question:

Values of #equation\[{K\_{{a\_1}}}\]equation#and #equation\[{K\_{{a\_2}}}\]equation#of a dibasic acid H2A are 10–4 and 10–6 respectively. What is the pH of 2 M solution of NaHA salt?

#Option1:

4

#Option2:

6

#Option3:

5

#Option4:

2

#Answer:

Option3

#Solution:

#equation\[pH = \frac{{{p^{{K\_{{a\_1}}}}} + {p^{{K\_{{a\_2}}}}}}}{2} = \frac{{4 + 6}}{2} = 5\]equation#

#Level:

Analytical , Moderate

#ConceptCode:

C110502

#ConceptIds:

1168

#QuestionType:

SMCQ

#QuestionSerialNo:

72

#Question:

The solubility product of a salt XY is Ksp. What will be it’s solubility in water if it forms X3+ and Y3– ions upon ionization?

#Option1:

#equation\[\sqrt {{K\_{sp}}} \]equation#

#Option2:

#equation\[\sqrt[3]{{{K\_{sp}}}}\]equation#

#Option3:

#equation\[{\left( {{K\_{sp}}} \right)^{3/2}}\]equation#

#Option4:

#equation\[{\left( {{K\_{sp}}} \right)^{2/3}}\]equation#

#Answer:

Option1

#Solution:

K=sp = s  s  s = #equation\[\sqrt {{K\_{sp}}} \]equation#

#Level:

Conceptual , Easy

#ConceptCode:

C110501

#ConceptIds:

1167

#QuestionType:

SMCQ

#QuestionSerialNo:

73

#Question:

The half-life of a zero order reaction is 4 minutes. How much time is needed for 75% completion of the reaction?

#Option1:

4 minute

#Option2:

6 minute

#Option3:

8 minute

#Option4:

2 minute

#Answer:

Option2

#Solution:

For zero order reaction t½  a.

#Level:

Conceptual , Moderate

#ConceptCode:

C110608

#ConceptIds:

1180

#QuestionType:

SMCQ

#QuestionSerialNo:

74

#Question:

What is the unit of rate constant of the following elementary reaction?

#Option1:

mol3 L–3s–1

#Option2:

mol–2 L2s–1

#Option3:

mol–3 L3s–1

#Option4:

mol2 L–2s–1

#Answer:

Option3

#Solution:

It is a fourth order reaction.

#Level:

Ultimate, Difficult

#ConceptCode:

C110601

#ConceptIds:

1173

#QuestionType:

SMCQ

#QuestionSerialNo:

75

#Question:

The most soluble compound in water, out of the following is:

#Option1:

Be(OH)2

#Option2:

Mg(OH)2

#Option3:

Ca(OH)2

#Option4:

Ba(OH)2

#Answer:

Option4

#Solution:

Solubility of hydroxides decreases on moving down the group of alkaline earth elements.

#Level:

Conceptual , Easy

#ConceptCode:

C110902

#ConceptIds:

1196

#QuestionType:

SMCQ

#QuestionSerialNo:

76

#Question:

Which of the following substance can decolourise Cl2 in cold condition?

#Option1:

NaOH

#Option2:

Na2SO4

#Option3:

NaNO3

#Option4:

NaCl

#Answer:

Option1

#Solution:



#Level:

Conceptual , Moderate

#ConceptCode:

C110807

#ConceptIds:

1192

#QuestionType:

SMCQ

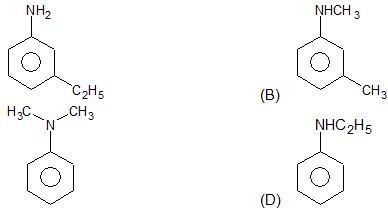
#QuestionSerialNo:

77

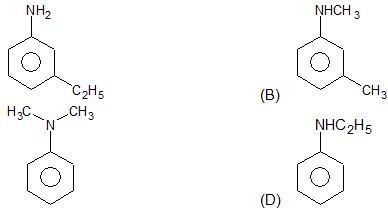
#Question:

The most basic compound in gaseous state out of the following is:

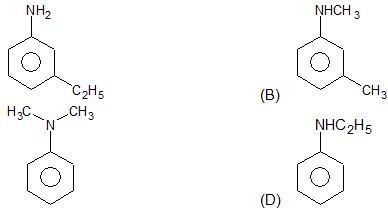
#Option1:



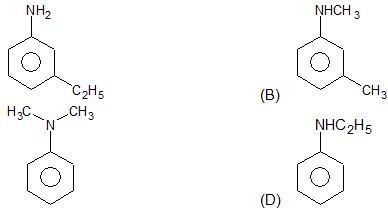
#Option2:



#Option3:



#Option4:



#Answer:

Option3

#Solution:

It is a tertiary amine.

#Level:

Analytical , Difficult

#ConceptCode:

C111302

#ConceptIds:

1224

#QuestionType:

SMCQ

#QuestionSerialNo:

78

#Question:

Which of the following reaction produces C2H4?

#Option1:



#Option2:

Description: 78 op

#Option3:



#Option4:



#Answer:

Option2

#Solution:

Description: 78 sol

#Level:

Conceptual , Moderate

#ConceptCode:

C111705

#ConceptIds:

1253

#QuestionType:

SMCQ

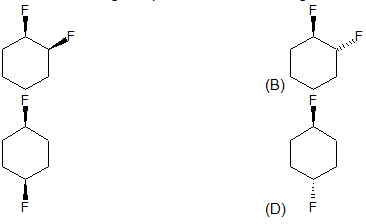
#QuestionSerialNo:

79

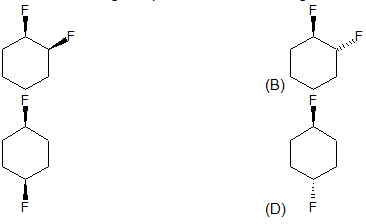
#Question:

Which of the following compound can form the largest no. of stereoisomers?

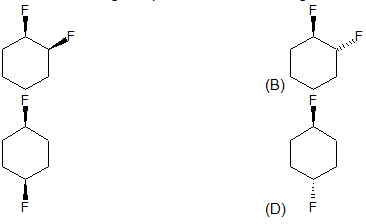
#Option1:



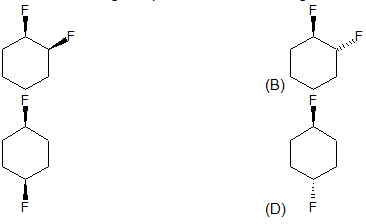
#Option2:



#Option3:



#Option4:



#Answer:

Option2

#Solution:

The compound in (B) can have geometrical and as well as optical isomers. Other have only geometrical isomers.

#Level:

Analytical , Moderate

#ConceptCode:

C111404

#ConceptIds:

1230

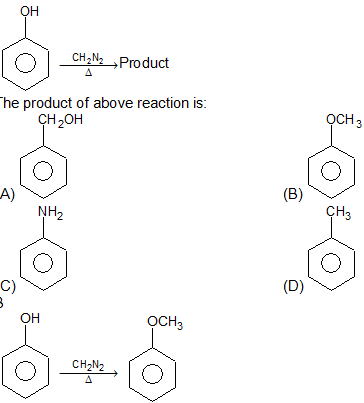
#QuestionType:

SMCQ

#QuestionSerialNo:

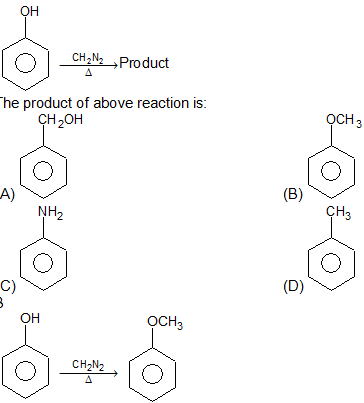
80

#Question:

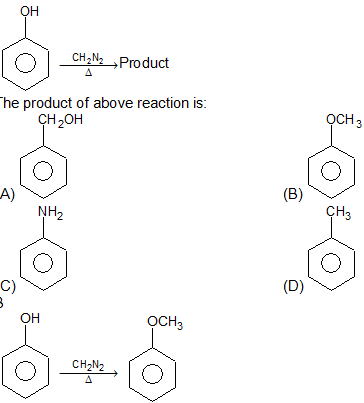


The product of above reaction is:

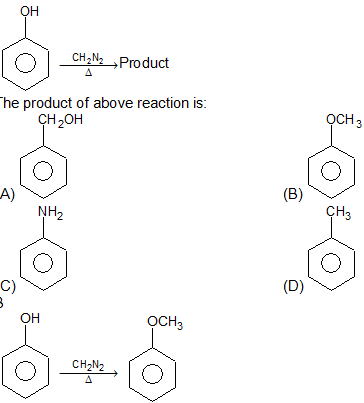
#Option1:



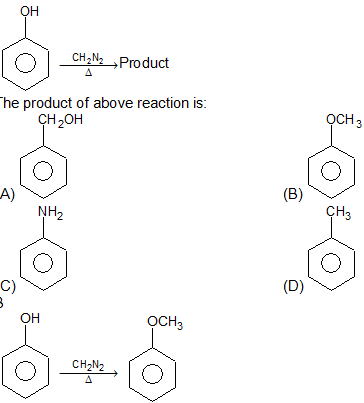
#Option2:



#Option3:



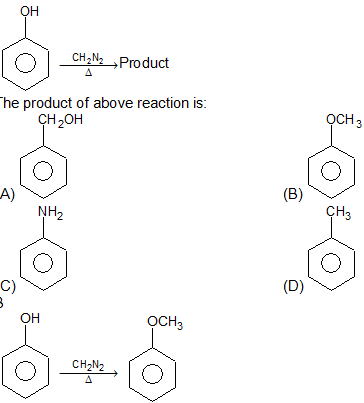
#Option4:



#Answer:

Option2

#Solution:



#Level:

Conceptual , Difficult

#ConceptCode:

C121205

#ConceptIds:

1356

#Section:

**ENGLISH PROFICIENCY**

#SerialNo:

3

#Subject:

**English Proficiency**

#SubSection:

**English Proficiency**

#SubSectionSerialNo:

1

#MarksPerQuestion:

3

#NegativeMarks:

1

#QuestionType:

Passage

#Paragraph:

**Directions (Questions 81 – 85):** Read the passage given below and answer the questions that follow:

At one time, in the history of India, most women knew very well how to bring up their infants and they lived a perfectly healthy life, free from diseases. The overall standard of women and children in the country was much better than those of other civilisations of that period. But ever since India was exposed to frequent invasions by foreign nations, life became unsafe and property was unprotected, and people were forced to congregate in towns in such a compact way, that it led to awful insanitation and diseases. The traditional knowledge of domestic and personal health and hygiene was ignored. Women were confined indoors for the fear of insults and a train of social and unhealthy dangers followed. It is a problem which needs to be given priority to bring back the original culture and restore the welfare of women and children in India.

#TotalQuestions:

5

#SubQuestionType:

SMCQ

#QuestionSerialNo:

81

#Question:

What was the main cause of poor health conditions of women in India?

#Option1:

Women were confined indoors

#Option2:

Illiteracy among women

#Option3:

Frequent foreign invasions

#Option4:

Awful sanitation

#Answer:

Option3

#Solution:

Frequent foreign invasions

#Level:

Conceptual, Easy

#ConceptCode:

E11120101

#ConceptIds:

8473

#SubQuestionType:

SMCQ

#QuestionSerialNo:

82

#Question:

What question has the writer posed before the readers?

#Option1:

How to check foreign invasion?

#Option2:

Why has the traditional knowledge been ignored?

#Option3:

What should be done for infants and women?

#Option4:

How can the original conditions of healthy life be restored in India?

#Answer:

Option4

#Solution:

How can the original conditions of healthy life be restored in India?

#Level:

Conceptual, Easy

#ConceptCode:

E11120101

#ConceptIds:

8473

#SubQuestionType:

SMCQ

#QuestionSerialNo:

83

#Question:

How did life become unsafe and property unprotected?

#Option1:

Because of awful insanitation and diseases

#Option2:

Because the women were confined indoors

#Option3:

Exposure to frequent foreign invasions

#Option4:

People were forced to congregate in disease

#Answer:

Option3

#Solution:

Exposure to frequent foreign invasions

#Level:

Conceptual, Easy

#ConceptCode:

E11120101

#ConceptIds:

8473

#SubQuestionType:

SMCQ

#QuestionSerialNo:

84

#Question:

Why were the women confined indoors?

