#TestName:

**OLTS-1718-JEEA – 2018 SAMPLE PAPER FULL TEST PAPER – I**

#Time:180 minutes

#Language:English

#Attempts:0

#StartDate:

#EndDate:

#TestPause:Yes

#Review:Yes

#ShowCorrectAnswers:Yes

#SectionShuffle:No

#QuestionShuffle:No

#AnswerShuffle:No

#CourseId:

#TestType:Full

#Syllabus:

#ScheduleId:

#Section:

PHYSICS

#SerialNo:

1

#Subject:

Physics

#SubSection:

**SMCQ Multi Correct**

#SubSectionSerialNo:

1

#MarksPerQuestion:

4

#NegativeMarks:

2

#QuestionType:

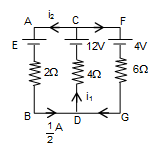
SMCQ

#QuestionSerialNo:

1

#Question:

In the circuit shown in figure



#Option1:

E = 6.6 V

#Option2:

i1 = 1.1 A

#Option3:

i2 = 0.5 A

#Option4:

E = 4.4 V

#Answer:

Option1, Option2

#Solution:

Assume unknwon currents and apply KVL twice.

#Level:

Analytical, Moderate

#ConceptCode:

P120204

#ConceptIds:

1480

#QuestionType:

SMCQ

#QuestionSerialNo:

2

#Question:

When photons of energy 4.25 eV strike the surface of a metal A, the ejected photoelectrons have maximum kinetic energy TA eV and de-Broglie wavelength lA. The maximum kinetic energy of photoelectrons liberated from another metal B by photons of energy 4.70 eV is TB=(TA – 1.50) eV. If the de-Broglie wavelength of these photoelectrons is lB = 2lA then

#Option1:

the work function of A is 2.25 eV

#Option2:

the work function of B is 4.20 eV

#Option3:

TA = 2.00 eV

#Option4:

TB = 2.75 eV

#Answer:

Option1, Option2, Option3

#Solution:

KE = hn – f

#Level:

Analytical, Moderate

#ConceptCode:

P120602

#ConceptIds:

1526

#QuestionType:

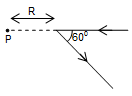
SMCQ

#QuestionSerialNo:

3

#Question:

A long straight wire, carrying a current I is bent at its mid point to form an angle of 600 . AT a point P, distance R from the point of bending the magnetic field is



#Option1:

#equation\[\frac{{\left( {\sqrt 2 - 1} \right){\mu \_0}i}}{{4\pi R}}\]equation#

#Option2:

#equation\[\frac{{\left( {\sqrt 2 + 1} \right){\mu \_0}i}}{{4\pi R}}\]equation#

#Option3:

#equation\[\frac{{{\mu \_0}i}}{{4\sqrt 3 \pi R}}\]equation#

#Option4:

#equation\[\frac{{{\mu \_0}i}}{{8R}}\]equation#

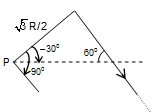
#Answer:

Option3

#Solution:

B = #equation\[\frac{{{\mu \_o}I}}{{4\pi \sqrt 3 \;R/2}}\left[ {\sin \;{{90}^o} + \sin ( - {{30}^o})} \right]\]equation#

= #equation\[\frac{{{\mu \_o}I}}{{4\sqrt 3 \;R}}\]equation#



#Level:

Conceptual, Moderate

#ConceptCode:

P120301

#ConceptIds:

1486

#QuestionType:

SMCQ

#QuestionSerialNo:

4

#Question:

Figure show three spherical equipotential surface 1, 2 and 3 round a point charge q. The potential difference #equation\[{V\_1} - {V\_2} = {V\_2} - {V\_3}\]equation#. If t1 and t2 be the distance between them. Them

#Option1:

t1 = t2

#Option2:

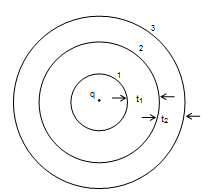
t1 > t2

#Option3:

t1 < t2

#Option4:

t1 £ t2



#Answer:

Option3

#Solution:

Q E is continuously decreasing along radially outward.

\ #equation\[\frac{{{V\_1} - {V\_2}}}{{{t\_1}}} > \frac{{{V\_2} - {V\_3}}}{{{t\_2}}}\]equation# ; \ t1 < t2

#Level:

Conceptual, Difficult

#ConceptCode:

P120102

#ConceptIds:

1463

#QuestionType:

SMCQ

#QuestionSerialNo:

5

#Question:

A transverse wave is travelling along a stretched string from right to left. The figure shown represents the shape of the string (snap shot) at a given instant. At this instant:

#Option1:

the particles at A, B and H have upward velocity.

#Option2:

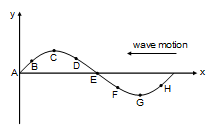
the particles at D, E and F have downward velocity.

#Option3:

the particles at C, E and G have zero velocity.

#Option4:

the particles at A and E have maximum velocity.

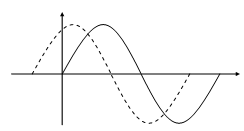


#Answer:

Option1, Option2, Option4

#Solution:

Results can be obtained by looking at shape of string after a short time (shown dotted). Also, each particle of string executes SHM about mean position which is on x-axis.



#Level:

Conceptual, Easy

#ConceptCode:

P111303

#ConceptIds:

1457

#QuestionType:

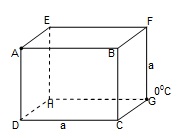
SMCQ

#QuestionSerialNo:

6

#Question:

A cubical frame is made by connecting 12 identical uniform conducting rods as shown in the figure. In the steady state the temperature of junction A is 1000 C while that the G is #equation\[{0^0}C\]equation#. Then,



#Option1:

B will be Hotter than H

#Option2:

Temperature of F is #equation\[{40^0}C\]equation#

#Option3:

Temperature of D is #equation\[{66.67^0}C\]equation#

#Option4:

Temperature of E is #equation\[{50^0}C\]equation#

#Answer:

Option2

#Solution:

100°C – Ir – #equation\[\frac{I}{2}r - Ir\]equation#= 0°C

Þ Ir = 40°C ; \

tF = 0° + Ir = 40°C

#Level:

Analytical, Easy

#ConceptCode:

P111207

#ConceptIds:

1453

#QuestionType:

SMCQ

#QuestionSerialNo:

7

#Question:

A ladder AB is supported by a smooth vertical wall and rough horizontal floor as shown. A boy starts moving from A to B slowly. The ladder remains at rest, then pick up the correct statement(s) ;

#Option1:

Magnitude of normal reaction by wall on ladder at point B will increase

#Option2:

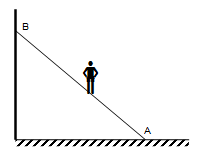
Magnitude of normal reaction by wall on ladder at point B will decrease

#Option3:

Magnitude of normal reaction by floor on ladder at point A will remain unchanged

#Option4:

Magnitude of friction force by floor on ladder at point A will increase



#Answer:

Option1, Option3, Option4

#Solution:

Vertical normal reaction will support weight and while horizontal normal reaction is balanced by friction force.

