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JEE 2023 Session-1 24th Jan to 1st Feb 2023

Application No	
Candidate Name	
Roll No	
Test Date	29/01/2023
Test Time	3:00 PM - 6:00 PM
Subject	B.TECH

Section : Physics Section A

Q.1 At 300 K, the rms speed of oxygen molecules is $\sqrt{\frac{n+5}{n}}$ times to that of its average speed in the gas . Then, the value of n will be

(used : $\pi = \frac{22}{7}$)

Options
1. 21
2. 27
3. 32
4. 28

Question Type : MCQ
Question ID : 398894079
Option 1 ID : 398894083
Option 2 ID : 398894085
Option 3 ID : 398894083
Option 4 ID : 398894084
Status : Answered
Chosen Option : 3

Q.2 The time taken by an object to slide down 45° rough inclined plane is n times as it takes to slide down a perfectly smooth 45° incline plane. The coefficient of kinetic friction between the object and the incline plane is:

Options
1. $1-\frac{1}{n^2}$
2. $1+\frac{1}{n^2}$
3. $\sqrt{1-\frac{1}{n^2}}$
4. $\sqrt{\frac{1}{1-n^2}}$

Question Type : MCQ
Question ID : 398894073
Option 1 ID : 398894078
Option 2 ID : 398894079
Option 3 ID : 398894081
Option 4 ID : 398894082
Status : Answered
Chosen Option : 3

Q.3 The ratio of de-Broglie wavelength of an α particle and a proton accelerated from rest by the same potential is $\frac{1}{\sqrt{m}}$, the value of m is-

Options
1. 8
2. 4
3. 2
4. 16

Question Type : MCQ
Question ID : 398894087
Option 1 ID : 398894075
Option 2 ID : 398894077
Option 3 ID : 398894075
Option 4 ID : 398894076
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.4 A point charge 2×10^{-2} C is moved from P to S in a uniform electric field of 30 NC^{-1} directed along positive x-axis. If coordinates of P and S are (1, 2, 0) m and (0, 0, 0) m respectively, the work done by electric field will be

Options
1. –600 mJ
2. –1200 mJ
3. 1200mJ
4. 600 mJ

Question Type : MCQ
Question ID : 398894089
Option 1 ID : 398894047
Option 2 ID : 398894049
Option 3 ID : 398894045
Option 4 ID : 398894048
Status : Answered
Chosen Option : 3

Q.5 A square loop of area 25 cm^2 has a resistance of 10 Ω . The loop is placed in uniform magnetic field of magnitude 40.0 T. The plane of loop is perpendicular to the magnetic field. The work done in pulling the loop out of the magnetic field slowly and uniformly in 1.0 sec, will be

Options
1. 1.0×10^{-5} J
2. 5×10^{-3} J
3. 2.5×10^{-2} J
4. 1.0×10^{-4} J

Question Type : MCQ
Question ID : 398894059
Option 1 ID : 398894058
Option 2 ID : 398894055
Option 3 ID : 398894056
Option 4 ID : 398894057
Status : Answered
Chosen Option : 3

Q.6 A fully loaded boeing aircraft has a mass of 5.4×10^5 kg. Its total wing area is 500 m^2. It is in level flight with a speed of 1080 km/h. If the density of air ρ is 1.2 kg m^{-3}, the frictional increase in the speed of the air on the upper surface of the wing relative to the lower surface in percentage will be. ($g = 10$ m/s^2)

Options
1. 16
2. 6
3. 8
4. 10

Question Type : MCQ
Question ID : 398894077
Option 1 ID : 398894038
Option 2 ID : 398894037
Option 3 ID : 398894039
Option 4 ID : 398894036
Status : Answered
Chosen Option : 2

Q.7 Heat energy of 184 kJ is given to ice of mass 600 g at -12°C. Specific heat of ice is 2222.3 J $kg^{-1}°C^{-1}$ and latent heat of ice in 336 kJ/kg^{-1}