#Option1:

To improve sanitation and healthy atmosphere

#Option2:

To keep them away from disease

#Option3:

For the fear of insults and unhealthy dangers

#Option4:

None of these

#Answer:

Option3

#Solution:

For the fear of insults and unhealthy dangers

#Level:

Conceptual, Easy

#ConceptCode:

E11120101

#ConceptIds:

8473

#SubQuestionType:

SMCQ

#QuestionSerialNo:

85

#Question:

When were women leading a perfectly healthy life?

#Option1:

After being confined indoors

#Option2:

Before foreign invasions

#Option3:

After restoring original conditions of healthy and happy life

#Option4:

Cannot be determined from the passage

#Answer:

Option2

#Solution:

Before foreign invasions

#Level:

Conceptual, Easy

#ConceptCode:

E11120101

#ConceptIds:

8473

#QuestionType:

Passage

#Paragraph:

**Directions (Questions 86 – 87):** Choose the option from the box which best suits the definition given.

#TotalQuestions:

2

#SubQuestionType:

SMCQ

#QuestionSerialNo:

86

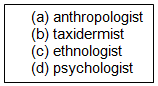
#Question:

One who preserves skin of animals and mounts them so as to resemble the living animals

One well-versed in the science of human races, their varieties and origin

One who studies the evolution of mankind

One who studies the working of the human mind



#Option1:

acdb

#Option2:

bcad

#Option3:

bacd

#Option4:

cabd

#Answer:

Option2

#Solution:

taxidermist, ethnologist, anthropologist, and psychologist

#Level:

Conceptual, Difficult

#ConceptCode:

E11120801

#ConceptIds:

8450

#SubQuestionType:

SMCQ

#QuestionSerialNo:

87

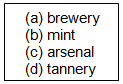
#Question:

A place where arms and weapons are kept

A place where wine is produced

A place where leather is processed and produced

A place where coins are made



#Option1:

acbd

#Option2:

dbac

#Option3:

bcad

#Option4:

cadb

#Answer:

Option4

#Solution:

arsenal, brewery, tannery, and mint

#Level:

Conceptual, Difficult

#ConceptCode:

E11120801

#ConceptIds:

8450

#QuestionType:

Passage

#Paragraph:

**Directions (Questions 88 – 90):** From the given alternatives choose the word which is nearest

in MEANING to the given word.

#TotalQuestions:

3

#SubQuestionType:

SMCQ

#QuestionSerialNo:

88

#Question:

BIASED

#Option1:

careful

#Option2:

partial

#Option3:

expert

#Option4:

unskilled

#Answer:

Option2

#Solution:

partial

#Level:

Conceptual, Moderate

#ConceptCode:

E11120501

#ConceptIds:

2462

#SubQuestionType:

SMCQ

#QuestionSerialNo:

89

#Question:

INTENSIFY

#Option1:

boiling

#Option2:

satisfy

#Option3:

aggravate

#Option4:

destroyed

#Answer:

Option3

#Solution:

aggravate

#Level:

Conceptual, Moderate

#ConceptCode:

E11120501

#ConceptIds:

2462

#SubQuestionType:

SMCQ

#QuestionSerialNo:

90

#Question:

REPULSIVE

#Option1:

frustrating

#Option2:

repellent

#Option3:

admirable

#Option4:

pleasant

#Answer:

Option2

#Solution:

repellent

#Level:

Conceptual, Moderate

#ConceptCode:

E11120501

#ConceptIds:

2462

#QuestionType:

Passage

#Paragraph:

**Directions (Questions 91 – 92):** From the given alternatives choose the word which is

OPPOSITE in meaning to the capitalized word.

#TotalQuestions:

2

#SubQuestionType:

SMCQ

#QuestionSerialNo:

91

#Question:

SIGNIFICANT

#Option1:

forceful

#Option2:

extreme

#Option3:

eloquent

#Option4:

unimportant

#Answer:

Option4

#Solution:

unimportant

#Level:

Conceptual, Easy

#ConceptCode:

E11120601

#ConceptIds:

2463

#SubQuestionType:

SMCQ

#QuestionSerialNo:

92

#Question:

EXTRAVAGANT

#Option1:

miserly

#Option2:

ornate

#Option3:

mean

#Option4:

silly

#Answer:

Option1

#Solution:

miserly

#Level:

Conceptual, Easy

#ConceptCode:

E11120601

#ConceptIds:

2463

#QuestionType:

Passage

#Paragraph:

**Directions (Questions 93 – 95):** From the options select the one word which appropriately

fills both the blanks.

#TotalQuestions:

3

#SubQuestionType:

SMCQ

#QuestionSerialNo:

93

#Question:

(i)

For success, you should develop ….. in yourself.

(ii)

Our ….. in your abilities has always been justified by your accomplishments.

#Option1:

courage

#Option2:

confidence

#Option3:

admiration

#Option4:

strength

#Answer:

Option2

#Solution:

confidence

#Level:

Conceptual, Easy

#ConceptCode:

E11121101

#ConceptIds:

8451

#SubQuestionType:

SMCQ

#QuestionSerialNo:

94

#Question:

(i) The Rajdhani Express….. speed as it travelled towards south.

(ii) The profits from the investments ….. value over the years.

#Option1:

increased

#Option2:

gained

#Option3:

achieved

#Option4:

added

#Answer:

Option2

#Solution:

gained

#Level:

Conceptual, Difficult

#ConceptCode:

E11121101

#ConceptIds:

8451

#SubQuestionType:

SMCQ

#QuestionSerialNo:

95

#Question:

(i)

She presented a diamond ring to her mother on the ….. of her birthday.

(ii)

Should the …. arise, we would love to visit Taj Mahal once again.

#Option1:

occasion

#Option2:

opportunity

#Option3:

time

#Option4:

eve

#Answer:

Option1

#Solution:

occasion

#Level:

Conceptual, Difficult

#ConceptCode:

E11121101

#ConceptIds:

8451

#Section:

**LOGICAL REASONING**

#SerialNo:

4

#Subject:

**Logical Reasoning**

#SubSection:

**Logical Reasoning**

#SubSectionSerialNo:

1

#MarksPerQuestion:

3

#NegativeMarks:

1

#QuestionType:

Passage

#Paragraph:

**Direction (Q.96):** Two statements followed by four conclusions numbered I, II, III, IV. You have to take the given statements to be true even if they seem to be at variance from commonly known facts and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts.

#TotalQuestions:

1

#SubQuestionType:

SMCQ

#QuestionSerialNo:

96

#Question:

Statements:

All branches are flowers. All flowers are leaves.

Conclusions:

I. All branches are leaves

II. All leaves are branches

III. All flowers are branches

IV. Some leaves are branches

#Option1:

None follows

#Option2:

Only I and IV follows

#Option3:

Only II and III follows

#Option4:

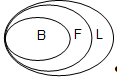
All follow

#Answer:

Option2

#Solution:

According to statements venn diagram will be drawn. Hence only conclusion I & IV will follows.



#Level:

Analytical, Moderate

#ConceptCode:

LR11120401

#ConceptIds:

2482

#QuestionType:

Passage

#Paragraph:

**Directions (Q.97):** The first word have a definite relationship. Choose one word of the given four alternatives which will fill in the blank space and show the same relationship with the third word as between the first two.

#TotalQuestions:

1

#SubQuestionType:

SMCQ

#QuestionSerialNo:

97

#Question:

Major is related to Lieutenant in the same way as Squadron Leader is related to…..?

#Option1:

Group Captain

#Option2:

Flying Attendant

#Option3:

Flying Officer

#Option4:

Pilot Officer

#Answer:

Option3

#Solution:

‘Major’ and ‘Squadron Leader’ are equivalent ranks in ‘Army’ and ‘Air Force’ respectively.

Similarly, ‘Lieutenant’ and ‘Flying Officer’ are equivalent ranks in ‘Army’ and ‘Air Force’ respectively.

#Level:

Analytical, Moderate

#ConceptCode:

LR11120101

#ConceptIds:

8499

#QuestionType:

SMCQ

#QuestionSerialNo:

98

#Question:

There is a certain relation between two given number on one side of : : and one number is given on another side of : : while another number is to be found form the given alternatives, having the same relation with this number as the numbers of the given pair bear. Choose the best alternative.

23 : 8 : : 32 : ?

#Option1:

9

#Option2:

7

#Option3:

11

#Option4:

6

#Answer:

Option1

#Solution:

23 = 8

Similarly, 32 = 9

#Level:

Ultimate, Difficult

#ConceptCode:

LR11120102

#ConceptIds:

8500

#QuestionType:

SMCQ

#QuestionSerialNo:

99

#Question:

Three of the following four are alike in a certain way and so from a group. Which is the one that does not belong to that group?

#Option1:

168

#Option2:

120

#Option3:

255

#Option4:

101

#Answer:

Option4

#Solution:

Except 101, all others are perfect square minus 1.

#Level:

Analytical, Moderate

#ConceptCode:

LR11120202

#ConceptIds:

8503

#QuestionType:

SMCQ

#QuestionSerialNo:

100

#Question:

A number series is given with one term missing. Choose the correct alternative that will continue the same pattern and replace the question mark in the given series.

325, 259, 204, 160, 127, 105, ?

#Option1:

96

#Option2:

98

#Option3:

100

#Option4:

94

#Answer:

Option4

#Solution:

The given sequence follows the pattern.



Therefore, missing term = 105 – 11 = 94.

#Level:

Conceptual, Easy

#ConceptCode:

LR11120301

#ConceptIds:

6793

#QuestionType:

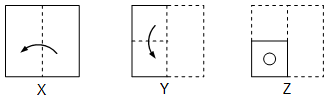
SMCQ

#QuestionSerialNo:

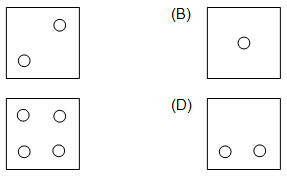
101

#Question:

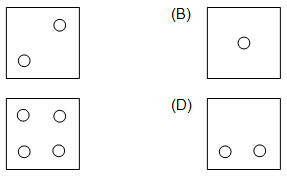
The question that follow contain a set of three figures X, Y and Z showing a sequence of folding of a piece of paper. Figure (Z) shows the manner in which the folded paper has been cut. These three figures are followed by four answer figures from which you have to choose a figure which would most closely resemble the unfolded form of figure (Z).



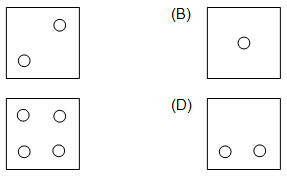
#Option1:



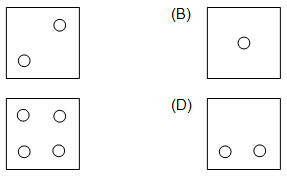
#Option2:



#Option3:



#Option4:



#Answer:

Option3

#Solution:

By observation.

#Level:

Conceptual, Easy

#ConceptCode:

LR11120802

#ConceptIds:

8508

#QuestionType:

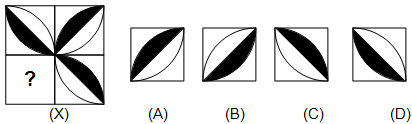
SMCQ

#QuestionSerialNo:

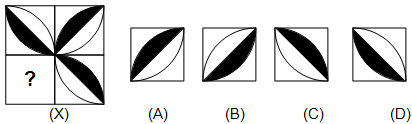
102

#Question:

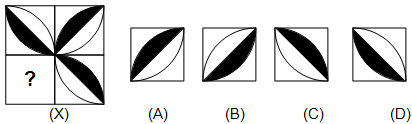
Select the figure from the four alternative figures, which when placed in the missing portion (?) of the original figure as shown by figure (X), would complete the pattern.