#Level:

Analytical, Moderate

#ConceptCode:

P110704

#ConceptIds:

1415

#SubSection:

**Single Correct**

#SubSectionSerialNo:

2

#MarksPerQuestion:

3

#NegativeMarks:

1

#QuestionType:

SMCQ

#QuestionSerialNo:

8

#Question:

|  |  |  |
| --- | --- | --- |
| For the motion of a particle on straight path position is represent by x, velocity by v. Acceleration by a and time t. | | |
| Column 1 | Column 2 | Column 3 |
| (I)  V = 3t2 m/s | (i)  a = 2 cos t (m/s2) | (P) |
| (II)  V = 2 sin t m/s | (ii)  a = 0 | (Q) |
| (III)  V = 10 m/s | (iii)  a = 6t m/s2 | (R) |
| (IV)  V = 2t – 2 (m/s) #equation\[\]equation# | (iv)  a = 2 m/s2 | (S) |

A particle is moving on straight path with uniform velocity

#Option1:

(IV) (iv) (Q)

#Option2:

(III) (ii) (P)

#Option3:

(III) (ii) (Q)

#Option4:

(IV) (ii) (P)

#Answer:

Option2

#Level:

Conceptual, Moderate

#ConceptCode:

P110301

#ConceptIds:

1376

#QuestionType:

SMCQ

#QuestionSerialNo:

9

#Question:

|  |  |  |
| --- | --- | --- |
| For the motion of a particle on straight path position is represent by x, velocity by v. Acceleration by a and time t. | | |
| Column 1 | Column 2 | Column 3 |
| (I)  V = 3t2 m/s | (i)  a = 2 cos t (m/s2) | (P) |
| (II)  V = 2 sin t m/s | (ii)  a = 0 | (Q) |
| (III)  V = 10 m/s | (iii)  a = 6t m/s2 | (R) |
| (IV)  V = 2t – 2 (m/s) #equation\[\]equation# | (iv)  a = 2 m/s2 | (S) |

If particle moving with uniformly accelerated motion then

#Option1:

(II) (i) (R)

#Option2:

(IV) (iv) (Q)

#Option3:

(IV) (iv) (P)

#Option4:

(I) (iii) (Q)

#Answer:

Option3

#Level:

Conceptual, Easy

#ConceptCode:

P110301

#ConceptIds:

1376

#QuestionType:

SMCQ

#QuestionSerialNo:

10

#Question:

|  |  |  |
| --- | --- | --- |
| For the motion of a particle on straight path position is represent by x, velocity by v. Acceleration by a and time t. | | |
| Column 1 | Column 2 | Column 3 |
| (I)  V = 3t2 m/s | (i)  a = 2 cos t (m/s2) | (P) |
| (II)  V = 2 sin t m/s | (ii)  a = 0 | (Q) |
| (III)  V = 10 m/s | (iii)  a = 6t m/s2 | (R) |
| (IV)  V = 2t – 2 (m/s) #equation\[\]equation# | (iv)  a = 2 m/s2 | (S) |

If particle moving with increasing acceleration.

#Option1:

(III) (iii) (S)

#Option2:

(II) (i) (R)

#Option3:

(I) (iii) (Q)

#Option4:

(IV) (iv) (S)

#Answer:

Option3

#Level:

Analytical, Moderate

#ConceptCode:

P110302

#ConceptIds:

1377

#QuestionType:

SMCQ

#QuestionSerialNo:

11

#Question:

|  |  |  |  |
| --- | --- | --- | --- |
| Capacitor (C) and inductor (L) are connected with resistance R1 and R2 respectively as shown in figure. Initially capacitor is unchanged. | | |  |
| Column 1 | Column 2 | Column 3 | |
| (I) Current in R1 is 0. | (i) Charge on capacitor is zero | (P) Energy stored in capacitor is #equation\[\frac{1}{2}C{V^2}\]equation# | |
| (II) Current in R2 is #equation\[\frac{V}{{{R\_2}}}\]equation# | (ii) Charge on capacitor is CV | (Q) Energy stored in inductor is maximum | |
| (III) Current in R1 is #equation\[\frac{V}{{{R\_1}}}\]equation# | (iii) Induced emf in inductor is maximum | (R) Energy stored in capacitor is zero. | |
| (IV) Current in R2 is zero #equation\[\]equation# | (iv) Induced emf in inductor is minimum | (S) Energy stored in inductor is minimum | |

Just after closing only switch S1 at t = 0.

#Option1:

(II) (ii) (P)

#Option2:

(III) (i) (R)

#Option3:

(IV) (iv) (P)

#Option4:

(IV) (iii) (P)

#Answer:

Option2

#Level:

Conceptual, Moderate

#ConceptCode:

P120209

#ConceptIds:

1485

#QuestionType:

SMCQ

#QuestionSerialNo:

12

#Question:

|  |  |  |  |
| --- | --- | --- | --- |
| Capacitor (C) and inductor (L) are connected with resistance R1 and R2 respectively as shown in figure. Initially capacitor is unchanged. | | |  |
| Column 1 | Column 2 | Column 3 | |
| (I) Current in R1 is 0. | (i) Charge on capacitor is zero | (P) Energy stored in capacitor is #equation\[\frac{1}{2}C{V^2}\]equation# | |
| (II) Current in R2 is #equation\[\frac{V}{{{R\_2}}}\]equation# | (ii) Charge on capacitor is CV | (Q) Energy stored in inductor is maximum | |
| (III) Current in R1 is #equation\[\frac{V}{{{R\_1}}}\]equation# | (iii) Induced emf in inductor is maximum | (R) Energy stored in capacitor is zero. | |
| (IV) Current in R2 is zero #equation\[\]equation# | (iv) Induced emf in inductor is minimum | (S) Energy stored in inductor is minimum | |

Just after closing only switch S2 at t = 0.

#Option1:

(IV) (iii) (S)

#Option2:

(II) (iii) (Q)

#Option3:

(III) (i) (R)

#Option4:

(I) (i) (P)

#Answer:

Option1

#Level:

Conceptual, Easy

#ConceptCode:

P120415

#ConceptIds:

6845

#QuestionType:

SMCQ

#QuestionSerialNo:

13

#Question:

|  |  |  |  |
| --- | --- | --- | --- |
| Capacitor (C) and inductor (L) are connected with resistance R1 and R2 respectively as shown in figure. Initially capacitor is unchanged. | | |  |
| Column 1 | Column 2 | Column 3 | |
| (I) Current in R1 is 0. | (i) Charge on capacitor is zero | (P) Energy stored in capacitor is #equation\[\frac{1}{2}C{V^2}\]equation# | |
| (II) Current in R2 is #equation\[\frac{V}{{{R\_2}}}\]equation# | (ii) Charge on capacitor is CV | (Q) Energy stored in inductor is maximum | |
| (III) Current in R1 is #equation\[\frac{V}{{{R\_1}}}\]equation# | (iii) Induced emf in inductor is maximum | (R) Energy stored in capacitor is zero. | |
| (IV) Current in R2 is zero #equation\[\]equation# | (iv) Induced emf in inductor is minimum | (S) Energy stored in inductor is minimum | |

Switch S1 and S2 closed simultaneously at t = 0.

#Option1:

(III) (i) (Q)

#Option2:

(I) (i) (P)

#Option3:

(II) (ii) (Q)

#Option4:

(III) (i) (S)

#Answer:

Option4

#Level:

Analytical, Moderate

#ConceptCode:

P120415

#ConceptIds:

6845

#SubSection:

**Integer**

#SubSectionSerialNo:

3

#MarksPerQuestion:

3

#NegativeMarks:

0

#QuestionType:

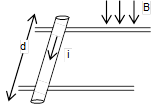
Integer

#QuestionSerialNo:

14

#Question:

A cylindrical uniform rod of mass 0.72 kg and radius 6 cm rests on two parallel rails, that are d = 50 cm apart. The rod caries a current I = 48A (In the direction shown) and rolls along the rails without slipping. If it starts from rest, uniform magnetic field of magnitudes 0.25 T is directed perpendicular to the rod and the rail, then the friction force(In N) between rod and rails is



#Answer:

2

#Solution:

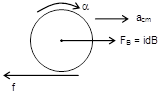
idB – f = ma

fr = Ia, a = ra

Solving

f = #equation\[\frac{{idB}}{3}\]equation#

Þ #equation\[\frac{{48 \times 0.5 \times 0.25}}{3}\]equation# = 2.