A. Final temperature of system will be 0°C

B. Final temperature of the system will be greater than 0°C .

C. The final system will have a mixture of ice and water in the ratio of 5:1.

D. The final system will have a mixture of ice and water in the ratio of 1:5.

E. The final system will have water only.

Question Type : MCQ
Question ID : 398894078
Option 1 ID : 398894042
Option 2 ID : 398894039
Option 3 ID : 398894040
Option 4 ID : 398894041
Status : Answered
Chosen Option : 3

Choose the correct answer from the options given below :

Options
1. A and E Only
2. A and C Only
3. B and D Only
4. A and D Only

Q.8 Substance A has atomic mass number 16 and half life of 1 day. Another substance B has atomic mass number 32 and half life of $\frac{1}{2}$ day. If both A and B simultaneously start undergo radio activity at the same time with initial mass 320 g each, how many total atoms of A and B combined would be left after 2 days

Options
1. 1.69×10^{24}
2. 6.76×10^{23}
3. 3.38×10^{24}
4. 6.76×10^{24}

Question Type : MCQ
Question ID : 306694283
Option 1 ID : 306694885
Option 2 ID : 306694879
Option 3 ID : 306694880
Option 4 ID : 306694882
Status : Answered
Chosen Option : 3

Q.9 Given below are two statements :

Statement I: Electromagnetic waves are not deflected by electric and magnetic field.

Statement II: The amplitude of electric field and the magnetic field in electromagnetic waves are related to each other as $c_0 = \sqrt{\frac{\mu_0}{\varepsilon_0}}\, a_0$.

In the light of the above statements, choose the correct answer from the options given below :

Options
1. Both Statement I and Statement II are true
2. Statement I is false but statement II is true
3. Statement I is true but statement II is false
4. Both Statement I and Statement II are false

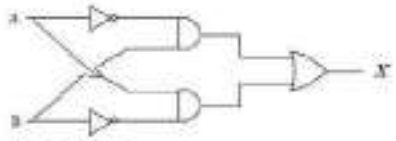
Question Type : MCQ
Question ID : 306694285
Option 1 ID : 306694887
Option 2 ID : 306694873
Option 3 ID : 306694883
Option 4 ID : 306694884
Status : Answered
Chosen Option : 1

Q.10 The electric current in a circular coil of four turns produces a magnetic induction 32 T at its centre. The coil is unwound and is rewound into a circular coil of single turn. the magnetic induction at the centre of the coil by the same current will be :

Options
1. 4 T
2. 2 T
3. 8 T
4. 16 T

Question Type : MCQ
Question ID : 306694280
Option 1 ID : 306694862
Option 2 ID : 306694860
Option 3 ID : 306694859
Option 4 ID : 306694861
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.11 For the given logic gates combination, the correct truth table will be



Options

1

A	B	X
0	0	1
0	1	0
1	0	0
1	1	0

2

A	B	X
0	0	0
0	1	1
1	0	1
1	1	0

3

A	B	X
0	0	1
0	1	0
1	0	1
1	1	0

4

A	B	X
0	0	0
0	1	1
1	0	1
1	1	1

Question Type : MCQ
Question ID : 306694279
Option 1 ID : 306694878
Option 2 ID : 306694884
Option 3 ID : 306694881
Option 4 ID : 306694874
Status : Answered
Chosen Option : 4

Q.12 The modulation index for an A.M. wave having maximum and minimum peak-to-peak voltages of 14 mV and 6 mV respectively is-

Options
1. 0.6
2. 0.4
3. 0.2
4. 1.4

Question Type : MCQ
Question ID : 306694290
Option 1 ID : 306694897
Option 2 ID : 306694890
Option 3 ID : 306694889
Option 4 ID : 306694896
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.13 The time period of a satellite of earth is 24 hours.If the separation between the earth and the satellite is decreased to one fourth of the previous value, then its new time period will become

Options
1. 3 hours

Question Type : MCQ
Question ID : 306694275
Option 1 ID : 306694833
Option 2 ID : 306694832
Option 3 ID : 306694834