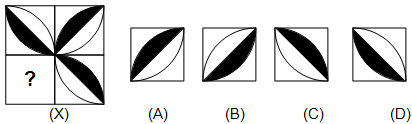
#Option1:



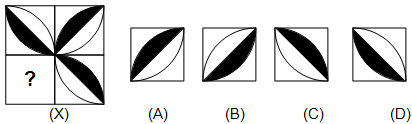
#Option2:



#Option3:



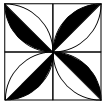
#Option4:



#Answer:

Option2

#Solution:



#Level:

Conceptual, Easy

#ConceptCode:

LR11120601

#ConceptIds:

2484

#QuestionType:

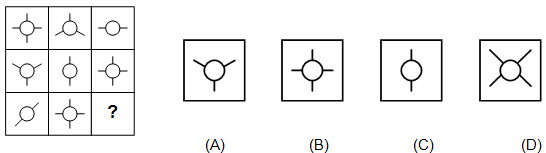
SMCQ

#QuestionSerialNo:

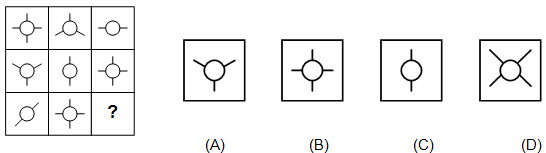
103

#Question:

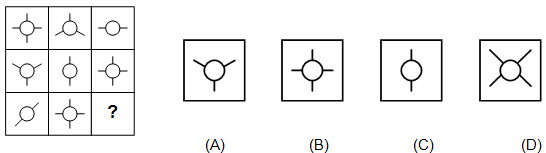
Find out which of the answer figure (A), (B), (C) and (D) complete the figure matrix.



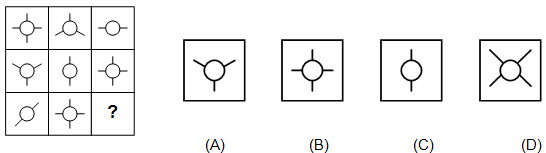
#Option1:



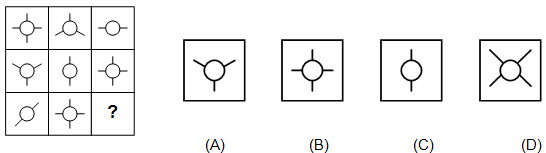
#Option2:



#Option3:



#Option4:



#Answer:

Option1

#Solution:

Each row (as well as each column) contains a figure consisting of a circle and two line segments, a figure consisting of a circle and three line segments and a figure consisting of a circle and four line segments.

#Level:

Analytical, Moderate

#ConceptCode:

LR11120901

#ConceptIds:

2487

#QuestionType:

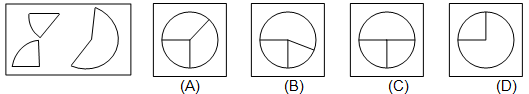
SMCQ

#QuestionSerialNo:

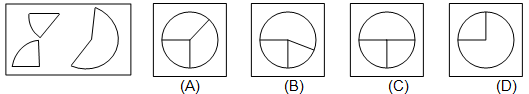
104

#Question:

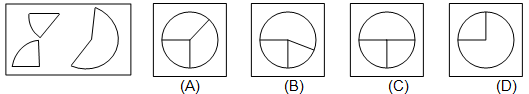
Find which figure (A), (B), (C) and (D) will be formed when all elements will combine.



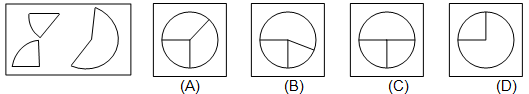
#Option1:



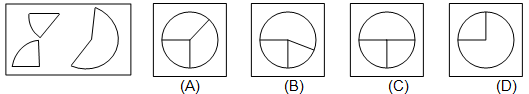
#Option2:



#Option3:



#Option4:



#Answer:

Option2

#Solution:

By observation.

#Level:

Analytical, Moderate

#ConceptCode:

LR11120701

#ConceptIds:

2485

#QuestionType:

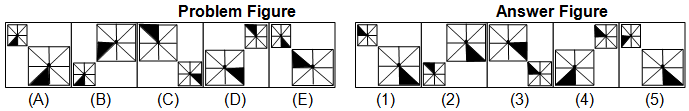
SMCQ

#QuestionSerialNo:

105

#Question:

Select the figure from amongst the answer figures which will continue the same series as established by the five problem figures.



#Option1:

1

#Option2:

2

#Option3:

3

#Option4:

4

#Answer:

Option2

#Solution:

By observation.

#Level:

Conceptual, Easy

#ConceptCode:

LR11121001

#ConceptIds:

8509

#Section:

**MATHEMATICS**

#SerialNo:

5

#Subject:

Mathematics

#SubSection:

Mathematics

#SubSectionSerialNo:

1

#MarksPerQuestion:

3

#NegativeMarks:

**1**

#QuestionType:

SMCQ

#QuestionSerialNo:

106

#Question:

Let a and b be non – zero reals such that #equation\[a \ne b\]equation#. Then the equation of the line passing through the origin and the point of intersection of #equation\[\frac{x}{a} + \frac{y}{b} = 1\]equation# and #equation\[\frac{x}{b} + \frac{y}{a} = 1\]equation# is

#Option1:

#equation\[ax + by = 0\]equation#

#Option2:

#equation\[bx + ay = 0\]equation#

#Option3:

#equation\[y - x = 0\]equation#

#Option4:

#equation\[x + y = 0\]equation#

#Answer:

Option3

#Solution:

Given equation of lines are

#equation\[\frac{x}{a} + \frac{y}{b} = 1\]equation# ……..(i)

and #equation\[\frac{x}{b} + \frac{y}{a} = 1\]equation# ………..(ii)

#equation\[ \Rightarrow bx + ay = ab\]equation# …….(iii),

and #equation\[ax + by = ab\]equation# ………..(iv)

Solving (iii) and (iv), we get

#equation\[\left( {{a^2} - {b^2}} \right)y = {a^2}b - a{b^2} = ab\left( {a - b} \right)\]equation#

#equation\[ \Rightarrow \]equation# #equation\[y = \frac{{ab}}{{a + b}}\]equation#

Substituting the value of y in (iii), we get

#equation\[bx + a\,.\,\frac{{ab}}{{a + b}} = ab \Rightarrow bx = ab - \frac{{{a^2}b}}{{a + b}}\]equation# #equation\[ \Rightarrow x = \frac{{ab}}{{a + b}}\]equation#

#equation\[\therefore \]equation# Point of intersection is #equation\[\left( {\frac{{ab}}{{a + b}},\,\,\frac{{ab}}{{a + b}}} \right)\]equation#

Since equation of the line passing through origin is #equation\[y = mx\]equation#

#equation\[\therefore \]equation# When it pass through #equation\[\left( {\frac{{ab}}{{a + b}},\,\,\frac{{ab}}{{a + b}}} \right)\]equation# then, we get #equation\[m = 1\]equation#

Hence, required equation of line is, #equation\[y - x = 0\]equation#

#Level:

Analytical, Difficult

#ConceptCode:

M110703

#ConceptIds:

956

#QuestionType:

SMCQ

#QuestionSerialNo:

107

#Question:

If #equation\[2{x^2} + 2{y^2} + 4x + 5y + 1 = 0\]equation# and #equation\[3{x^2} + 3{y^2} + 6x - 7y + 3k = 0\]equation# are orthogonal, then value of k

is

#Option1:

#equation\[\frac{{17}}{{12}}\]equation#

#Option2:

#equation\[\frac{{12}}{{17}}\]equation#

#Option3:

#equation\[\frac{{ - 12}}{{17}}\]equation#

#Option4:

#equation\[\frac{{ - 17}}{{12}}\]equation#

#Answer:

Option4

#Solution:

Equation of 1st circle is #equation\[ = {x^2} + {y^2} + 2x + \frac{5}{2}y + \frac{1}{2} = 0\]equation# and equation of 2nd circle is

#equation\[{x^2} + {y^2} + 2x - \frac{7}{3}y + k = 0\]equation#

Two circles are orthogonal if #equation\[2gg' + 2ff' = c + c'\]equation#

#equation\[ \Rightarrow \]equation# #equation\[2\left( 1 \right)\left( 1 \right) + 2\left( {\frac{5}{4}} \right)\left( {\frac{{ - 7}}{6}} \right) = \frac{1}{2} + k \Rightarrow 2 + \left( {\frac{{ - 35}}{{12}}} \right) = \frac{1}{2} + k\]equation#

#equation\[ \Rightarrow \]equation# #equation\[k = \frac{3}{2} - \frac{{35}}{{12}} = \frac{{18 - 35}}{{12}} = \frac{{ - 17}}{{12}} \Rightarrow k = \frac{{ - 17}}{{12}}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M110807

#ConceptIds:

971

#QuestionType:

SMCQ

#QuestionSerialNo:

108

#Question:

If two positive numbers are in the ratio #equation\[3 + 2\sqrt 2 :\,3 - 2\sqrt 2 ,\]equation# then the ratio between their A.M. and G.M. is

#Option1:

6 : 1

#Option2:

3 : 2

#Option3:

2 : 1

#Option4:

3 : 1

#Answer:

Option4

#Solution:

We have #equation\[a:b = 3 + 2\sqrt 2 \,:\,3 - 2\sqrt 2 \]equation#

#equation\[\therefore \]equation# #equation\[\frac{{a + b}}{2} = 3\]equation# and #equation\[\sqrt {ab} = 1\]equation#

So, required ratio = 3 : 1

#Level:

Conceptual, Easy

#ConceptCode:

M110506

#ConceptIds:

943

#QuestionType:

SMCQ

#QuestionSerialNo:

109

#Question:

The angle of elevation of the top of a vertical tower from a point A, due east of it is #equation\[{45^o}\]equation#. The angle of elevation of the top of the same tower from a point B, due south of A is #equation\[{30^o}\]equation#. If the distance between A and B is #equation\[54\sqrt 2 \]equation#m, then the height of the tower (in metres), is

#Option1:

108

#Option2:

#equation\[36\sqrt 3 \]equation#

#Option3:

#equation\[54\sqrt 3 \]equation#

#Option4:

54

#Answer:

Option4

#Solution:

Let the height of tower PQ be H

Now, in right angle triangle PQA

#equation\[\tan \,{45^o} = \frac{H}{{QA}} \Rightarrow H = QA\]equation#

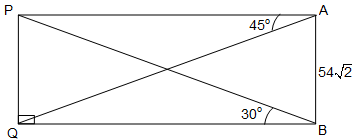
In right angle triangle PQB

#equation\[\tan \,{30^o} = \frac{H}{{BQ}} \Rightarrow BQ = \sqrt 3 H\]equation#

In right angle triangle QAB

#equation\[Q{A^2} + {\left( {54\sqrt 2 } \right)^2} = Q{B^2}\]equation#

#equation\[ \Rightarrow \]equation# #equation\[{H^2} + {\left( {54\sqrt 2 } \right)^2} = 3{H^2} \Rightarrow H = 54\,m\]equation#



#Level:

Analytical, Difficult

#ConceptCode:

M111803

#ConceptIds:

1027

#QuestionType:

SMCQ

#QuestionSerialNo:

110

#Question:

An equilateral triangle is inscribed in the parabola #equation\[{y^2} = 8x\]equation#, with one of its vertices is the vertex of the parabola. Then, the length of the side of that triangle is

#Option1:

#equation\[24\sqrt 3 \]equation#

#Option2:

#equation\[16\sqrt 3 \]equation#

#Option3:

#equation\[8\sqrt 3 \]equation#

#Option4:

#equation\[4\sqrt 3 \]equation#

#Answer:

Option2

#Solution:

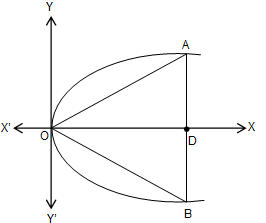
Let AB = 1

Then, #equation\[AD = \frac{1}{2}\]equation# and #equation\[OD = \sqrt {{l^2} - \frac{{{l^2}}}{4}} = \frac{{\sqrt 3 }}{2}l\]equation#

So, we say, #equation\[\left( {\frac{{\sqrt 3 }}{2}l,\,\frac{l}{2}} \right)\]equation#lies

On the parabola #equation\[{y^2} = 8x\]equation#

#equation\[ \Rightarrow \]equation# #equation\[{\left( {\frac{l}{2}} \right)^2} = 8 \times \frac{{\sqrt 3 }}{2}l \Rightarrow l = 16\sqrt 3 \]equation#