#Level:

Analytical, Moderate

#ConceptCode:

P120305

#ConceptIds:

1490

#QuestionType:

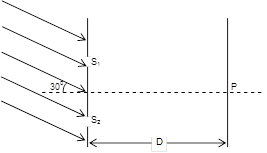
Integer

#QuestionSerialNo:

15

#Question:

The given figure shows a YDSE apparatus are incident on slits S1 and S2 (#equation\[{S\_1}{S\_2} = \frac{2}{3}mm\]equation#) at an angle 30o with the horizontal. The medium on left side of the slits in water#equation\[\left( {{\mu \_w} = 4/3} \right)\]equation#. To obtain the central maxima at point P, a glass slab #equation\[\left( {{\mu \_g} = 3/2} \right)\]equation# is introduced in front of slits #equation\[{S\_{1.}}\]equation# If the thickness of the glass slab required for this purpose is t then find the value of 9t (in mm).



#Answer:

8

#Solution:

mw d sin 30 = (mg – 1) × t

#Level:

Analytical, Difficult

#ConceptCode:

P120512

#ConceptIds:

1520

#QuestionType:

Integer

#QuestionSerialNo:

16

#Question:

A ring of mass 3 kg is rolling without slipping with linear velocity 1 m/sec on a smooth horizontal surface. A rod of same mass is fitted along its one diameter. Find total kinetic energy of the system (in J).

#Answer:

5

#Solution:

K.E. = #equation\[\frac{1}{2}m{v^2} + \frac{1}{2}m{v^2} + \frac{1}{2}\;\frac{{m{{(2r)}^2}}}{{12}}{w^2} + \frac{1}{2}m{r^2}{w^2}\]equation# = 5.

#Level:

Analytical, Moderate

#ConceptCode:

P110706

#ConceptIds:

1417

#QuestionType:

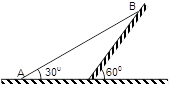
Integer

#QuestionSerialNo:

17

#Question:

In the figure shown, the instantaneous speed of end A of the rod is v to the left. The angular velocity of the rod of length L is equal to #equation\[n\frac{v}{\ell }\]equation# then find the value of ‘n’.

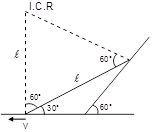


#Answer:

1

#Solution:

#equation\[\omega = \frac{v}{L}\]equation#



#Level:

Analytical, Moderate

#ConceptCode:

P110712

#ConceptIds:

1423

#QuestionType:

Integer

#QuestionSerialNo:

18

#Question:

An ideal gas is expanding such that PT2 = constant. The coefficient of volume expansion of the gas is A/T where T is temperature in kelvin. Find the value of A.

#Answer:

3

#Solution:

PT2 = k

#equation\[\gamma = \frac{1}{V}\;\left( {\frac{{dV}}{{dT}}} \right)\]equation# …(i)

#equation\[\left( {\frac{{nRT}}{V}} \right)\;{T^2} = k\]equation#

 #equation\[\frac{{{T^3}}}{V} = k'\]equation#

 #equation\[V = \frac{{{T^3}}}{{k'}}\]equation# …(ii)

#equation\[\frac{{dV}}{{dT}} = \frac{{3{T^2}}}{{K'}}\]equation# …(iii)

From (i), (ii) and (iii)

#equation\[\gamma = \left( {\frac{{k'}}{{{T^3}}}} \right) \times \left( {\frac{{3{T^2}}}{{k'}}} \right) = \frac{3}{T}\]equation#

#Level:

Analytical, Moderate

#ConceptCode:

P111205

#ConceptIds:

1451

#Section:

CHEMISTRY

#SerialNo:

2

#Subject:

Chemistry

#SubSection:

**SMCQ Multi Correct**

#SubSectionSerialNo:

1

#MarksPerQuestion:

4

#NegativeMarks:

2

#QuestionType:

SMCQ

#QuestionSerialNo:

19

#Question:

Which of the following are essential amino acids?

#Option1:

Valine

#Option2:

Phenyl alanine

#Option3:

Isoleucin

#Option4:

Tryptophan

#Answer:

Option1, Option2, Option3, Option4

#Solution:

Valine, phenylalanine, isoleucine and tryptophane are essential amino acids.

#Level:

Conceptual, Easy

#ConceptCode:

C121603

#ConceptIds:

931

#QuestionType:

SMCQ

#QuestionSerialNo:

20

#Question:

Which of the following will give haloform reaction?

#Option1:



#Option2:

CH­3OH

#Option3:



#Option4:



#Answer:

Option1, Option3

#Solution:

(a) is correct because 

(b) is correct because



(c) is correct because as explained in (b).

(d) is incorrect because amide does not give haloform reaction

#Level:

Conceptual, Easy

#ConceptCode:

C121206

#ConceptIds:

1357

#QuestionType:

SMCQ

#QuestionSerialNo:

21

#Question:

Which of the following is/are aromatic?

#Option1:



#Option2:



#Option3:



#Option4:



#Answer:

Option1, Option2, Option4

#Solution:

(a), (b) and (d) are aromatic because they follow Huckl’s rule, i.e., have (4n + 2)

Electron and  electrons are delocalized.

#Level:

Analytical, Moderate

#ConceptCode:

C111801

#ConceptIds:

1261

#QuestionType:

SMCQ

#QuestionSerialNo:

22

#Question:

Which of the following will show common ion effect and form a buffer solution?

#Option1:

CH3COONa and CH3COOH

#Option2:

NH3Cl and NH4OH

#Option3:

H2SO4 and Na2SO4

#Option4:

NaCl and NaOH

#Answer:

Option1, Option2

#Solution:

(A)

is buffer because it contains weak acid and its salt and they will also show common ion effect.

(B)

is also a buffer because it contains a weak acid and its salt. They will show common ion effect.

(C)

is not buffer solution because they contains strong acids and its salt. They will not show common ion effect.

(D)

is not a buffer solution because it contains strong base and its salt. They will not show common ion effect.

#Level:

Conceptual, Easy

#ConceptCode:

C110504

#ConceptIds:

1170

#QuestionType:

SMCQ

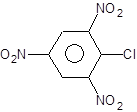
#QuestionSerialNo:

23

#Question:

Detection of the chlorine is possible without preparing sodium extract in qualitative analysis, is/are

#Option1:



#Option2:

CHCl3

#Option3:



#Option4:

CH2 = CH – CH2 – Cl

#Answer:

Option1, Option3, Option4

#Solution:

Due to more ewg c & d are stable #equation\[{{\rm{C}}^{\rm{ + }}}\]equation# ions

#Level:

Analytical, Moderate

#ConceptCode:

C121207

#ConceptIds:

1358

#QuestionType:

SMCQ

#QuestionSerialNo:

24

#Question:

At STP the volume of nitrogen gas required to cover a sample of silica gel, assuming Langmuir monolayer adsorption, is found to be 1.33 cm3 g–1 of the gel. The area occupied by each nitrogen molecule is 0.14 nm2. What is the surface area (in m2) per gm of silica gel ?

#Option1:

4

#Option2:

5

#Option3:

8

#Option4:

10

#Answer:

Option2

#Solution:

Vol. of N2 = 1.33 c.c./g

Area occupied by N2 molecule = 0.14 nm2 = 0.14  (10–7)2 = 0.14  10–18 m2

= #equation\[\frac{{{\rm{1}}{\rm{.33}}}}{{{\rm{22,400}}}}\, \times \,{\rm{6}}\, \times \,{\rm{1}}{{\rm{0}}^{{\rm{23}}}}\, \times \,{\rm{0}}{\rm{.14}}\, \times \,{\rm{1}}{{\rm{0}}^{{\rm{ - 18}}}}\]equation# = 0.00005  105 = 5 m2

#Level:

Conceptual, Difficult

#ConceptCode:

C121301

#ConceptIds:

1364

#QuestionType:

SMCQ

#QuestionSerialNo:

25

#Question:



Which of the statements regarding the product formed in the above reaction is correct?