3 12 hours
4 3 hours

Option 4 ID : 306694803
Status : Answered
Chosen Option : 3

Q.14 With the help of potentiometer, we can determine the value of emf of a given cell. The sensitivity of the potentiometer is

(A) directly proportional to the length of the potentiometer wire

(B) directly proportional to the potential gradient of the wire

(C) inversely proportional to the potential gradient of the wire

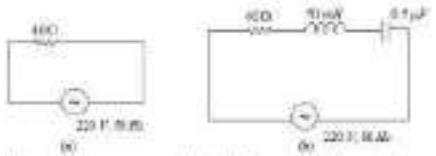
(D) inversely proportional to the length of the potentiometer wire

Choose the correct option for the above statements

Options
1. A and C only
2. B and D only
3. C only
4. A only

Question Type : MCQ
Question ID : 306694281
Option 1 ID : 306694284
Option 2 ID : 306694283
Option 3 ID : 306694282
Option 4 ID : 306694281
Status : Answered
Chosen Option : 1

Q.15 For the given figures, choose the correct options:



Options
1. At resonance, current in (b) is less than that in (a)
2. The rms current in circuit (b) can be larger than that in (a)
3. The rms current in figure(a) is always equal to that in figure (b)
4. The rms current in circuit (b) can never be larger than that in (a)

Question Type : MCQ
Question ID : 306694284
Option 1 ID : 306694285
Option 2 ID : 306694286
Option 3 ID : 306694285
Option 4 ID : 306694284
Status : Marked For Review
Chosen Option : 3

Q.16 The equation of a circle is given by $x^2 - y^2 = a^2$, where a is the radius. If the equation is modified to change the origin other than $(0, 0)$, then find out the correct dimensions of A and B in a new equation : $(x - At)^2 + \left(y - \frac{1}{B}\right)^2 = a^2$. The dimensions of t is given as $[T^{-1}]$.

Options
1. $A = [L^{-1}T^{-1}]$, $B = [LT]$
2. $A = [L^{-1}T]$, $B = [LT^{-1}]$
3. $A = [L^{-1}T^{-1}]$, $B = [LT^{-1}]$
4. $A = [LT]$, $B = [L^{-1}T^{-1}]$

Question Type : MCQ
Question ID : 306694278
Option 1 ID : 306694277
Option 2 ID : 306694279
Option 3 ID : 306694278
Option 4 ID : 306694280
Status : Answered
Chosen Option : 4

Q.17 A scientist is observing a bacteria through a compound microscope. For better analysis and to improve its resolving power he should (Select the best option)

Options
1. Increase the wave length of the light
2. Decrease the diameter of the objective lens
3. Decrease the focal length of the eye piece.
4. Increase the refractive index of the medium between the object and objective lens

Question Type : MCQ
Question ID : 306694269
Option 1 ID : 306694272
Option 2 ID : 306694271
Option 3 ID : 306694273
Option 4 ID : 306694274
Status : Answered
Chosen Option : 1

Q.18 A force acts for 20 s on a body of mass 20 kg, starting from rest, after which the force ceases and then body describes 50 m in the next 10 s. The value of force will be:

Options
1. 5 N
2. 20 N
3. 40 N
4. 10 N

Question Type : MCQ
Question ID : 306694274
Option 1 ID : 306694283
Option 2 ID : 306694282
Option 3 ID : 306694281
Option 4 ID : 306694284
Status : Answered
Chosen Option : 4

Q.19 Identify the correct statements from the following:

A. Work done by a man in lifting a bucket out of a well by means of a rope tied to the bucket is negative.

B. Work done by gravitational force in lifting a bucket out of a well by a rope tied to the bucket is negative.

C. Work done by friction on a body sliding down an inclined plane is positive.

D. Work done by an applied force on a body moving on a rough horizontal plane with uniform velocity is zero.

E. Work done by the air resistance on an oscillating pendulum is negative.

Choose the correct answer from the options given below:

Options
1. A and C Only
2. B, D and E only
3. B and E only
4. B and D only

Question Type : MCQ
Question ID : 306694275
Option 1 ID : 306694287
Option 2 ID : 306694288
Option 3 ID : 306694289
Option 4 ID : 306694286
Status : Answered
Chosen Option : 3

Q.20 An object moves at a constant speed along a circular path in a horizontal plane with center at the origin. When the object is at $x = +2$ m, its velocity is $-4\hat{j}$ m/s. The object's velocity (v) and acceleration (a) at $x = -2$ m will be

Question Type : MCQ
Question ID : 306694272
Option 1 ID : 306694810

Options: 1 $v=-4\hat{j}$ m/s, $a=8\hat{i}$ m/s^2

2 $v=4\hat{i}$ m/s, $a=8\hat{j}$ m/s^2

3 $v=-4\hat{i}$ m/s, $a=-8\hat{j}$ m/s^2

4 $v=4\hat{j}$ m/s, $a=8\hat{i}$ m/s^2

Option 2 ID : 336694817
Option 3 ID : 336694813
Option 4 ID : 336694815
Status : Answered
Chosen Option : 3

Section : Physics Section B

Q.21 In an experiment of measuring the refractive index of a glass slab using travelling microscope in physics lab, a student measures real thickness of the glass slab as 5.25 mm and apparent thickness of the glass slab as 5.00 mm. Travelling microscope has 20 divisions in one cm on main scale and 50 divisions on vernier scale is equal to 49 divisions on main scale. The estimated uncertainty in the measurement of refractive index of the slab is $\frac{x}{10}\times10^{-2}$, where x is _____

Question Type : SA
Question ID : 336694282
Status : Answered

Given Answer : 72

Q.22 A car is moving on a circular path of radius 600 m such that the magnitudes of the tangential acceleration and centripetal acceleration are equal. The time taken by the car to complete first quarter of revolution , if it is moving with an initial speed of 54 km/hr is $\pi(1-e^{-1})$s. The value of t is _____.

Question Type : SA
Question ID : 336694300
Status : Not Attempted and Marked For Review

Given Answer : –

Q.23 Unpolarised light is incident on the boundary between two dielectric media, whose dielectric constants are 2.8 (medium –1) and 6.8 (medium –2), respectively. To satisfy the condition, so that the reflected and refracted rays are perpendicular to each other, the angle of incidence should be $\sin^{-1}\left(\sqrt{\frac{10}{\theta}}\right)^{\frac{1}{2}}$, the value of θ is _____.

(Given for dielectric media $\mu_r = 1$)

Question Type : SA
Question ID : 336694299
Status : Not Attempted and Marked For Review

Given Answer : –

Q.24 A null point is found at 200 cm in potentiometer when cell in secondary circuit is shunted by 5Ω. When a resistance of 15Ω is used for shunting, null point moves to 300 cm. The internal resistance of the cell is _____Ω.

Question Type : SA
Question ID : 336694298
Status : Not Attempted and Marked For Review

Given Answer : –

Q.25 An inductor of inductance 2 μH is connected in series with a resistance, a variable capacitor and an AC source of frequency 7 kHz. The value of capacitance for which maximum current is drawn into the circuit is $\frac{1}{x}$ F, where the value of x is _____.

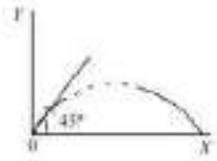
(Take $\pi=\frac{22}{7}$)

Question Type : SA
Question ID : 336694294
Status : Not Attempted and Marked For Review

Given Answer : –

Q.26 A particle of mass 100 g is projected at time t = 0 with a speed 20 ms^{-1} at an angle 45° to the horizontal as given in the figure. The magnitude of the angular momentum of the particle about the starting point at time t = 2s is found to be $\sqrt{K}$ kg m^2/s. The value of K is _____.

(Take g = 10 ms^{-2})



Question Type : SA
Question ID : 336694289
Status : Not Attempted and Marked For Review

Given Answer : –

Q.27 A particle of mass 250 g executes a simple harmonic motion under a periodic force F = (–25 x) N. The particle attains a maximum speed of 4 m/s during its oscillation. The amplitude of the motion is _____ cm.