#Level:

Analytical, Difficult

#ConceptCode:

M110901

#ConceptIds:

975

#QuestionType:

SMCQ

#QuestionSerialNo:

111

#Question:

The line #equation\[2x + y + k = 0\]equation# is a normal to the parabola #equation\[{y^2} = - 8x\]equation#, if k equals

#Option1:

–24

#Option2:

12

#Option3:

24

#Option4:

–12

#Answer:

Option3

#Solution:

We know that the equation of the normal to the parabola #equation\[{y^2} = - 4ax\]equation# is given by

#equation\[y = mx + 2am + a{m^3}\]equation#

or #equation\[ - mx + y - 2am - a{m^3} = 0\]equation# ………….(i)

where m is the slope of the normal

Comparing equation (i) with the given equation

#equation\[2x + y + k = 0,\]equation# we get #equation\[m = - 2\]equation# and #equation\[k = - 2am - a{m^3}\]equation#

#equation\[\therefore \]equation# #equation\[k = - 2\left( 2 \right)\left( { - 2} \right) - 2{\left( { - 2} \right)^3} = 24\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M110905

#ConceptIds:

979

#QuestionType:

SMCQ

#QuestionSerialNo:

112

#Question:

If #equation\[\alpha ,\,\beta \]equation# are the roots of #equation\[a{x^2} + bx + c = 0\]equation##equation\[\left( {a \ne 0} \right)\]equation# and #equation\[\alpha + h,\,\,\beta + h\]equation# are the roots of #equation\[p{x^2} + qx + r = 0\left( {p \ne 0} \right)\]equation# then the ratio of the squares of their discriminants is

#Option1:

#equation\[{a^2}:\,\,{p^2}\]equation#

#Option2:

#equation\[a\,:\,{p^2}\]equation#

#Option3:

#equation\[{a^2}\,:\,p\]equation#

#Option4:

#equation\[a\,:\,2p\]equation#

#Answer:

Option1

#Solution:

Difference of roots in both are same.

#equation\[\therefore \]equation# #equation\[\alpha - \beta = \left( {\alpha + h} \right) - \left( {\beta + h} \right)\]equation#

#equation\[ \Rightarrow \]equation# #equation\[{\left( {\alpha - \beta } \right)^2} = {\left\{ {\left( {\alpha + h} \right) - \left( {\beta + h} \right)} \right\}^2}\]equation#

#equation\[ \Rightarrow \]equation# #equation\[{\left( {\alpha + \beta } \right)^2} - 4\,\alpha \beta \]equation#

#equation\[ = {\left\{ {\left( {\alpha + h} \right) + \left( {\beta + h} \right)} \right\}^2} - 4\left( {\alpha + h} \right)\left( {\beta + h} \right)\]equation#

#equation\[ \Rightarrow \]equation# #equation\[{\left( { - \frac{b}{a}} \right)^2} - 4\left( {\frac{c}{a}} \right) = {\left( { - \frac{q}{p}} \right)^2} - 4.\,\frac{r}{p}\]equation#

#equation\[ \Rightarrow \]equation# #equation\[\frac{{{b^2} - 4ac}}{{{q^2} - 4\,pr}} = \frac{{{a^2}}}{{{p^2}}}\]equation#

#equation\[ \Rightarrow \]equation# #equation\[D\_1^2:\,D\_2^2 = {a^2}:\,{p^2}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M110101

#ConceptIds:

914

#QuestionType:

SMCQ

#QuestionSerialNo:

113

#Question:

If #equation\[\beta \]equation# satisfies the inequation #equation\[{x^2} - x - 6 > 0\]equation#, then a value exists for

#Option1:

#equation\[{\cos ^{ - 1}}\left( {\cos \,\beta } \right)\]equation#

#Option2:

#equation\[\sec \left( {{{\sec }^{ - 1}}\,\beta } \right)\]equation#

#Option3:

#equation\[\sin \left( {{{\sin }^{ - 1}}\,\beta } \right)\]equation#

#Option4:

none of these

#Answer:

Option2

#Solution:

Since, #equation\[\beta \]equation# satisfy the inequation

#equation\[{x^2} - x - 6 > 0 \Rightarrow {\beta ^2} - \beta - 6 > 0\]equation#

#equation\[ \Rightarrow \]equation# #equation\[\left( {\beta - 3} \right)\left( {\beta + 2} \right) > 0\]equation# #equation\[ \Rightarrow \]equation# #equation\[\beta > 3,\,\,\beta < - 2\]equation#

#Level:

Analytical, Difficult

#ConceptCode:

M121401

#ConceptIds:

1126

#QuestionType:

SMCQ

#QuestionSerialNo:

114

#Question:

Solve the inequality #equation\[3x + 2 > - 16,\,\,2x - 3 \le 11\]equation#

#Option1:

#equation\[\left( { - 6,\,\,7} \right)\]equation#

#Option2:

#equation\[\left[ { - 6,\,\,7} \right)\]equation#

#Option3:

#equation\[\left( { - 6,\,\,7} \right]\]equation#

#Option4:

#equation\[\left[ { - 6,\,\,7} \right]\]equation#

#Answer:

Option3

#Solution:

Given inequality is

#equation\[3x + 2 > - 16 \Rightarrow 3x > - 18 \Rightarrow x > - 6\]equation# ……………(i)

and #equation\[2x - 3 \le 11 \Rightarrow 2x \le 14 \Rightarrow x \le 7\]equation# ……………(ii)

From (i) and (ii), we conclude that #equation\[x \in \left( { - 6,\,\,7} \right]\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M121601

#ConceptIds:

1131

#QuestionType:

SMCQ

#QuestionSerialNo:

115

#Question:

If #equation\[\frac{{5{z\_2}}}{{11{z\_1}}}\]equation# is purely imaginary, then the value of #equation\[\left| {\frac{{2{z\_1} + 3{z\_2}}}{{2{z\_1} - 3{z\_2}}}} \right|\]equation# is

#Option1:

#equation\[\frac{{37}}{{33}}\]equation#

#Option2:

2

#Option3:

1

#Option4:

3

#Answer:

Option3

#Solution:

Say #equation\[\frac{{5{z\_2}}}{{11{z\_1}}} = \lambda \]equation#

Now #equation\[\left| {\frac{{2\,.\,{z\_1} + 3{z\_2}}}{{2{z\_1} - 3{z\_2}}}} \right|\]equation#

#equation\[ = \left| {\frac{{2 + 3{z\_2}/21}}{{2 - 3\,{z^2}/21}}} \right|\]equation#

#equation\[ = \left| {\frac{{2 + 3 \times \frac{{11}}{5}\lambda i}}{{2 - 3 \times \frac{{11}}{5}\lambda i}}} \right|\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M110302

#ConceptIds:

924

#QuestionType:

SMCQ

#QuestionSerialNo:

116

#Question:

If #equation\[\frac{{\left( {1 + i} \right)\left( {2 + 3i} \right)\left( {3 - 4i} \right)}}{{\left( {2 - 3i} \right)\left( {1 - i} \right)\left( {3 + 4i} \right)}} = a + ib,\]equation#then #equation\[{a^2} + {b^2} = \]equation#

#Option1:

132

#Option2:

25

#Option3:

144

#Option4:

1

#Answer:

Option4

#Solution:

We have, #equation\[\frac{{\left( {1 + i} \right)\left( {2 + 3i} \right)\left( {3 - 4i} \right)}}{{\left( {2 - 3i} \right)\left( {1 - i} \right)\left( {3 + 4i} \right)}} = a + ib\]equation#

Taking modulus on both sides, we get

#equation\[\left| {\frac{{\left( {1 + i} \right)\left( {2 + 3i} \right)\left( {3 - 4i} \right)}}{{\left( {2 - 3i} \right)\left( {1 - i} \right)\left( {3 + 4i} \right)}}} \right| = \left| {a + ib} \right|\]equation#

#equation\[ \Rightarrow \frac{{\sqrt {1 + 1} \times \sqrt {4 + 9} \times \sqrt {9 + 16} }}{{\sqrt {4 + 9} \times \sqrt {1 + 1} \times \sqrt {9 + 16} }} = \sqrt {{a^2} + {b^2}} \]equation##equation\[ \Rightarrow \]equation# #equation\[{a^2} + {b^2} = 1\]equation#

#Level:

Analytical, Easy

#ConceptCode:

M110302

#ConceptIds:

924

#QuestionType:

SMCQ

#QuestionSerialNo:

117

#Question:

In the binomial expansion of #equation\[{\left( {a - b} \right)^n},\,n \ge 5,\]equation#the sum of 5th and 6th terms is zero. Then #equation\[\frac{a}{b}\]equation# equals to

#Option1:

#equation\[\frac{{n - 4}}{2}\]equation#

#Option2:

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

#Option3:

#equation\[\frac{{n - 4}}{5}\]equation#

#Option4:

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

#Answer:

Option3

#Solution:

General term of expansion #equation\[{\left( {a - b} \right)^n},\,\,n \ge 5\]equation# is #equation\[{T\_{r + 1}} = {\,^n}{C\_r}{\left( a \right)^{n - r}}{\left( { - b} \right)^r}\]equation#

5th term of #equation\[{\left( {a - b} \right)^n}\]equation# is #equation\[{T\_{4 + 1}} = {\,^n}{C\_4}{\left( a \right)^{n - 4}}{\left( { - b} \right)^4}\]equation#

6th term of #equation\[{\left( {a - b} \right)^n}\]equation# is #equation\[{T\_{5 + 1}} = {\,^n}{C\_5}{\left( a \right)^{n - 5}}{\left( { - b} \right)^5}\]equation#

#equation\[ \Rightarrow \]equation# #equation\[\frac{{n!}}{{\left( {n - 5} \right)!4!}} \times \frac{{{a^n}}}{{{a^4}}} \times {b^4}\left[ {\frac{1}{{\left( {n - 4} \right)}} - \frac{1}{{5 \times a}} \times b} \right] = 0\]equation#

Since, #equation\[\frac{{n!}}{{\left( {n - 5} \right)!4!}}{a^{n - 4}}{b^4} \ne 0\,\, \Rightarrow \frac{1}{{n - 4}} - \frac{b}{{5a}} = 0\]equation#

#equation\[ \Rightarrow \,\,\frac{b}{{5a}} = \frac{1}{{n - 4}} \Rightarrow \frac{a}{b} = \frac{{n - 4}}{5}\]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

M110401

#ConceptIds:

933

#QuestionType:

SMCQ

#QuestionSerialNo:

118

#Question:

The coefficient of #equation\[{x^{53}}\]equation# in the following expansion #equation\[\sum\limits\_{m = 0}^{100} {{\,^{100}}{C\_m}{{\left( {x - 3} \right)}^{100 - m}}\,.\,{2^m}} \]equation# is

#Option1:

#equation\[^{100}{C\_{48}}\]equation#

#Option2:

#equation\[^{100}{C\_{53}}\]equation#

#Option3:

#equation\[{ - ^{100}}{C\_{53}}\]equation#

#Option4:

#equation\[{ - ^{100}}{C\_{100}}\]equation#

#Answer:

Option3

#Solution:

The given sigma expansion

#equation\[\sum\limits\_{m = 0}^{100} {{\,^{100}}{C\_m}{{\left( {x - 3} \right)}^{100 - m}}\,.\,{2^m}} \]equation# can be rewritten as

#equation\[{\left[ {\left( {x - 3} \right) + 2} \right]^{100}} = {\left( {x - 1} \right)^{100}} = {\left( {1 - x} \right)^{100}}\]equation#

#equation\[\therefore \]equation# #equation\[{x^{53}}\]equation# will occur in #equation\[{T\_{54}} \Rightarrow {T\_{54}} = {\,^{100}}{C\_{53}}{\left( { - x} \right)^{53}}\]equation#

#equation\[\therefore \]equation# Required coefficient is #equation\[ - {\,^{100}}{C\_{53}}\]equation#.