#Option1:

If Br is replaced with NO2 rate of reaction increases

#Option2:

Inversion of configuration takes place.

#Option3:

Nucleophillic acyl substitution takes place.

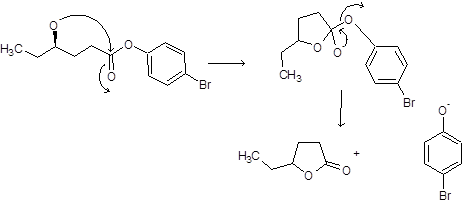
#Option4:

Configuration at chiral carbon does not change

#Answer:

Option1, Option3, Option4

#Solution:



#Level:

Analytical, Moderate

#ConceptCode:

C121207

#ConceptIds:

1358

#SubSection:

**Single Correct**

#SubSectionSerialNo:

2

#MarksPerQuestion:

3

#NegativeMarks:

1

#QuestionType:

SMCQ

#QuestionSerialNo:

26

#Question:

Column 1, 2 & 3 contains starting materials, reagents and the products formed respectively.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Column** – **1** | | **Column** – **2** | | **Column** – **3** | |
| (I) |  | (i) | Br2/CCl4 | (P) | Brown ppt. |
| (II) |  | (ii) | I2/OH– | (Q) | Yellow ppt. |
| (III) | H3C – CH = CH2 | (iii) | Baeyer’s reagent | (R) | White ppt. |
| (IV) | R – C  C – H | (iv) | Ammonical silver nitrate | (S) | Colourless organic product |

The only correct combination that gives organometallic compound is

#Option1:

(IV)  (iv)  (S)

#Option2:

(II)  (ii)  (Q)

#Option3:

(I)  (iii)  (R)

#Option4:

(III)  (i)  (S)

#Answer:

Option1

#Solution:



#Level:

Conceptual, Moderate

#ConceptCode:

C121233

#ConceptIds:

6852

#QuestionType:

SMCQ

#QuestionSerialNo:

27

#Question:

Column 1, 2 & 3 contains starting materials, reagents and the products formed respectively.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Column** – **1** | | **Column** – **2** | | **Column** – **3** | |
| (I) |  | (i) | Br2/CCl4 | (P) | Brown ppt. |
| (II) |  | (ii) | I2/OH– | (Q) | Yellow ppt. |
| (III) | H3C – CH = CH2 | (iii) | Baeyer’s reagent | (R) | White ppt. |
| (IV) | R – C  C – H | (iv) | Ammonical silver nitrate | (S) | Colourless organic product |

The correct combination using for test for unsaturation and resulting into metal oxide ppt. is

#Option1:

(I)  (i)  (Q)

#Option2:

(II)  (iii)  (R)

#Option3:

(III)  (iii)  (P)

#Option4:

(IV)  (ii)  (S)

#Answer:

Option3

#Solution:

#Level:

Analytical, Moderate

#ConceptCode:

C111707

#ConceptIds:

1255

#QuestionType:

SMCQ

#QuestionSerialNo:

28

#Question:

Column 1, 2 & 3 contains starting materials, reagents and the products formed respectively.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Column** – **1** | | **Column** – **2** | | **Column** – **3** | |
| (I) |  | (i) | Br2/CCl4 | (P) | Brown ppt. |
| (II) |  | (ii) | I2/OH– | (Q) | Yellow ppt. |
| (III) | H3C – CH = CH2 | (iii) | Baeyer’s reagent | (R) | White ppt. |
| (IV) | R – C  C – H | (iv) | Ammonical silver nitrate | (S) | Colourless organic product |

The only correct combination giving ppt. along with acid salt formation is

#Option1:

(IV)  (iii)  (P)

#Option2:

(III)  (i)  (S)

#Option3:

(I)  (iv)  (R)

#Option4:

(II)  (ii)  (Q)

#Answer:

Option4

#Solution:

#Level:

Conceptual, Moderate

#ConceptCode:

C111712

#ConceptIds:

1260

#QuestionType:

SMCQ

#QuestionSerialNo:

29

#Question:

Column 1, 2 & 3.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Column** – **1** | | **Column** – **2** | | **Column** – **3** | |
| (I) | Na2O2 | (i) | Cold H2SO4 | (P) | Diamagnetic gas |
| (II) | KO2 | (ii) | H2O | (Q) | Paramagnetic gas |
| (III) | BaO2 | (iii) | Heated CrO3 | (R) | White ppt. |
| (IV) | NH3 | (iv) | CO | (S) | Salt + O2 |

The only combination that can give alkali, H2O2 and O2 gas is

#Option1:

(I)  (i)  (Q)

#Option2:

(II)  (iii)  (Q)

#Option3:

(III)  (iii)  (P)

#Option4:

(IV)  (ii)  (S)

#Answer:

Option2

#Solution:

A, b, c

#Level:

Conceptual, Easy

#ConceptCode:

C110802

#ConceptIds:

1187

#QuestionType:

SMCQ

#QuestionSerialNo:

30

#Question:

Column 1, 2 & 3.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Column** – **1** | | **Column** – **2** | | **Column** – **3** | |
| (I) | Na2O2 | (i) | Cold H2SO4 | (P) | Diamagnetic gas |
| (II) | KO2 | (ii) | H2O | (Q) | Paramagnetic gas |
| (III) | BaO2 | (iii) | Heated CrO3 | (R) | White ppt. |
| (IV) | NH3 | (iv) | CO | (S) | Salt + O2 |

The correct combination that gives insoluble salt and H2O2 is

#Option1:

(I)  (iv)  (S)

#Option2:

(II)  (ii)  (Q)

#Option3:

(IV)  (iii)  (R)

#Option4:

(III)  (i)  (R)

#Answer:

Option4

#Solution:

A,bc

#Level:

Conceptual, Moderate

#ConceptCode:

C111004

#ConceptIds:

1204

#QuestionType:

SMCQ

#QuestionSerialNo:

31

#Question:

Column 1, 2 & 3.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Column** – **1** | | **Column** – **2** | | **Column** – **3** | |
| (I) | Na2O2 | (i) | Cold H2SO4 | (P) | Diamagnetic gas |
| (II) | KO2 | (ii) | H2O | (Q) | Paramagnetic gas |
| (III) | BaO2 | (iii) | Heated CrO3 | (R) | White ppt. |
| (IV) | NH3 | (iv) | CO | (S) | Salt + O2 |

The correct combination that gives colourless gas is

#Option1:

(I)  (iv)  (R)

#Option2:

(II)  (ii)  (Q)

#Option3:

(IV)  (iii)  (P)

#Option4:

(III)  (i)  (S)

#Answer:

Option3

#Solution:

a.b.c

#Level:

Analytical, Easy

#ConceptCode:

C110803

#ConceptIds:

**1188**

#SubSection:

**Integer**

#SubSectionSerialNo:

3

#MarksPerQuestion:

3

#NegativeMarks:

0

#QuestionType:

Integer

#QuestionSerialNo:

32

#Question:

The maximum number of electrons that can have principal quantum number, n = 3 and spin quantum number, #equation\[{m\_s} = - \frac{1}{2},\]equation# is

#Answer:

9

#Solution:

For principal quantum number (n = 3)

Number of orbitals = n2 = 9

So, number of electrons with #equation\[{m\_s} = - \frac{1}{2},\]equation# will be 9.