Question Type : SA
Question ID : 336694287
Status : Answered

Given Answer : 40

Q.28 For a charged spherical ball, electrostatic potential inside the ball varies with r as $V = 2ar^2 + b$.
Here, a and b are constant and r is the distance from the center. The volume charge density inside the ball is $-k\varepsilon ar$. The value of k is _____.
ε = permittivity of the medium

Question Type : SA
Question ID : 336694286
Status : Not Attempted and Marked For Review

Given Answer : –

Q.29 When two resistances R_1 and R_2 connected in series and introduced into the left gap of a meter bridge and a resistance of 10 Ω is introduced into the right gap, a null point is found at 60 cm from left side . When R_1 and R_2 are connected in parallel and introduced into the left gap, a resistance of 3 Ω is introduced into the right-gap to get null point at 40 cm from left end. The product of $R_1 R_2$ is _____Ω^2

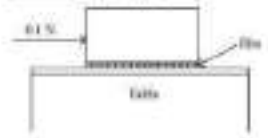
Question Type : SA
Question ID : 336694285
Status : Not Attempted and Marked For Review

Given Answer : –

Q.30 A metal block of base area 0.20 m^2 is placed on a table, as shown in figure. A liquid film of thickness 0.25 mm is inserted between the block and the table. The

Question Type : SA
Question ID : 336694290

block is pushed by a horizontal force of 0.1 N and moves with a constant speed. If the viscosity of the liquid is 5.0×10^{-3} Pl, the speed of block is _____ $\times 10^{-3}$ m/s.



Given Answer : –

Status : Not Attempted and Marked For Review

Section : Chemistry Section A

Q.31 An indicator 'X' is used for studying the effect of variation in concentration of iodide ion on the rate of reaction of iodide ion with H_2O_2 at room temp. The indicator 'X' forms blue colored complex with compound 'A' present in the solution. The indicator 'X' and compound 'A' respectively are

Options
1 Starch and iodine
2 Starch and H_2O_2
3 Methyl orange and iodine
4 Methyl orange and H_2O_2

Question Type : MCQ
Question ID : 306694089
Option 1 ID : 306694093
Option 2 ID : 306694078
Option 3 ID : 306694077
Option 4 ID : 306694079
Status : Answered
Chosen Option : 2

Q.32 Match **List I** and **List II**

List I	List II
A. Osmosis	I. Solvent molecules pass through semi permeable membrane towards solvent side
B. Reverse osmosis	II. Movement of charged colloidal particles under the influence of applied electric potential towards oppositely charged electrodes
C. Electro osmosis	III. Solvent molecules pass through semi permeable membrane towards solution side
D. Electrophoresis	IV. Dispersion medium moves in an electric field.

Choose the correct answer from the options given below :

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

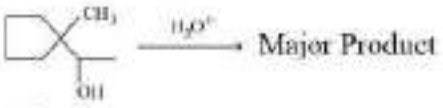
Question Type : MCQ
Question ID : 306694084
Option 1 ID : 306694093
Option 2 ID : 306694095
Option 3 ID : 306694096
Option 4 ID : 306694094
Status : Answered
Chosen Option : 4

Q.33 The concentration of dissolved Oxygen in water for growth of fish should be more than X ppm and Biochemical Oxygen Demand in clean water should be less than Y ppm. X and Y in ppm are, respectively

Options
1 X = 6, Y = 5
2 X = 4, Y = 15
3 X = 4, Y = 8
4 X = 6, Y = 12

Question Type : MCQ
Question ID : 306694091
Option 1 ID : 306694101
Option 2 ID : 306694104
Option 3 ID : 306694102
Option 4 ID : 306694103
Status : Answered
Chosen Option : 2

Q.34 Find out the major product for the following reaction.