#Level:

Conceptual, Easy

#ConceptCode:

M110403

#ConceptIds:

935

#QuestionType:

SMCQ

#QuestionSerialNo:

119

#Question:

If #equation\[\alpha ,\,\beta \]equation# are the roots of the equation #equation\[{x^2} - px + q = 0\]equation#, then #equation\[\left( {\alpha + \beta } \right)x - \frac{{{\alpha ^2} + {\beta ^2}}}{2}{x^2} + \frac{{{\alpha ^3} + {\beta ^3}}}{3}{x^3} - ...\]equation# is equal to

#Option1:

#equation\[{\log \_e}\left( {1 + px + q{x^2}} \right)\]equation#

#Option2:

#equation\[{\log \_e}\left( {1 + qx + p{x^2}} \right)\]equation#

#Option3:

#equation\[{\log \_e}\left( {1 - px + q{x^2}} \right)\]equation#

#Option4:

#equation\[{\log \_e}\left( {1 - px + q{x^2}} \right)\]equation#

#Answer:

Option1

#Solution:

Since #equation\[\alpha ,\,\beta \]equation# are roots of given equation #equation\[{x^2} - px + q = 0\]equation#

 #equation\[\alpha + \beta = p,\,\,\alpha \beta = q\]equation#…………..(i)

Taking #equation\[\left( {\alpha + \beta } \right)x - \frac{{{\alpha ^2} + {\beta ^2}}}{2}{x^2} + \frac{{{\alpha ^3} + {\beta ^3}}}{3}{x^3} - ...\infty \]equation#

#equation\[ = \left( {\alpha x - \frac{{{\alpha ^2}{x^2}}}{2} + \frac{{{\alpha ^3}{x^3}}}{3} - ....\infty } \right) + \left( {\beta x - \frac{{{\beta ^2}{x^2}}}{2} + \frac{{{\beta ^3}\,{x^3}}}{3} - ...\infty } \right)\]equation#

#equation\[ = \log \left( {1 + \alpha x} \right) + \log \left( {1 + \beta x} \right)\]equation#

#equation\[ = \log \left\{ {\left( {1 + \alpha x} \right)\left( {1 + \beta x} \right)} \right\} = {\log \_e}\left( {1 + px + q{x^2}} \right)\]equation# Using (i)

#Level:

Conceptual, Difficult

#ConceptCode:

M111601

#ConceptIds:

1028

#QuestionType:

SMCQ

#QuestionSerialNo:

120

#Question:

The value of #equation\[\frac{2}{{3!}} + \frac{4}{{5!}} + \frac{6}{{7!}} + .....\]equation# is

#Option1:

#equation\[{e^{1/2}}\]equation#

#Option2:

#equation\[{e^{ - 1}}\]equation#

#Option3:

e

#Option4:

#equation\[{e^{1/3}}\]equation#

#Answer:

Option2

#Solution:

#equation\[\frac{2}{{3!}} + \frac{4}{{5!}} + \frac{6}{{7!}} + ... = \frac{{3 - 1}}{{3!}} + \frac{{5 - 1}}{{5!}} + \frac{{7 - 1}}{{7!}} + ....\]equation#

#equation\[ = \left( {\frac{1}{{2!}} - \frac{1}{{3!}}} \right) + \left( {\frac{1}{{4!}} - \frac{1}{{5!}}} \right) + ....\]equation#

#equation\[ = \left( {1 - \frac{1}{{1!}}} \right) + \left( {\frac{1}{{2!}} - \frac{1}{{3!}}} \right) + \left( {\frac{1}{{4!}} - \frac{1}{{5!}}} \right) + .... = {e^{ - 1}}\]equation#

#Level:

Analytical, Difficult

#ConceptCode:

M111601

#ConceptIds:

1028

#QuestionType:

SMCQ

#QuestionSerialNo:

121

#Question:

If the line #equation\[y = 7x - 25\]equation# meets the circle #equation\[{x^2} + {y^2} = 25\]equation# in the points A, B, then the distance between A and B is:

#Option1:

#equation\[\sqrt {10} \]equation#

#Option2:

10

#Option3:

#equation\[5\sqrt 2 \]equation#

#Option4:

5

#Answer:

Option3

#Solution:

Point of intersection of line #equation\[y = 7x - 25\]equation#……….(i)

and circle #equation\[{x^2} + {y^2} = 25\]equation# is #equation\[{x^2} + {\left( {7x - 25} \right)^2} = 25\]equation#

#equation\[ \Rightarrow \]equation# #equation\[{x^2} + 49{x^2} + 625 - 350x = 25 \Rightarrow 50{x^2} - 350x + 600 = 0\]equation#

#equation\[ \Rightarrow \]equation# #equation\[{x^2} - 7x + 12 = 0\]equation# or #equation\[\left( {x - 4} \right)\left( {x - 3} \right) = 0 \Rightarrow x = 3,\,4\]equation#

Substituting #equation\[x = 3,\,4\]equation# in #equation\[y = 7x - 25,\]equation# we get #equation\[y = 21 - 25 \Rightarrow y = - 4\]equation#

#equation\[y = 28 - 25 \Rightarrow y = 3\]equation#

#equation\[\therefore \]equation# #equation\[A\left( {3,\,\, - 4} \right),\,B\left( {4,\,\,3} \right)\]equation#

Using distance formula, we get

#equation\[AB = \sqrt {{{\left( {3 - 4} \right)}^2} + {{\left( { - 4 - 3} \right)}^2}} = \sqrt {1 + 49} = \sqrt {50} = 5\sqrt 2 \]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M110802

#ConceptIds:

966

#QuestionType:

SMCQ

#QuestionSerialNo:

122

#Question:

If #equation\[\cos \,x + {\cos ^2}x = 1\]equation#, then the value of #equation\[{\sin ^{12}}x + 3\,{\sin ^{10}}x + 3\,{\sin ^8}x + {\sin ^6}x - 1\]equation#, is equal to

#Option1:

2

#Option2:

1

#Option3:

–1

#Option4:

0

#Answer:

Option4

#Solution:

\because \; #equation\[\cos \,x + {\cos ^2}x = 1\]equation#

#equation\[ \Rightarrow \cos \,x = 1 - {\cos ^2}x = {\sin ^2}x\]equation#

#equation\[{\sin ^{12}}x + 3\,{\sin ^{10}}x + 3{\sin ^8}x + si{n^6}x - 1\]equation#

#equation\[ = {\cos ^6}x + 3\,{\cos ^5}x + 3{\cos ^4}x + {\cos ^3}x - 1\]equation#

#equation\[ = {\left( {{{\cos }^2}x + \cos \,x} \right)^3} - 1 = 1 - 1 = 0\]equation#

#Level:

Analytical, Difficult

#ConceptCode:

M111401

#ConceptIds:

1011

#QuestionType:

SMCQ

#QuestionSerialNo:

123

#Question:

The sum #equation\[\sum\limits\_{r = 1}^{10} {\left( {{r^2} + 1} \right) \times \left( {r!} \right)} \]equation#is equal to

#Option1:

#equation\[11 \times \left( {11!} \right)\]equation#

#Option2:

#equation\[10 \times \left( {11!} \right)\]equation#

#Option3:

#equation\[\left( {11!} \right)\]equation#

#Option4:

#equation\[101 \times \left( {10!} \right)\]equation#

#Answer:

Option2

#Solution:

We have

#equation\[{T\_r} = \left( {{r^2} + 1 + r - r} \right)\left| \!{\nderline {\,

r \,}} \right. = \left( {{r^2} + r} \right)\left| \!{\nderline {\,

r \,}} \right. - \left( {r - 1} \right)\,\left| \!{\nderline {\,

r \,}} \right. \]equation#

#equation\[ \Rightarrow {T\_r} = r\left| \!{\nderline {\,

{r + 1} \,}} \right. - \left( {r - 1} \right)\,\left| \!{\nderline {\,

r \,}} \right. \]equation#

#equation\[\therefore \,\,{T\_1} = 1\left| \!{\nderline {\,

2 \,}} \right. - 0\]equation#

#equation\[{T\_2} = 2\left| \!{\nderline {\,

3 \,}} \right. - 1\left| \!{\nderline {\,

2 \,}} \right. \]equation#

#equation\[{T\_3} = 3\left| \!{\nderline {\,

4 \,}} \right. - 2\left| \!{\nderline {\,

3 \,}} \right. \]equation#

: :

: :

#equation\[{T\_{10}} = 10\,\left| \!{\nderline {\,

{11} \,}} \right. - 9\left| \!{\nderline {\,

{10} \,}} \right. \]equation#

#equation\[\therefore \,\,\sum\limits\_{r = 1}^{10} {\left( {{r^2} + 1} \right)\,\left| \!{\nderline {\,

r \,}} \right. = 10\left| \!{\nderline {\,

{11} \,}} \right. } \]equation#

#Level:

Analytical, Difficult

#ConceptCode:

M110505

#ConceptIds:

942

#QuestionType:

SMCQ

#QuestionSerialNo:

124

#Question:

If the latus rectum of the ellipse is half the minor axis, then its eccentricity is

#Option1:

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

#Option2:

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

#Option3:

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

#Option4:

none of these

#Answer:

Option1

#Solution:

Latus rectum of ellipse is half the minor axis i.e. #equation\[\frac{{2{b^2}}}{a} = \frac{{2b}}{2} \Rightarrow 2b = a \Rightarrow \frac{b}{a} = \frac{1}{2}\]equation#

 #equation\[e = \sqrt {1 - {{\left( {\frac{b}{a}} \right)}^2}} = \sqrt {1 - \frac{1}{4}} = \frac{{\sqrt 3 }}{2}\]equation#

#Level:

Analytical, Easy

#ConceptCode:

M111001

#ConceptIds:

982

#QuestionType:

SMCQ

#QuestionSerialNo:

125

#Question:

The foci of the ellipse #equation\[\frac{{{x^2}}}{{16}} + \frac{{{y^2}}}{{{b^2}}} = 1\]equation# and the hyperbola #equation\[\frac{{{x^2}}}{{144}} - \frac{{{y^2}}}{{81}} = \frac{1}{{25}}\]equation# coincide. Then, the value of #equation\[{b^2}\]equation# is

#Option1:

5

#Option2:

7

#Option3:

9

#Option4:

1

#Answer:

Option2

#Solution:

The equation of hyperbola is #equation\[\frac{{{x^2}}}{{144/25}} - \frac{{{y^2}}}{{81/25}} = 1\]equation#

So, thee coordinates of the foci are #equation\[\left( { \pm \sqrt {\frac{{144}}{{25}} + \frac{{81}}{{25}}} ,\,\,0} \right)\]equation#i.e. #equation\[\left( { \pm 3,\,\,0} \right)\]equation#

The coordinates of foci of ellipse are #equation\[\left( { \pm \sqrt {16 - {b^2}} ,\,0} \right)\]equation#

The foci of ellipse and hyperbola coincide,

 #equation\[3 = \sqrt {16 - {b^2}} \]equation#

#equation\[ \Rightarrow \]equation# #equation\[{b^2} = 7\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M111101

#ConceptIds:

989

#QuestionType:

SMCQ

#QuestionSerialNo:

126

#Question:

Coordinates of the foci of the ellipse #equation\[5{x^2} + 9{y^2} + 10x - 36y - 4 = 0\]equation# are

#Option1:

(1, 2) and (3, 2)

#Option2:

(1, 2) and (–3, 2)

#Option3:

(–1, 2) and (–3, –2)

#Option4:

(1, –2) and (3, –2)

#Answer:

Option2

#Solution:

Ellipse is #equation\[\frac{{{{\left( {x + 1} \right)}^2}}}{9} + \frac{{{{\left( {y - 2} \right)}^2}}}{5} = 1\]equation#

#equation\[e = \frac{2}{3},\]equation# #equation\[ae = 2\]equation#

Foci #equation\[\left( { - 1 \pm 2,\,\,2} \right) \Rightarrow \left( { - 3,\,\,2} \right),\,\left( {1,\,\,2} \right)\]equation#

#Level:

Analytical, Easy

#ConceptCode:

M111001

#ConceptIds:

982

#QuestionType:

SMCQ

#QuestionSerialNo:

127

#Question:

If #equation\[f\left( x \right) = {\sin ^2}x + {\sin ^2}\left( {x + \frac{\pi }{3}} \right) + \cos \,x\,.\,\cos \left( {x + \frac{\pi }{3}} \right)\]equation# and #equation\[g\left( {\frac{5}{4}} \right) = 1,\]equation# then #equation\[\left( {gof} \right)\left( x \right) = \]equation#