#Level:

Ultimate, Easy

#ConceptCode:

C110106

#ConceptIds:

1139

#QuestionType:

Integer

#QuestionSerialNo:

33

#Question:

The concentration of R in the reaction, #equation\[R \to P\]equation#, was measured as a function of time and the following data is obtained :

[R] (molar) 1.0 0.75 0.40 0.10

t (min.) 0.0 0.05 0.12 0.18

The order of the reaction is :

#Answer:

0

#Solution:

For zero order reaction, the rate law is written as

#equation\[{K\_I} = \frac{x}{t} = \frac{{0.25}}{{0.05}} = 5\]equation#

#equation\[\therefore \,\,p\left( x \right) = \frac{1}{4}{x^4} - {x^3} + {x^2} \Rightarrow p\left( 2 \right) = \frac{1}{4}\left( {16} \right) - 8 + 4 = 0\]equation#

#Level:

Analytical, Difficult

#ConceptCode:

C110601

#ConceptIds:

1173

#QuestionType:

Integer

#QuestionSerialNo:

35

#Question:

For how many seconds a current of 60 A is passed through an aqueous solution of #equation\[CuS{O\_4}\]equation# to produce 0.0314 litres of oxygen gas at STP.

#Answer:

9

#Solution:

Equivalents of oxygen = equivalents of charge

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

\frac{V}{{5.6}} = \frac{{it}}{{96500}}\\

\frac{{0.0314}}{{5.6}} = \frac{{60 \times t}}{{96500}}\\

t = \frac{{0.0314 \times 96500}}{{5.6 \times 60}} = 9\sec

\end{array}\]equation#

#Level:

Analytical, Easy

#ConceptCode:

C120506

#ConceptIds:

1303

#QuestionType:

Integer

#QuestionSerialNo:

36

#Question:

For the thermal decomposition of nitrous oxide by Gold at 900oC and at initial pressure of 200 mm was 50% complete in 53 min and 73% in 100 min. Calculate the order of reaction.

#Answer:

1

#Solution:

For 50% completion

#equation\[k = \frac{{0.693}}{{53}} = 0.01307\,{\min ^{ - 1}}\]equation#

For 73% completion #equation\[k = \frac{{2.303}}{{100}}\log \frac{{100}}{{27}} = 0.01309\,{\min ^{ - 1}}\]equation#

#Level:

Conceptual, Moderate

#ConceptCode:

C110601

#ConceptIds:

1173

#Section:

Mathematics

#SerialNo:

3

#Subject:

Mathematics

#SubSection:

**SMCQ Multi Correct**

#SubSectionSerialNo:

1

#MarksPerQuestion:

4

#NegativeMarks:

2

#QuestionType:

SMCQ

#QuestionSerialNo:

37

#Question:

Let #equation\[{a\_n} = \underbrace {\left( {111...1} \right)}\_{n\,\,times},\]equation#then

#Option1:

#equation\[{a\_{912}}\]equation# is not prime

#Option2:

#equation\[{a\_{951}}\]equation# is not prime

#Option3:

#equation\[{a\_{480}}\]equation# is not prime

#Option4:

#equation\[{a\_{91}}\]equation# is not prime

#Answer:

Option1, Option2, Option3, Option4

#Solution:

As #equation\[{a\_{912}},\,\,{a\_{951}}\]equation# and #equation\[{a\_{480}}\]equation#are divisible by 3, none of them is prime. For #equation\[{a\_{91}},\]equation# we have #equation\[{a\_{91}} = \frac{1}{9}\underbrace {\left( {99...9} \right)}\_{91\,\,times} = \frac{1}{9}\left( {{{10}^{91}} - 1} \right)\]equation#

#equation\[ = \frac{1}{9}\left[ {{{\left( {{{10}^7}} \right)}^{13}} - 1} \right] = \left[ {\frac{{{{\left( {{{10}^7}} \right)}^{13}} - 1}}{{{{10}^7} - 1}}} \right]\left[ {\frac{{{{10}^7} - 1}}{{10 - 7}}} \right]\]equation#

#equation\[ = \left[ {{{\left( {{{10}^7}} \right)}^{12}} + {{\left( {{{10}^7}} \right)}^{11}} + ... + \,{{10}^7} + 1} \right] \times \left[ {{{10}^6} + {{10}^5} + ... + 10 + 1} \right]\]equation#

#equation\[ \Rightarrow \,\,{a\_{91}}\]equation# is not prime.

#Level:

Conceptual, Moderate

#ConceptCode:

M110502

#ConceptIds:

939

#QuestionType:

SMCQ

#QuestionSerialNo:

38

#Question:

If in the expansion of #equation\[{\left( {\frac{1}{x} + x\,\tan \,x} \right)^5}\]equation#the ratio of 4th term to the 2nd term is #equation\[\frac{2}{{27}}{\pi ^4}\]equation#, then value of x can be

#Option1:

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

#Option2:

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

#Option3:

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

#Option4:

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

#Answer:

Option2, Option3

#Solution:

We have #equation\[{T\_4} = {\,^5}{C\_3}{\left( {\frac{1}{x}} \right)^{5 - 3}}{\left( {x\,\tan \,x} \right)^3} = 10\,x\,{\tan ^3}x\]equation# and #equation\[{T\_2} = {\,^5}{C\_1}{\left( {\frac{1}{x}} \right)^{5 - 1}}\left( {x\,\tan \,x} \right) = \frac{{5\tan \,x}}{{{x^3}}}\]equation#

We are given #equation\[\frac{{{T\_4}}}{{{T\_2}}} = \frac{2}{{27}}\,{\pi ^4} \Rightarrow 2{x^4}{\tan ^2}x = \frac{2}{{27}}{\pi ^4}\]equation#

#equation\[ \Rightarrow \]equation# #equation\[{x^2}\tan \,x = \pm \frac{1}{{3\sqrt 3 }}\,{\pi ^2}\]equation#

It is possible (from among the answers) when #equation\[x = \pm \frac{\pi }{3}\]equation#

#Level:

Conceptual, Easy

#ConceptCode:

M110403

#ConceptIds:

935

#QuestionType:

SMCQ

#QuestionSerialNo:

39

#Question:

If A and B are two events such that #equation\[P\left( A \right) = \frac{1}{2}\]equation# and #equation\[P\left( B \right) = \frac{2}{3}\]equation#, then

#Option1:

#equation\[P\left( {A \cup B} \right) \ge \frac{2}{3}\]equation#

#Option2:

#equation\[P\left( {A \cap B'} \right) \le \frac{1}{3}\]equation#

#Option3:

#equation\[\frac{1}{6} \le P\left( {A \cap B} \right) \le \frac{1}{2}\]equation#

#Option4:

#equation\[\frac{1}{6} \le P\left( {A' \cap B} \right) \le \frac{1}{2}\]equation#

#Answer:

Option1, Option2, Option3, Option4

#Solution:

We have #equation\[P\left( {A \cup B} \right) \ge \max \left\{ {P\left( A \right),\,P\left( B \right)} \right\} = \frac{2}{3}\]equation#

Next #equation\[P\left( {A \cap B} \right) = P\left( A \right) + P\left( B \right) - P\left( {A \cup B} \right) \ge P\left( A \right) + P\left( B \right) - 1 = \frac{1}{6}\]equation#

and #equation\[P\left( {A \cap B} \right) \le \min \left\{ {P\left( A \right),\,P\left( B \right)} \right\} = \frac{1}{2}\]equation#

#equation\[ \Rightarrow \frac{1}{6} \le P\left( {A \cap B} \right) \le \frac{1}{2}\]equation#