Options
1 
2 
3 
4 

Question Type : MCQ
Question ID : 306694093
Option 1 ID : 306694097
Option 2 ID : 306694099
Option 3 ID : 306694095
Option 4 ID : 306694098
Status : Answered
Chosen Option : 3

Q.35 The major component of which of the following ore is sulphide based mineral?

Options
1 Malachite
2 Calamine
3 Sphalerite
4 Siderite

Question Type : MCQ
Question ID : 306694106
Option 1 ID : 306694121
Option 2 ID : 306694122
Option 3 ID : 306694120
Option 4 ID : 306694123
Status : Not Attempted and Marked For Review
Chosen Option : –

Q.36 Given below are two statements :

Statement I : The decrease in first ionization enthalpy from B to Al is much larger than that from Al to Ga.

Statement II : The d orbitals in Ga are completely filled.

Question Type : MCQ
Question ID : 306694085
Option 1 ID : 306694083
Option 2 ID : 306694081
Option 3 ID : 306694087
Option 4 ID : 306694082
Status : Answered
Chosen Option : 4

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

Options
1. Statement I is incorrect but statement II is correct
2. Both the statements I and II are incorrect
3. Both the statements I and II are correct
4. Statement I is correct but statement II is incorrect

Q.37 A solution of C_2O_3 in amyl alcohol has a _____ colour.

Options
1. Yellow
2. Green
3. Blue
4. Orange-Red

Question Type : MCQ
Question ID : 366694308
Option 1 ID : 366694312
Option 2 ID : 366694313
Option 3 ID : 366694309
Option 4 ID : 366694311
Status : Answered
Chosen Option : 4

Q.38 Which of the following relations are correct ?

(A) $\Delta U = q + p\Delta V$

(B) $\Delta G = \Delta H - T\Delta S$

(C) $\Delta S = \frac{q_{rev}}{T}$

(D) $\Delta H = \Delta U - \Delta nRT$

Choose the most appropriate answer from the options given below :

Options
1. B and D Only
2. C and D Only
3. B and C Only
4. A and B Only

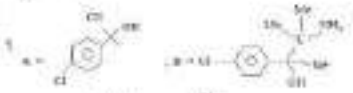
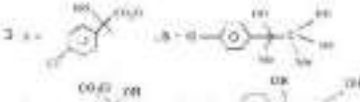
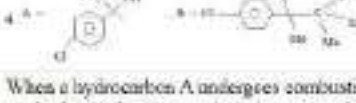
Question Type : MCQ
Question ID : 366694302
Option 1 ID : 366694307
Option 2 ID : 366694305
Option 3 ID : 366694304
Option 4 ID : 366694306
Status : Answered
Chosen Option : 4

Q.39 Correct order of spin only magnetic moment of the following complex ions is:
(Given At.no. Fe: 26, Co:27)

Options
1. $[Co(C_2O_4)_3]^{3-} > [CoF_6]^{3-} > [FeF_6]^{3-}$
2. $[FeF_6]^{3-} > [Co(C_2O_4)_3]^{3-} > [CoF_6]^{3-}$
3. $[FeF_6]^{3-} > [CoF_6]^{3-} > [Co(C_2O_4)_3]^{3-}$
4. $[CoF_6]^{3-} > [FeF_6]^{3-} > [Co(C_2O_4)_3]^{3-}$

Question Type : MCQ
Question ID : 366694309
Option 1 ID : 366694315
Option 2 ID : 366694314
Option 3 ID : 366694313
Option 4 ID : 366694316
Status : Answered
Chosen Option : 3

Q.40 Find out the major products from the following reaction sequence.

Options
1. 
2. 
3. 
4. 

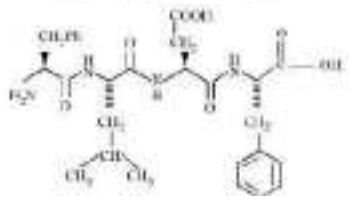
Question Type : MCQ
Question ID : 366694310
Option 1 ID : 366694317
Option 2 ID : 366694320
Option 3 ID : 366694318
Option 4 ID : 366694319
Status : Not Answered and Marked For Review
Chosen Option : --

Q.41 When a hydrocarbon A undergoes combustion in the presence of air, it requires 9.5 equivalents of oxygen and produces 3 equivalents of water. What is the molecular formula of A ?