#Option1:

0

#Option2:

1

#Option3:

2

#Option4:

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

#Answer:

Option2

#Solution:

#equation\[f\left( x \right) = {\sin ^2}x + {\sin ^2}\left( {x + \frac{\pi }{3}} \right) + \cos \,x\cos \left( {x + \frac{\pi }{3}} \right)\]equation#

#equation\[ = \frac{1}{2}\left( {2{{\sin }^2}x + 2{{\sin }^2}\left( {x + \frac{\pi }{3}} \right) + 2\cos \,x\,\cos \left( {x + \frac{\pi }{3}} \right)} \right)\]equation#

#equation\[ = \frac{1}{2}\left( {1 - \cos \,2x + 1 - \cos \,\left( {2x + \frac{{2\pi }}{3}} \right) + \cos \left( {2x + \frac{\pi }{3}} \right) + \cos \frac{\pi }{3}} \right)\]equation#

#equation\[ = \frac{5}{4} + \frac{1}{2}\left( { - 2\,\cos \left( {2x + \frac{\pi }{3}} \right).\,\cos \frac{\pi }{3} + \,\cos \left( {2x + \frac{\pi }{3}} \right)} \right)\]equation#

#equation\[ = \frac{5}{4} + \frac{1}{2}\left( { - \cos \left( {2x + \frac{\pi }{3}} \right) + \cos \left( {2x + \frac{\pi }{3}} \right)} \right)\]equation##equation\[ = \frac{5}{4}\]equation#

#equation\[g\left( {f\left( x \right)} \right) = g\left( {\frac{5}{4}} \right) = 1\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M111401

#ConceptIds:

1011

#QuestionType:

SMCQ

#QuestionSerialNo:

128

#Question:

For #equation\[x \in R,\,\,x \ne 0,\,\,x \ne 1,\]equation# let #equation\[{f\_0}\left( x \right) = \frac{1}{{1 - x}}\]equation# and #equation\[{f\_{n + 1}}\left( x \right) = {f\_0}\left( {{f\_n}\left( x \right)} \right),\,n = 0,\,1,\,2...\]equation#Then the value of #equation\[{f\_{100}}\left( 3 \right) + {f\_1}\left( {\frac{2}{3}} \right) + {f\_2}\left( {\frac{3}{2}} \right)\]equation# is equal to

#Option1:

#equation\[\frac{8}{3}\]equation#

#Option2:

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

#Option3:

#equation\[\frac{5}{3}\]equation#

#Option4:

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

#Answer:

Option3

#Solution:

#equation\[{f\_0}\left( x \right) = \frac{1}{{1 - x}}\]equation#

#equation\[{f\_1}\left( x \right) = \frac{1}{{1 - \frac{1}{{1 - x}}}} = \frac{{1 - x}}{{ - x}} = \frac{{x - 1}}{x}\]equation#

#equation\[{f\_2}\left( x \right) = \frac{1}{{1 - \left( {\frac{{x - 1}}{x}} \right)}} = x\]equation#

 #equation\[{f\_{99}}\left( x \right) = \frac{1}{{1 - x}}\]equation#

 #equation\[{f\_{100}}\left( x \right) = \frac{{x - 1}}{x}\]equation#

 #equation\[{f\_{100}}\left( 3 \right) + {f\_1}\left( {\frac{2}{3}} \right) + {f\_2}\left( {\frac{3}{2}} \right)\]equation# #equation\[ = \frac{{3 - 1}}{3} + \frac{{2/3 - 1}}{{2/3}} + \frac{3}{2} = \frac{2}{3} - \frac{1}{2} + \frac{3}{2} = \frac{5}{3}\]equation#

#Level:

Analytical, Difficult

#ConceptCode:

M120310

#ConceptIds:

1048

#QuestionType:

SMCQ

#QuestionSerialNo:

129

#Question:

If #equation\[\cos ec\,\theta - \cot \,\theta = \frac{1}{{\sqrt 3 }},\]equation# then the value of #equation\[\cos \,\theta \]equation# is

#Option1:

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

#Option2:

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

#Option3:

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

#Option4:

#equation\[\sqrt 3 \]equation#

#Answer:

Option1

#Solution:

We have, #equation\[\cos ec\,\theta - \cot \,\theta = \frac{1}{{\sqrt 3 }}\]equation# ………..(1)

#equation\[\cos e{c^2}\theta - {\cot ^2}\theta = 1\]equation#

#equation\[ \Rightarrow \]equation# #equation\[\left( {\cos ec\,\theta - \cot \,\theta } \right)\left( {\cos ec\,\theta + \cot \,\theta } \right) = 1\]equation#

#equation\[ \Rightarrow \]equation# #equation\[\frac{1}{{\sqrt 3 }}\left( {\cos ec\,\theta + \cot \,\theta } \right) = 1\]equation#

#equation\[ \Rightarrow \]equation# #equation\[\cos ec\,\theta + \cot \,\theta = \sqrt 3 \]equation# ………(2)

Adding (1) and (2), we get

#equation\[{\mathop{\rm cosec}\nolimits} \,\theta = \frac{2}{{\sqrt 3 }} \Rightarrow \theta = {60^o}\]equation#

 #equation\[\cos \,\theta = \cos \,{60^o} = \frac{1}{2}\]equation#

#Level:

Analytical, Easy

#ConceptCode:

M111401

#ConceptIds:

1011

#QuestionType:

SMCQ

#QuestionSerialNo:

130

#Question:

If P is a #equation\[3 \times 3\]equation# matrix such that #equation\[{P^T} = 2P + I,\]equation# where #equation\[{P^T}\]equation# is the transpose of P and I is the #equation\[3 \times 3\]equation# identity matrix, then there exists a column matrix #equation\[X = \left[ {\begin{array}{\*{20}{c}}

x\\

y\\

z

\end{array}} \right] \ne \left[ {\begin{array}{\*{20}{c}}

0\\

0\\

0

\end{array}} \right]\]equation# such that

#Option1:

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

0\\

0\\

0

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

#Option2:

#equation\[PX = X\]equation#

#Option3:

#equation\[PX = 2X\]equation#

#Option4:

#equation\[PX = - X\]equation#

#Answer:

Option4

#Solution:

We have #equation\[{P^T} = 2P + I\]equation#

We get, #equation\[{P^T} - 2P = I\]equation#

Taking transpose, we have #equation\[{\left( {{P^T} - 2P} \right)^T} = {I^T}\]equation# …………..(i)

#equation\[ \Rightarrow \]equation#

#equation\[P - 2{P^T} = I\]equation#

From (i) and (ii) on eliminating #equation\[{P^T}\]equation#, we have …………(ii)

#equation\[ - 4P + P = 3I \Rightarrow P = - I\]equation#

#equation\[ \Rightarrow P + I = O\]equation#

Thus #equation\[\left( {P + I} \right)X = O \Rightarrow PX = - X\]equation#

#Level:

Conceptual, Difficult

#ConceptCode:

M120102

#ConceptIds:

1031

#QuestionType:

SMCQ

#QuestionSerialNo:

131

#Question:

If #equation\[{s\_r} = {\alpha ^r} + {\beta ^r} + {\gamma ^r},\]equation# then the value of #equation\[\left| {\begin{array}{\*{20}{c}}

{{s\_0}}&{{s\_1}}&{{s\_2}}\\

{{s\_1}}&{{s\_2}}&{{s\_3}}\\

{{s\_2}}&{{s\_3}}&{{s\_4}}

\end{array}} \right|\]equation# is equal to

#Option1:

0

#Option2:

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

#Option3:

#equation\[{\left( {\alpha + \beta + \gamma } \right)^6}\]equation#

#Option4:

#equation\[{\left( {\alpha - \beta } \right)^2}{\left( {\beta - \gamma } \right)^2}{\left( {\gamma - \alpha } \right)^2}\]equation#

#Answer:

Option4

#Solution:

Given determinant is product of #equation\[\left| {\begin{array}{\*{20}{c}}

1&1&1\\

\alpha &\beta &\gamma \\

{{\alpha ^2}}&{{\beta ^2}}&{{\gamma ^2}}

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

1&1&1\\

\alpha &\beta &\gamma \\

{{\alpha ^2}}&{{\beta ^2}}&{{\gamma ^2}}

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

#Level:

Analytical, Difficult

#ConceptCode:

M120201

#ConceptIds:

1036

#QuestionType:

SMCQ

#QuestionSerialNo:

132

#Question:

If #equation\[f\]equation# and g are differentiable functions in [0, 1] satisfying #equation\[f\left( 0 \right) = 2 = g\left( 1 \right),\]equation# #equation\[g\left( 0 \right) = 0\]equation# and #equation\[f\left( 1 \right) = 6,\]equation# then for some #equation\[c \in \left] {0,\,\,1} \right[\]equation#

#Option1:

#equation\[2f'\left( c \right) = 3g'\left( c \right)\]equation#

#Option2:

#equation\[f'\left( c \right) = g'\left( c \right)\]equation#

#Option3:

#equation\[f'\left( c \right) = 2g'\left( c \right)\]equation#

#Option4:

#equation\[2f'\left( c \right) = g'\left( c \right)\]equation#

#Answer:

Option3

#Solution:

#equation\[\frac{{f'\left( c \right)}}{{g'\left( c \right)}} = \frac{{f\left( 1 \right) - f\left( 0 \right)}}{{g\left( 1 \right) - g\left( 0 \right)}} = \frac{{6 - 2}}{{2 - 0}} = 2\]equation#

#equation\[ \Rightarrow \,\,f'\left( c \right) = 2g'\left( c \right)\]equation#

#Level:

Analytical, Difficult

#ConceptCode:

M120607

#ConceptIds:

1069

#QuestionType:

SMCQ

#QuestionSerialNo:

133

#Question:

#equation\[\int {\frac{{\sqrt {\tan \,x} }}{{\sin \,2x}}} \,dx\]equation# equals

#Option1:

#equation\[\sqrt {\tan \,x} + C\]equation#

#Option2:

#equation\[2\sqrt {an\,x} + C\]equation#

#Option3:

#equation\[\frac{1}{2}\sqrt {\tan \,x} + C\]equation#

#Option4:

#equation\[\frac{1}{4}\sqrt {\tan \,x} + C\]equation#

#Answer:

Option1

#Solution:

Let #equation\[I = \int {\frac{{\sqrt {\tan \,x} }}{{\sin \,2x}}} \,dx = \int {\frac{{\sqrt {\tan \,x} }}{{2\sin \,x\,\cos \,x}}} \,dx\]equation#

#equation\[ = \int {\frac{{\sqrt {\tan \,x} }}{{2\tan \,x\,{{\cos }^2}x}}\,dx = \int {\frac{{{{\sec }^2}x}}{{2\sqrt {\tan \,x} }}\,dx} } \]equation#

Put #equation\[\tan \,x = t\]equation#

#equation\[ \Rightarrow \]equation# #equation\[{\sec ^2}x\,dx = dt\]equation#

 #equation\[I = \int {\frac{{dt}}{{2\sqrt t }} \Rightarrow I = \sqrt t + C} \]equation#

#equation\[ \Rightarrow \]equation# #equation\[I = \sqrt {\tan \,x} + C\]equation#

#Level:

Analytical, Easy

#ConceptCode:

M120701

#ConceptIds:

1070

#QuestionType:

SMCQ

#QuestionSerialNo:

134

#Question:

#equation\[\int\limits\_{ - 1}^1 {\left( {{e^{{x^3}}} + {e^{ - {x^3}}}} \right)\left( {{e^x} - {e^{ - x}}} \right)\,dx} \]equation# is equal to

#Option1:

#equation\[\frac{{{e^2}}}{2} - 2e\]equation#

#Option2:

#equation\[{e^2} - 2e\]equation#

#Option3:

0

#Option4:

#equation\[2{e^{ - 2}} - 2e\]equation#

#Answer:

Option3

#Solution:

#equation\[\int\limits\_{ - 1}^1 {\left( {{e^{{x^3}}} + {e^{ - {x^3}}}} \right)\left( {{e^x} - {e^{ - x}}} \right)\,dx} \]equation#

Let #equation\[f\left( x \right) = \left( {{e^{{x^3}}} + {e^{ - {x^3}}}} \right)\left( {{e^x} - {e^{ - x}}} \right)\]equation#