Also #equation\[P\left( {A \cap B'} \right) = P\left( A \right) - P\left( {A \cap B} \right) \le \frac{1}{2} - \frac{1}{6} = \frac{1}{3}\]equation#

Lastly #equation\[P\left( {A' \cap B} \right) = P\left( B \right) - P\left( {A \cap B} \right)\]equation#

Hence #equation\[\frac{2}{3} - \frac{1}{2} \le P\left( {A' \cap B} \right) \le \frac{2}{3} - \frac{1}{6}\]equation#

#equation\[ \Rightarrow \]equation# #equation\[\frac{1}{6} \le P\left( {A' \cap B} \right) \le \frac{1}{2}\]equation#

#Level:

Analytical , Moderate

#ConceptCode:

M121305

#ConceptIds:

1118

#QuestionType:

SMCQ

#QuestionSerialNo:

40

#Question:

The equation of the tangents to the curve #equation\[y = {x^4}\]equation# from the point (2, 0) not on the curve, are given by

#Option1:

#equation\[y = 0\]equation#

#Option2:

#equation\[y - 1 = 5\left( {x - 1} \right)\]equation#

#Option3:

#equation\[y - \frac{{4098}}{{81}} = \frac{{2048}}{{27}}\left( {x - \frac{8}{3}} \right)\]equation#

#Option4:

#equation\[y - \frac{{32}}{{243}} = \frac{{80}}{{81}}\left( {x - \frac{2}{3}} \right)\]equation#

#Answer:

Option1, Option3

#Solution:

Let #equation\[\left( {{x\_0},\,x\_0^4} \right)\]equation#be the point of tangency. Then the equation of the tangent will be #equation\[y - x\_0^4 = 4x\_0^3\left( {x - {x\_0}} \right)\]equation#. Since this tangent passes through the point (2, 0), we have #equation\[ - {x^4}\_0 = 4{x^3}\_0\left( {2 - {x\_0}} \right),\]equation# or #equation\[3{x^4}\_0 - 8x\_0^3 = 0\]equation#. That is, #equation\[{x\_0} = 0\]equation# or #equation\[{x\_0} = \frac{8}{3}\]equation#, so that the points of tangency are (0, 0) and #equation\[\left( {\frac{8}{3},\,\,\frac{{4096}}{{81}}} \right)\]equation#. Therefore, the equations of the tangents are #equation\[y = 0\]equation# and #equation\[y - \frac{{4096}}{{81}} = \frac{{2048}}{{27}}\left( {x - \frac{8}{3}} \right)\]equation#

#Level:

Analytical , Easy

#ConceptCode:

M120601

#ConceptIds:

1063

#QuestionType:

SMCQ

#QuestionSerialNo:

41

#Question:

The value of #equation\[\alpha \]equation# which satisfy #equation\[\int\limits\_{\pi /2}^\alpha {\sin \,x\,dx = \sin \,2\alpha \left( {\alpha \in \left[ {0,\,\,2\pi } \right]} \right)} \]equation# are equal to

#Option1:

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

#Option2:

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

#Option3:

#equation\[\frac{{7\pi }}{6}\]equation#

#Option4:

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

#Answer:

Option1, Option2, Option3, Option4

#Solution:

#equation\[\sin \,2\alpha = \int\_{\pi /2}^\alpha {\sin \,x\,dx \Rightarrow \sin \,2\alpha = - \cos \,\alpha } \]equation#

#equation\[ \Rightarrow \cos \,\alpha \left( {2\,\sin \,\alpha + 1} \right) = 0\]equation#

Hence #equation\[\cos \,\alpha = 0\]equation# or #equation\[\sin \,\alpha = \frac{{ - 1}}{2}\]equation#. Therefore, #equation\[\alpha = \frac{\pi }{2},\,\,\frac{{3\pi }}{2},\,\,\frac{{7\pi }}{6}\]equation# or #equation\[\frac{{11\pi }}{6}\]equation#

#Level:

Analytical , Moderate

#ConceptCode:

M111303

#ConceptIds:

1010

#QuestionType:

SMCQ

#QuestionSerialNo:

42

#Question:

The solution of #equation\[{\left( {\frac{{dy}}{{dx}}} \right)^2} + 2y\,\cot \,x\frac{{dy}}{{dx}} = {y^2}\]equation# is

#Option1:

#equation\[y - \frac{c}{{1 + \cos \,x}} = 0\]equation#

#Option2:

#equation\[y = \frac{c}{{1 - \cos \,x}}\]equation#

#Option3:

#equation\[x = 2\,{\sin ^{ - 1}}\sqrt {c/2\,y} \]equation#

#Option4:

None of these

#Answer:

Option2, Option3

#Solution:

Solving for #equation\[\frac{{dy}}{{dx}},\]equation# we obtain

#equation\[\frac{{dy}}{{dx}} = \frac{{ - 2y\,\cot \,x \pm \sqrt {4{y^2}\,{{\cot }^2}x + 4{y^2}} }}{2} = y\left( { - \cot \,x \pm \,\cos ec\,x} \right)\]equation#

Thus, we have #equation\[\frac{{dy}}{y} = \left( { - \cot \,x + \,\cos ec\,x} \right)\,dx\]equation#

#equation\[ \Rightarrow \]equation# #equation\[\log \,y = - \log \,\sin \,x + \log \,\tan x/2 + \log \,c\]equation#

#equation\[ \Rightarrow \]equation# #equation\[y = \frac{{C\,\tan \,x/2}}{{\sin \,x}} = \frac{C}{{2{{\cos }^2}x/2}} = \frac{C}{{1 + \cos \,x}}\]equation#

Solving #equation\[\frac{{dy}}{y} = - \left( {\cot \,x + \cos ec\,x} \right)\,dx,\]equation# we get #equation\[y = \frac{c}{{1 - \cos \,x}}\]equation#

#equation\[ \Rightarrow \]equation# #equation\[x = 2\,{\sin ^{ - 1}}\sqrt {C/2y} \]equation#

#Level:

Analytical , Moderate

#ConceptCode:

M120903

#ConceptIds:

1085

#QuestionType:

SMCQ

#QuestionSerialNo:

43

#Question:

The solution of #equation\[{y\_1}\left( {{x^2}{y^3} + xy} \right) = 1\]equation# is

#Option1:

#equation\[\frac{1}{x} = 2 - {y^2} + C\,{e^{ - {y^2}/2}}\]equation#

#Option2:

the solution of an equation which is reducible to linear equation

#Option3:

#equation\[\frac{2}{x} = 1 - {y^2} + {e^{ - y/2}}\]equation#

#Option4:

#equation\[{e^{{y^2}/2}}\left( {\frac{{1 - 2x}}{x} + {y^2}} \right) = C\]equation#

#Answer:

Option1, Option2, Option4

#Solution:

Rewriting the given equation, we have #equation\[\]equation##equation\[\frac{{dx}}{{dy}} = {x^2}{y^3} + xy\]equation#

#equation\[ \Rightarrow {x^{ - 2}}\frac{{dx}}{{dy}} - {x^{ - 1}}y = {y^3},\]equation# which is reducible to linear form.

Putting #equation\[{x^{ - 1}} = u,\]equation# we have #equation\[\frac{{du}}{{dy}} + yu = - {y^3}\]equation#

This I.F. of this equation #equation\[{e^{{y^2}/2}}\]equation#. So the solution is

#equation\[u{e^{{y^2}/2}} = - \int {{y^3}\,{e^{{y^2}/2}}dy + C = - \left( {{y^2}{e^{{y^2}/2}} - 2{e^{{y^2}/2}}} \right) + C} \]equation#

#equation\[ \Rightarrow \frac{1}{x} = \left( {2 - {y^2}} \right) + C\,{e^{ - {y^2}/2}}\]equation# or #equation\[\left( {1 - 2x} \right)/x = - {y^2} + C\,{e^{ - {y^2}/2}}\]equation#

|  |  |  |
| --- | --- | --- |
| Columns 1, 2 and 3 contain function, domain and range respectively. | | |
| **Column 1** | **Column 2** | **Column 3** |
| (I) 1, 2, 3, 4, 5, 6 | (i) A | (P) a |
| (II) 1, 2, 2, 3, 4, 5 | (ii) B | (Q) b |
| (III) 1, 2, 2, 3, 3, 4 | (iii) C | (R) c |
| (IV) 1, 2, 2, 3, 3, 3 | (iv) D | (S) d |

#Level:

Analytical , Moderate

#ConceptCode:

M120905

#ConceptIds:

1087

#SubSection:

**Single Correct**

#SubSectionSerialNo:

2

#MarksPerQuestion:

3

#NegativeMarks:

1

#QuestionType:

SMCQ

#QuestionSerialNo:

44

#Question:

If difference between ways of arrangement and ways of selection is 172 then correct combination is

#Option1:

III, (iii), S

#Option2:

III, (iv), S

#Option3:

II, (i), P

#Option4:

I, (ii), R

#Answer:

Option1

#Solution:

**(44 to 46)**

Use basic formulae to get

A = 360, B = 720, C = 180, D = 60

a = 11, b = 15, c = 5, d = 8

By appropriately matching the information given in the three columns of the following table.

|  |  |  |
| --- | --- | --- |
| Columns 1, 2 and 3 contains conics, equations of tangents to the conics and points of contact, respectively. | | |
| **Column 1** | **Column 2** | **Column 3** |
| (I) #equation\[f\left( x \right) = {x^2} + \frac{1}{{{x^2} + 1}}\]equation# | (i) A | (P) a |
| (II) #equation\[f\left( x \right) = \sqrt {{e^{{{\cos }^{ - 1}}}}\left( {{{\log }\_4}{x^2}} \right)} \]equation# | (ii) B | (Q) b |
| (III) #equation\[f\left( x \right) = {\log \_{10}}{\log \_{10}}\left( {1 + {x^3}} \right)\]equation# | (iii) C | (R) c |
| (IV) #equation\[f\left( x \right) = {x^2} + 8x + 18\]equation# | (iv) D | (S) d |

#Level:

Conceptual, Moderate

#ConceptCode:

M111206

#ConceptIds:

1003

#QuestionType:

SMCQ

#QuestionSerialNo:

45

#Question:

If product of ways of arrangements and ways of selection is 300 then correct combination is

#Option1:

III, (ii), S

#Option2:

IV, (iv), R

#Option3:

IV, (iv), Q

#Option4:

III, (iii), P

#Answer:

Option2

#Solution:

Use basic formulae to get

A = 360, B = 720, C = 180, D = 60

a = 11, b = 15, c = 5, d = 8

By appropriately matching the information given in the three columns of the following table.

|  |  |  |
| --- | --- | --- |
| Columns 1, 2 and 3 contains conics, equations of tangents to the conics and points of contact, respectively. | | |
| **Column 1** | **Column 2** | **Column 3** |
| (I) #equation\[f\left( x \right) = {x^2} + \frac{1}{{{x^2} + 1}}\]equation# | (i) A | (P) a |
| (II) #equation\[f\left( x \right) = \sqrt {{e^{{{\cos }^{ - 1}}}}\left( {{{\log }\_4}{x^2}} \right)} \]equation# | (ii) B | (Q) b |
| (III) #equation\[f\left( x \right) = {\log \_{10}}{\log \_{10}}\left( {1 + {x^3}} \right)\]equation# | (iii) C | (R) c |
| (IV) #equation\[f\left( x \right) = {x^2} + 8x + 18\]equation# | (iv) D | (S) d |

#Level:

Conceptual, Moderate

#ConceptCode:

M111206

#ConceptIds:

1003

#QuestionType:

SMCQ

#QuestionSerialNo:

46

#Question:

If sum of ways of arrangement and ways of selection is 371 then correct combination is

#Option1:

III, (ii), R

#Option2:

III, (iv), P

#Option3:

II, (i), P

#Option4:

IV, (i), P

#Answer:

Option3

#Solution:

Use basic formulae to get

A = 360, B = 720, C = 180, D = 60

a = 11, b = 15, c = 5, d = 8

By appropriately matching the information given in the three columns of the following table.

|  |  |  |
| --- | --- | --- |
| Columns 1, 2 and 3 contains conics, equations of tangents to the conics and points of contact, respectively. | | |
| **Column 1** | **Column 2** | **Column 3** |
| (I) #equation\[f\left( x \right) = {x^2} + \frac{1}{{{x^2} + 1}}\]equation# | (i) A | (P) a |
| (II) #equation\[f\left( x \right) = \sqrt {{e^{{{\cos }^{ - 1}}}}\left( {{{\log }\_4}{x^2}} \right)} \]equation# | (ii) B | (Q) b |
| (III) #equation\[f\left( x \right) = {\log \_{10}}{\log \_{10}}\left( {1 + {x^3}} \right)\]equation# | (iii) C | (R) c |
| (IV) #equation\[f\left( x \right) = {x^2} + 8x + 18\]equation# | (iv) D | (S) d |

#Level:

Conceptual, Moderate

#ConceptCode:

M111206

#ConceptIds:

1003

#QuestionType:

SMCQ

#QuestionSerialNo:

47

#Question:

If domain is #equation\[\left[ {1,\,\,\infty } \right)\]equation# then correct combination is

#Option1:

I, (ii), R

#Option2:

II, (ii), R

#Option3:

I, (ii), P

#Option4:

None of these

#Answer:

Option1

#Solution:

(i) R (ii) #equation\[\left[ {1,\,\,\infty } \right)\]equation# (iii) #equation\[\left( {0,\,\,\infty } \right)\]equation# (iv) #equation\[\left[ { - 2,\,\,\frac{{ - 1}}{2}} \right] \cup \left[ {\frac{1}{2},\,\,2} \right]\]equation#

(P) #equation\[\left[ {2,\,\,\infty } \right)\]equation# (Q) #equation\[\left[ {1,\,\,\sqrt {e\pi } } \right]\]equation# (R) #equation\[\left[ {1,\,\,\infty } \right)\]equation# (S) R

#Level:

Conceptual, Moderate

#ConceptCode:

M120303, M120304

#ConceptIds:

1041

#QuestionType:

SMCQ

#QuestionSerialNo:

48

#Question:

If (–3, –1) is subset of Range then correct combination is

#Option1:

II, (ii), S

#Option2:

III, (iii), S

#Option3:

III, (iii), Q

#Option4:

None of these

#Answer:

Option2

#Solution:

(i) R (ii) #equation\[\left[ {1,\,\,\infty } \right)\]equation# (iii) #equation\[\left( {0,\,\,\infty } \right)\]equation# (iv) #equation\[\left[ { - 2,\,\,\frac{{ - 1}}{2}} \right] \cup \left[ {\frac{1}{2},\,\,2} \right]\]equation#

(P) #equation\[\left[ {2,\,\,\infty } \right)\]equation# (Q) #equation\[\left[ {1,\,\,\sqrt {e\pi } } \right]\]equation# (R) #equation\[\left[ {1,\,\,\infty } \right)\]equation# (S) R

#Level:

Conceptual, Moderate

#ConceptCode:

M120303, M120304

#ConceptIds:

949

#QuestionType:

SMCQ

#QuestionSerialNo:

49

#Question:

If range include finite integers then correct combination is

#Option1:

II, (iv), Q

#Option2:

II, (i), Q

#Option3:

III, (iv), P

#Option4:

None of these

#Answer:

Option1

#Solution:

(i) R (ii) #equation\[\left[ {1,\,\,\infty } \right)\]equation# (iii) #equation\[\left( {0,\,\,\infty } \right)\]equation# (iv) #equation\[\left[ { - 2,\,\,\frac{{ - 1}}{2}} \right] \cup \left[ {\frac{1}{2},\,\,2} \right]\]equation#

(P) #equation\[\left[ {2,\,\,\infty } \right)\]equation# (Q) #equation\[\left[ {1,\,\,\sqrt {e\pi } } \right]\]equation# (R) #equation\[\left[ {1,\,\,\infty } \right)\]equation# (S) R

#Level:

Conceptual, Moderate

#ConceptCode:

M120303, M120304

#ConceptIds:

**950**

#SubSection:

**Integer**

#SubSectionSerialNo:

3

#MarksPerQuestion:

3

#NegativeMarks:

0

#QuestionType:

Integer

#QuestionSerialNo:

50

#Question:

Find the sum of all the integral roots of #equation\[{\left( {{{\log }\_5}x} \right)^2} + {\log \_{5x}}\left( {\frac{5}{x}} \right) = 1\]equation#

#Answer:

6

#Solution:

Clearly #equation\[x > 0\]equation# and #equation\[x \ne \frac{1}{5}\]equation#

#equation\[{\log \_{5x}}\left( {\frac{5}{x}} \right) = \frac{{{{\log }\_5}5 - {{\log }\_5}x}}{{{{\log }\_5}5 + {{\log }\_5}x}}\]equation#

Putting #equation\[{\log \_5}x = t,\]equation# then equation (1)

becomes

#equation\[{t^2} + \frac{{1 - t}}{{1 + t}} = 1\,\, \Leftrightarrow \,\,{t^3} + {t^2} - 2t = 0\]equation#

#equation\[ \Leftrightarrow \,t\left( {t - 1} \right)\left( {t + 2} \right) = 0\,\, \Leftrightarrow \,\,t = 0,\,\,1,\,\, - 2\]equation#

So integral roots of (1) are 1 and 5.

#Level:

Conceptual, Moderate

#ConceptCode:

M110201

#ConceptIds:

921

#QuestionType:

Integer

#QuestionSerialNo:

51

#Question:

Find sum of #equation\[12\left( {\frac{1}{{1.3.5}} + \frac{1}{{3.5.7}} + \frac{1}{{5.7.9}} + ....upto\,\infty } \right)\]equation#

#Answer:

1

#Solution:

Let #equation\[{t\_r} = \frac{1}{{\left( {2r - 1} \right)\left( {2r + 1} \right)\left( {2r + 3} \right)}}\]equation#

#equation\[ = \frac{1}{8}\frac{1}{{2r - 1}} - \frac{1}{{4\left( {2r + 1} \right)}} + \frac{1}{{8\left( {2r + 3} \right)}}\]equation#

#equation\[ = \frac{1}{8}\left( {\frac{1}{{2r - 1}} - \frac{1}{{2r + 1}}} \right) - \frac{1}{8}\left( {\frac{1}{{2r + 1}} - \frac{1}{{2r + 3}}} \right)\]equation#

#equation\[\sum\limits\_{r = 1}^n {{t\_r}} = \frac{1}{8}\left( {1 - \frac{1}{{2n + 1}}} \right) - \frac{1}{8}\left( {\frac{1}{3} - \frac{1}{{2n + 3}}} \right)\]equation#

#equation\[\mathop {\lim }\limits\_{n \to \infty } \sum\limits\_{r = 1}^n {{t\_r}} = \frac{1}{8} - \frac{1}{{24}} = \frac{1}{{12}}\]equation#.

#Level:

Conceptual, Moderate

#ConceptCode:

M110505

#ConceptIds:

942

#QuestionType:

Integer

#QuestionSerialNo:

52

#Question:

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

1&{3\cos \,x}&1\\

{\sin \,x}&1&{3\cos \,x}\\

1&{\sin \,x}&1

\end{array}} \right|\]equation# find the maximum value of f(x).

#Answer:

10

#Solution:

We have #equation\[f\left( x \right) = 9\,{\cos ^2}x + {\sin ^2}\,x - 6\,\sin \,x\,\cos \,x\]equation#

#equation\[ = 5 + 4\,\cos \,2x - 3\,\sin \,2x\]equation#,

As maximum value of #equation\[4\,\cos \,2x - 3\,\sin \,2x\]equation# is 5, we get maximum value of #equation\[f\left( x \right)\]equation# is 10.

#Level:

Analytical , Moderate

#ConceptCode:

M120201

#ConceptIds:

1036

#QuestionType:

Integer

#QuestionSerialNo:

53

#Question:

The derivatives of #equation\[{\sec ^{ - 1}}\left[ {\frac{1}{{\left( {2{x^2} - 1} \right)}}} \right]\]equation# with respect to #equation\[\sqrt {1 - {x^2}} \]equation# at #equation\[x = \frac{1}{2}\]equation#, is

#Answer:

4

#Solution:

Putting #equation\[x = \cos \,\theta ,\]equation# we get #equation\[u = {\sec ^{ - 1}}\frac{1}{{2\,{{\cos }^2}\theta - 1}} = {\sec ^{ - 1}}\left( {\sec \,2\theta } \right) = 2\theta \]equation# and #equation\[y = \sqrt {1 - {x^2}} = \sin \,\theta \]equation#

#equation\[\therefore \]equation# #equation\[u = 2{\sin ^{ - 1}}y \Rightarrow \frac{{du}}{{dy}} = \frac{2}{{\sqrt {1 - {y^2}} }} = \frac{2}{{\sqrt {{x^2}} }}\]equation#

Thus, #equation\[{\left. {\frac{{du}}{{dy}}} \right|\_{x = 1/2}} = 4\]equation#

#Level:

Analytical , Moderate

#ConceptCode:

M120502

#ConceptIds:

1061

#QuestionType:

Integer

#QuestionSerialNo:

54

#Question:

Let #equation\[p\left( x \right)\]equation# be a polynomial of degree 4 having extremum at x = 1, 2 and #equation\[\mathop {\lim }\limits\_{x \to 0} \left( {1 + \frac{{p\left( x \right)}}{{{x^2}}}} \right) = 2\]equation#. Then the value of p (2) is

#Answer:

0

#Solution:

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

Let #equation\[p\left( x \right) = {a\_0}{x^4} + {a\_1}{x^3} + {a\_2}{x^2} + {a\_3}x + {a\_4}\]equation#. The given limit is finite is possible only if #equation\[{a\_3} = {a\_4} = 0\]equation#a and is 1 if #equation\[{a\_2} = 1\]equation#. Thus #equation\[p\left( x \right) = {a\_0}{x^4} + {a\_1}{x^3} + {x^2}\]equation#. #equation\[p\left( x \right)\]equation# has extremum at x = 1, 2 if #equation\[p'\left( 1 \right) = 0,\,\,p'\left( 2 \right) = 0 \Rightarrow 4{a\_0} + 2{a\_1} = - 2,\,\,32{a\_0} + 12{a\_1} = - 4\]equation#

Solving we get, #equation\[{a\_0} = \frac{1}{4},\,\,{a\_1} = - 1\]equation#

#equation\[\therefore \,\,p\left( x \right) = \frac{1}{4}{x^4} - {x^3} + {x^2} \Rightarrow p\left( 2 \right) = \frac{1}{4}\left( {16} \right) - 8 + 4 = 0\]equation#

#Level:

Analytical , Difficult

#ConceptCode:

M110601

#ConceptIds:

944