#equation\[f\left( { - x} \right) = \left( {{x^{ - {x^3}}} + {e^{{x^3}}}} \right)\left( {{e^{ - x}} - {e^x}} \right)\]equation#

#equation\[ = - \left( {{e^{{x^3}}} + {e^{ - {x^3}}}} \right)\left( {{e^x} - {e^{ - x}}} \right) = - f\left( x \right)\]equation#

So, the function #equation\[f\left( x \right)\]equation# is odd

 #equation\[\int\limits\_{ - 1}^1 {f\left( x \right)\,dx = 0} \]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M120802

#ConceptIds:

1076

#QuestionType:

SMCQ

#QuestionSerialNo:

135

#Question:

Let #equation\[F\left( x \right) = f\left( x \right) + f\left( {\frac{1}{x}} \right),\]equation# where #equation\[f\left( x \right) = \int\limits\_1^x {\frac{{\log \,t}}{{1 + t}}\,dt,} \]equation#Then #equation\[F\left( e \right)\]equation# equals

#Option1:

1

#Option2:

2

#Option3:

1/2

#Option4:

0

#Answer:

Option3

#Solution:

#equation\[F\left( x \right) = \int\limits\_1^x {\frac{{\ln \,t}}{{1 + t}}\,dt + \int\limits\_1^{1/x} {\frac{{\ln \,t}}{{1 + t}}\,dt} } \]equation#

#equation\[ \Rightarrow F\left( x \right) = \int\limits\_1^x {\left( {\frac{{\ln \,t}}{{1 + t}} + \frac{{\ln \,t}}{{\left( {1 + t} \right)\,t}}} \right)\,dt = \int\limits\_1^x {\frac{{\ln \,t}}{t}\,dt = \frac{1}{2}\,{{\left( {\ln \,x} \right)}^2}} } \]equation##equation\[ \Rightarrow \]equation# #equation\[F\left( e \right) = \frac{1}{2}\]equation#

#Level:

Analytical, Difficult

#ConceptCode:

M120802

#ConceptIds:

1076

#QuestionType:

SMCQ

#QuestionSerialNo:

136

#Question:

The area (in sq. units) of the region #equation\[\left\{ {\left( {x,\,y} \right):\,{y^2} \ge 2x\,\,and\,\,{x^2} + {y^2} \le 4x,\,\,x \ge 0,\,\,y \ge 0} \right\}\]equation# is

#Option1:

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

#Option2:

#equation\[\pi - \frac{8}{3}\]equation#

#Option3:

#equation\[\pi - \frac{{4\sqrt 2 }}{3}\]equation#

#Option4:

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

#Answer:

Option2

#Solution:

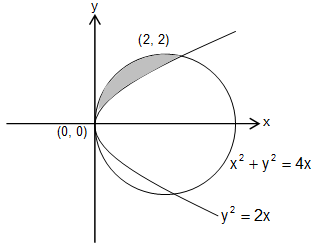
The area of the required region is

shaded.

 Area #equation\[ = \frac{{\pi \,.\,{2^2}}}{4} - \sqrt 2 \int\limits\_0^2 {\sqrt x \,dx} \]equation#

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

#equation\[ = \pi - \sqrt 2 \,.\,\frac{2}{3}.2\sqrt 2 = \left( {\pi - \frac{8}{3}} \right)\]equation# sq. units



#Level:

Analytical, Easy

#ConceptCode:

M121002

#ConceptIds:

1092

#QuestionType:

SMCQ

#QuestionSerialNo:

137

#Question:

Differential equation of those circles which passes through origin and their centres lie on y–axis will be

#Option1:

#equation\[\left( {{x^2} - {y^2}} \right)\frac{{dy}}{{dx}} + 2xy = 0\]equation#

#Option2:

#equation\[\left( {{x^2} - {y^2}} \right)\frac{{dy}}{{dx}} = 2xy\]equation#

#Option3:

#equation\[\left( {{x^2} - {y^2}} \right)\frac{{dy}}{{dx}} = xy\]equation#

#Option4:

#equation\[\left( {{x^2} - {y^2}} \right)\frac{{dy}}{{dx}} + xy = 0\]equation#

#Answer:

Option2

#Solution:

Since, equation of circle passing through origin and whose centre lie on y – axis i.e. (0, f) and radius f, is #equation\[{\left( {x - 0} \right)^2} + {\left( {y - f} \right)^2} = {f^2} \Rightarrow {x^2} + {y^2} - 2fy = 0\]equation# ……….(i)

On differentiating w.r.t. x, we get

#equation\[2x + 2y\frac{{dy}}{{dx}} - 2f\frac{{dy}}{{dx}} = 0 \Rightarrow x + \frac{{dy}}{{dx}}\left( {y - f} \right) = 0\]equation#

#equation\[ \Rightarrow x + \frac{{dy}}{{dx}}\left( {y - \frac{{\left( {{x^2} + {y^2}} \right)}}{{2y}}} \right) = 0\]equation#

[from (i)]

#equation\[ \Rightarrow x + \frac{{dy}}{{dx}}\left( {\frac{{{y^2} - {x^2}}}{{2y}}} \right) = 0 \Rightarrow \left( {{x^2} - {y^2}} \right)\frac{{dy}}{{dx}} = 2xy\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M120902

#ConceptIds:

1084

#QuestionType:

SMCQ

#QuestionSerialNo:

138

#Question:

The order of the differential equation whose general solution is given by

#equation\[y = {c\_1}{e^x} + {c\_2}{e^x} + \left( {{c\_3} + {c\_4}} \right){e^{3x + 5}} + {c\_5}{e^{2x}}\]equation#where #equation\[{c\_1},\,{c\_2},\,{c\_3},\,{c\_4}\]equation# and #equation\[{c\_5}\]equation# are arbitrary constants, is

#Option1:

5

#Option2:

4

#Option3:

3

#Option4:

2

#Answer:

Option3

#Solution:

#equation\[y = {c\_1}{e^x} + {c\_2}{e^x} + \left( {{c\_3} + {c\_4}} \right){e^{3x + 5}} + {c\_5}{e^{2x}}\]equation#

#equation\[ = \left( {{c\_1} + {c\_2}} \right){e^x} + \left( {{c\_3} + {c\_4}} \right){e^5}.\,{e^{3x}} + {c\_5}{e^{2x}}\]equation#

#equation\[ = \alpha {e^x} + \beta {e^{3x}} + \gamma {e^{2x}}\]equation#

 So we have 3 arbitrary

Constants #equation\[\alpha ,\,\beta ,\,\gamma \]equation#

 degree of differential equation is 3

#Level:

Conceptual, Moderate

#ConceptCode:

M120901

#ConceptIds:

1083

#QuestionType:

SMCQ

#QuestionSerialNo:

139

#Question:

If ABCD be a parallelogram and M be the point of intersection of the diagonals. If O is any point, then #equation\[\overrightarrow {OA} + \overrightarrow {OB} + \overrightarrow {OC} + \overrightarrow {OD} \]equation# is

#Option1:

#equation\[3\overrightarrow {OM} \]equation#

#Option2:

#equation\[4\overrightarrow {OM} \]equation#

#Option3:

#equation\[\overrightarrow {OM} \]equation#

#Option4:

#equation\[2\overrightarrow {OM} \]equation#

#Answer:

Option2

#Solution:

Let O be the origin and #equation\[\overrightarrow {OA} = \overrightarrow a ,\,\overrightarrow {OB} = \overrightarrow b ,\,\,\overrightarrow {OC} = \overrightarrow c ,\,\overrightarrow {OD} = \overrightarrow d \]equation#

#equation\[\overrightarrow {OA} + \overrightarrow {OB} + \overrightarrow {OC} + \overrightarrow {OD} = \overrightarrow a + \overrightarrow b + \overrightarrow c + \overrightarrow d \]equation#……………(i)

M is the point of intersection of diagonals.

So, #equation\[\overrightarrow {OM} = \frac{{\overrightarrow a + \overrightarrow b + \overrightarrow c + \overrightarrow d }}{4}\]equation#

 From (i) and (ii), we get #equation\[\overrightarrow {OA} + \overrightarrow {OB} + \overrightarrow {OC} + \overrightarrow {OD} = 4\overrightarrow {OM} \]equation#

#Level:

Analytical, Easy

#ConceptCode:

M121101

#ConceptIds:

1093

#QuestionType:

SMCQ

#QuestionSerialNo:

140

#Question:

Let ABCD be a parallelogram. If #equation\[\overrightarrow {AB} = \hat i + 3\hat j + 7\hat k,\,\,\overrightarrow {AD} = 2\hat i + 3\hat j - 5\hat k\]equation#and #equation\[\overrightarrow p \]equation# is a unit vector parallel to #equation\[\overrightarrow {AC} \]equation#, then #equation\[\overrightarrow p \]equation# is equal to

#Option1:

#equation\[\frac{1}{3}\left( {2\hat i + \hat j + 2\hat k} \right)\]equation#

#Option2:

#equation\[\frac{1}{3}\left( {2\hat i - 2\hat j + \hat k} \right)\]equation#

#Option3:

#equation\[\frac{1}{7}\left( {3\hat i + 6\hat j + 2\hat k} \right)\]equation#

#Option4:

#equation\[\frac{1}{7}\left( {6\hat i + 2\hat j + 3\hat k} \right)\]equation#

#Answer:

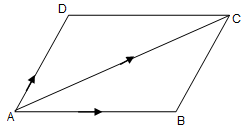
Option3

#Solution:

#equation\[\overrightarrow {AD} = \overrightarrow {BC} = 2\hat i + 3\hat j - 5\hat k\]equation#

#equation\[\overrightarrow {AC} = \overrightarrow {AB} + \overrightarrow {BC} = 3\hat i + 6\hat j + 2\hat k\]equation#

 #equation\[\overrightarrow p = \frac{{\overrightarrow {AC} }}{{\left| {\overrightarrow {AC} } \right|}} = \frac{1}{7}\left( {3\hat i + 6\hat j + 2\hat k} \right)\]equation#



#Level:

Analytical, Easy

#ConceptCode:

M121101

#ConceptIds:

1093

#QuestionType:

SMCQ

#QuestionSerialNo:

141

#Question:

Two lines #equation\[\frac{{x - 1}}{2} = \frac{{y + 1}}{3} = \frac{{z - 1}}{4}\]equation# and #equation\[\frac{{x - 3}}{1} = \frac{{y - k}}{2} = z\]equation# intersect at a point, if k is equal to

#Option1:

#equation\[\frac{2}{9}\]equation#

#Option2:

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

#Option3:

#equation\[\frac{9}{2}\]equation#

#Option4:

#equation\[\frac{1}{6}\]equation#

#Answer:

Option3

#Solution:

#equation\[\frac{{x - 1}}{2} = \frac{{y + 1}}{3} = \frac{{z - 1}}{4} = r\]equation# (say)

#equation\[ \Rightarrow \]equation# #equation\[x = 2r + 1,\,\,y = 3r - 1,\,\,z = 4r + 1\]equation#

Since, the two lines intersect.

So, putting above values in second line, we get

#equation\[\frac{{2r + 1 - 3}}{1} = \frac{{3r - 1 - k}}{2} = \frac{{4r + 1}}{1}\]equation#

Taking 1st and 3rd term, we get

#equation\[2r - 2 = 4r + 1\]equation#

#equation\[ \Rightarrow \]equation# #equation\[r = - 3/2\]equation#

Also taking 2nd and 3rd term, we get

#equation\[3r - 1 - k = 8r + 2\]equation# #equation\[ \Rightarrow \]equation# #equation\[k = - 5r - 3 = \frac{{15}}{2} - 3 = \frac{9}{2}\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M121204

#ConceptIds:

1109

#QuestionType:

SMCQ

#QuestionSerialNo:

142

#Question:

The distance of the point (1, –5, 9) from the plane #equation\[x - y + z = 5\]equation# measured along the line #equation\[x = y = z\]equation#is

#Option1:

#equation\[3\sqrt {10} \]equation#

#Option2:

#equation\[10\sqrt 3 \]equation#

#Option3:

#equation\[\frac{{10}}{{\sqrt 3 }}\]equation#

#Option4:

#equation\[\frac{{20}}{3}\]equation#

#Answer:

Option2

#Solution:

The equation of line parallel to #equation\[x = y = z\]equation# and passing through (1, –5, 9) is #equation\[\frac{{x - 1}}{1} = \frac{{y + 5}}{1} = \frac{{z - 9}}{1} = k\]equation# (say)

Let #equation\[A\left( {k + 1,\,\,k - 5,\,\,k + 9} \right)\]equation# be the point of intersection of line and plane.

We have, #equation\[k + 1 - k + 5 + k + 9 = 5 \Rightarrow k = - 10\]equation#

 The point is (–9, –15, –1)

Required distance #equation\[ = \sqrt {{{\left( {1 + 9} \right)}^2} + {{\left( { - 5 + 15} \right)}^2} + {{\left( {9 + 1} \right)}^2}} = 10\sqrt 3 \]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M121205

#ConceptIds:

1110

#QuestionType:

SMCQ

#QuestionSerialNo:

143

#Question:

Consider Maximize #equation\[z = - 2x - 3y\]equation# subject to #equation\[\frac{x}{2} + \frac{y}{3} \le 1;\,\,\frac{x}{3} + \frac{y}{2} \le 1;\,\,x,\,y \ge 0\]equation#. The max. value of z is

#Option1:

0

#Option2:

4

#Option3:

9

#Option4:

6

#Answer:

Option1

#Solution:

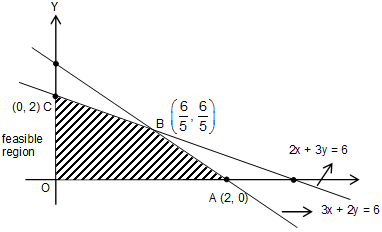
Given constraints are #equation\[\frac{x}{2} + \frac{y}{3} \le 1;\,\,\frac{x}{3} + \frac{y}{2} \le 1;\,\,x,\,y \ge 0\]equation#

or #equation\[3x + 2y \le 6,\,\,2x + 3y \le 6\]equation#

B is point of intersection of lines

#equation\[3x + 2y = 6\]equation# ………….(i)

and #equation\[2x + 3y = 6\]equation# …………(ii)



On solving (i) and (ii), we get #equation\[y = \frac{6}{5}\]equation#

Substitute in (i), we get

#equation\[3x = 6 - 2 \times \frac{6}{5} = 6 - \frac{{12}}{5}\]equation#

#equation\[3x = \frac{{18}}{5}\]equation# or #equation\[x = \frac{6}{5}\]equation#

We find maximum value of z at one of corner points of feasible region OABC.

|  |  |
| --- | --- |
| Points | #equation\[z = - 2x - 3y\]equation# |
| O (0, 0) | z = 0 |
| A (2, 0) | z = –4 |
| #equation\[B\left( {\frac{6}{5},\,\,\frac{6}{5}} \right)\]equation# | #equation\[z = - 6\]equation# |
| C (0, 2) | z = –6 |

 Max. z = 0

#Level:

Conceptual, Easy

#ConceptCode:

M111701

#ConceptIds:

1029

#QuestionType:

SMCQ

#QuestionSerialNo:

144

#Question:

An experiment succeeds twice as often as if fails. The probability of at least 5 successes in the six trials of this experiment is

#Option1:

#equation\[\frac{{496}}{{729}}\]equation#

#Option2:

#equation\[\frac{{192}}{{729}}\]equation#

#Option3:

#equation\[\frac{{240}}{{729}}\]equation#

#Option4:

#equation\[\frac{{256}}{{729}}\]equation#

#Answer:

Option4

#Solution:

Let #equation\[P\left( F \right) = p \Rightarrow P\left( S \right) = 2p\]equation#

Now, #equation\[p + 2p = 1 \Rightarrow p = \frac{1}{3}\]equation#

 #equation\[P\left( {x \ge 5} \right) = P\left( {x = 5} \right) + P\left( {x = 6} \right)\]equation#

#equation\[ = {\,^6}{C\_5}\left( {\frac{1}{3}} \right){\left( {\frac{2}{3}} \right)^5} + {\,^6}{C\_6}{\left( {\frac{2}{3}} \right)^6} = \frac{{256}}{{729}}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M121311

#ConceptIds:

1124

#QuestionType:

SMCQ

#QuestionSerialNo:

145

#Question:

The chances of defective screws in three boxes A, B, C are #equation\[\frac{1}{5},\,\,\frac{1}{6},\,\,\frac{1}{7}\]equation# respectively. A box is selected at random and a screw drawn from it at random is found to be defective. Then, the probability that it came from box A, is

#Option1:

#equation\[\frac{{16}}{{29}}\]equation#

#Option2:

#equation\[\frac{1}{{15}}\]equation#

#Option3:

#equation\[\frac{{27}}{{59}}\]equation#

#Option4:

#equation\[\frac{{42}}{{107}}\]equation#

#Answer:

Option4

#Solution:

Let #equation\[{E\_1},\,{E\_2}\]equation# and #equation\[{E\_3}\]equation# denote the events of selecting boxes A, B and C respectively and A be the event that a screw selected at random is defective. Then, #equation\[P\left( {{E\_1}} \right) = \frac{1}{3},\,P\left( {{E\_2}} \right) = \frac{1}{3},\,P\left( {{E\_3}} \right) = \frac{1}{3}\]equation#

#equation\[P\left( {A\left| {{E\_1}} \right.} \right) = \frac{1}{5},\,\,P\left( {A\left| {{E\_2}} \right.} \right) = \frac{1}{6},\,\,P\left( {A\left| {{E\_3}} \right.} \right) = \frac{1}{7}\]equation#

Now, by Baye’s theorem, the required probability

#equation\[P\left( {{E\_1}\left| A \right.} \right) = \frac{{\frac{1}{3}.\frac{1}{5}}}{{\frac{1}{3}.\frac{1}{5} + \frac{1}{3}.\frac{1}{6} + \frac{1}{3}.\frac{1}{7}}} = \frac{{\frac{1}{5}}}{{\frac{1}{5} + \frac{1}{6} + \frac{1}{7}}} = \frac{{42}}{{107}}\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

M121310

#ConceptIds:

1123

#QuestionType:

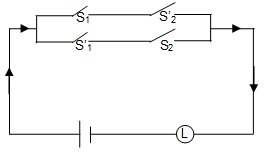
SMCQ

#QuestionSerialNo:

146

#Question:

Symbolic form of the given switching circuit is equivalent to \_\_\_\_\_\_\_\_



#Option1:

#equation\[p \vee \~q\]equation#

#Option2:

#equation\[p \wedge \~q\]equation#

#Option3:

#equation\[p \leftrightarrow q\]equation#

#Option4:

#equation\[\~\left( {p \leftrightarrow q} \right)\]equation#

#Answer:

Option4

#Solution:

Let p : Switch #equation\[{S\_1}\]equation# is closed

q : Switch #equation\[{S\_2}\]equation#is closed

#equation\[\~p:\]equation# Switch #equation\[S{'\_1}\]equation# is closed

#equation\[\~q\]equation# : Switch #equation\[S{'\_2}\]equation# is closed

Symbolic form of the given circuit is

#equation\[\left( {p \wedge \~\,q} \right) \vee \left( {\~p \wedge q} \right) \equiv \~\left( {p \leftrightarrow q} \right)\]equation#

#Level:

Analytical, Difficult

#ConceptCode:

M121701

#ConceptIds:

1132

#QuestionType:

SMCQ

#QuestionSerialNo:

147

#Question:

The negation of #equation\[\~s\, \vee \left( {\~r\, \wedge s} \right)\]equation# is equivalent to

#Option1:

#equation\[s \vee \left( {r \vee \~s} \right)\]equation#

#Option2:

#equation\[s \wedge r\]equation#

#Option3:

#equation\[s \wedge \~r\]equation#

#Option4:

#equation\[s \wedge \left( {r \wedge \~s} \right)\]equation#

#Answer:

Option2

#Solution:

Using the rules of logic, we have #equation\[\~s \vee \left( {\~r\, \wedge s} \right)\]equation#

#equation\[ \equiv \left( {\~s \vee \~r} \right) \wedge \left( {\~s \vee s} \right) \equiv \left( {\~s \vee \~r} \right) \wedge r \equiv \~s \vee \~r\]equation#

Now the negation of above is #equation\[\~\left( {\~s\, \vee \~r} \right) \equiv s \wedge r\]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

M121701

#ConceptIds:

1132

#QuestionType:

SMCQ

#QuestionSerialNo:

148

#Question:

The value of #equation\[\mathop {\lim }\limits\_{x \to 0} \frac{1}{{{x^3}}}\int\limits\_0^x {\frac{{t\,\ln \left( {1 + t} \right)}}{{{t^4} + 4}}\,dt} \]equation#

#Option1:

0

#Option2:

#equation\[\frac{1}{{12}}\]equation#

#Option3:

#equation\[\frac{1}{{24}}\]equation#

#Option4:

#equation\[\frac{1}{{64}}\]equation#

#Answer:

Option2

#Solution:

#equation\[\mathop {\lim }\limits\_{x \to 0} \frac{1}{{{x^3}}}\int\limits\_0^x {\frac{{t\,\ln \left( {1 + t} \right)}}{{{t^4} + 4}}\,dt} \]equation#

#equation\[ = \mathop {\lim }\limits\_{x \to 0} \frac{{\int\limits\_0^x {\frac{{t\,\ln \left( {1 + t} \right)}}{{{t^4} + 4}}} \,dt}}{{{x^3}}}\, = \mathop {\lim }\limits\_{x \to 0} \frac{{\frac{{x\,\ln \,\left( {1 + x} \right)}}{{{x^4} + 4}}}}{{3{x^2}}}\]equation#

[Using L’ Hospital’s rule]

#equation\[ = \mathop {\lim }\limits\_{x \to 0} \frac{{\ln \left( {1 + x} \right)}}{{3x\left( {{x^4} + 4} \right)}} = \left( {\mathop {\lim }\limits\_{x \to 0} \frac{{\ln \left( {1 + x} \right)}}{x}} \right).\frac{1}{3}\left( {\mathop {\lim }\limits\_{x \to 0} \frac{1}{{{x^4} + 4}}} \right)\]equation#

#equation\[ = 1.\frac{1}{3} \times \frac{1}{4} = \frac{1}{{12}}\]equation#

(Using #equation\[\mathop {\lim }\limits\_{x \to 0} \frac{{\ln \left( {1 + x} \right)}}{x} = 1\]equation#)

#Level:

Analytical, Difficult

#ConceptCode:

M110610

#ConceptIds:

953

#QuestionType:

SMCQ

#QuestionSerialNo:

149

#Question:

The distance between the directrices of the ellipse #equation\[\frac{{{x^2}}}{4} + \frac{{{y^2}}}{9} = 1\]equation# is

#Option1:

#equation\[\frac{9}{{\sqrt 5 }}\]equation#

#Option2:

#equation\[\frac{{24}}{{\sqrt 5 }}\]equation#

#Option3:

#equation\[\frac{{18}}{{\sqrt 5 }}\]equation#

#Option4:

None of these

#Answer:

Option3

#Solution:

4 = 9 (1-e2)  #equation\[e = \sqrt 5 /3\]equation#

Distance between the directrices = #equation\[\frac{{2b}}{e} = \frac{{2 \times 3 \times 3}}{{\sqrt 5 }} = \frac{{18}}{{\sqrt 5 }}\]equation# Ans.

Hence (C) is the correct answer.

#Level:

Analytical, Easy

#ConceptCode:

M111001

#ConceptIds:

982

#QuestionType:

SMCQ

#QuestionSerialNo:

150

#Question:

The number of terms which are free from radicals in the expansion of (a1/5 + b1/10)55.

#Option1:

6

#Option2:

7

#Option3:

5

#Option4:

4

#Answer:

Option1

#Solution:

Tr+1 = 55Cr (a1/5)55 –r (b1/10)r = 55Cr a11–r/5 br/10

Tr+1 is free from radicals only if both r/5 and r/10 are whole numbers

Þ r is multiple of 10 Þ 0 £ r £ 55

so, r = 0, 1, 2, 3, 4, 5.

Hence (A) is the correct answer.

#Level:

Analytical, Moderate

#ConceptCode:

M110401

#ConceptIds:

933