Options
1. C_9H_{12}
2. C_8H_8
3. C_9H_6
4. C_9H_8

Question Type : MCQ
Question ID : 366694303
Option 1 ID : 366694351
Option 2 ID : 366694349
Option 3 ID : 366694350
Option 4 ID : 366694352
Status : Answered
Chosen Option : 1

Q.42 Following tetrapeptide can be represented as



Question Type : MCQ
Question ID : 366694310
Option 1 ID : 366694372
Option 2 ID : 366694370
Option 3 ID : 366694371
Option 4 ID : 366694369
Status : Not Answered and Marked For Review
Chosen Option : --

$\underset{OH}{|}$

(F, L, D, Y, I, Q, P are one letter codes for amino acids)

Options
1. YQLF
2. FIQY
3. PLDY
4. FLDY

Q.63 Reaction of propanamide with Br_2/KOH (aq) produces :

Options
1. Ethylnitrile
2. Propylamine
3. Propanenitrile
4. Ethylamine

Question Type: MCQ
Question ID: 306694319
Option 1 ID: 306694864
Option 2 ID: 306694865
Option 3 ID: 306694863
Option 4 ID: 306694862
Status: Answered
Chosen Option: 4

Q.64 Match **List I** with **List II**

List I	List II
A. van't Hoff factor, i	I. Cryoscopic constant
B. k_f	II. Isotonic solutions
C. Solutions with same osmotic pressure	III. $\frac{\text{Normal molar mass}}{\text{Abnormal molar mass}}$
D. Azeotropes	IV. Solutions with same composition of vapour above it

Choose the correct answer from the options given below :

Options
1. A-III, B-I, C-IV, D-II
2. A-III, B-II, C-I, D-IV
3. A-III, B-I, C-II, D-IV
4. A-I, B-III, C-II, D-IV

Question Type: MCQ
Question ID: 306694303
Option 1 ID: 306694810
Option 2 ID: 306694812
Option 3 ID: 306694809
Option 4 ID: 306694811
Status: Answered
Chosen Option: 4

Q.65 A doctor prescribed the drug Equanil to a patient. The patient was likely to have symptoms of which disease?

Options
1. Stomach ulcers
2. Hyperacidity
3. Anxiety and stress
4. Depression and hypertension

Question Type: MCQ
Question ID: 306694318
Option 1 ID: 306694870
Option 2 ID: 306694874
Option 3 ID: 306694875
Option 4 ID: 306694873
Status: Answered
Chosen Option: 4

Q.66 The one giving maximum number of isomeric alkenes on dehydrohalogenation reaction is (excluding rearrangement)

Options
1. 2-Bromopropane
2. 1-Bromo-2-methylbutane
3. 2-Bromopentane
4. 2-Bromo-3,3-dimethylpentane

Question Type: MCQ
Question ID: 306694314
Option 1 ID: 306694850
Option 2 ID: 306694856
Option 3 ID: 306694855
Option 4 ID: 306694849
Status: Not Answered and Marked For Review
Chosen Option: --

Q.67 Match **List I** with **List II**

List I	List II
A. Elastomeric polymer	I. Urea-formaldehyde resin
B. Fibre Polymer	II. Polystyrene
C. Thermosetting Polymer	III. Polyester
D. Thermoplastic Polymer	IV. Neoprene

Choose the correct answer from the options given below :

Options
1. A-IV, B-I, C-III, D-II
2. A-II, B-I, C-IV, D-III
3. A-II, B-III, C-I, D-IV
4. A-IV, B-III, C-I, D-II

Question Type: MCQ
Question ID: 306694317
Option 1 ID: 306694867
Option 2 ID: 306694868
Option 3 ID: 306694866
Option 4 ID: 306694865
Status: Answered
Chosen Option: 1

Q.68 Given below are two statements:

Statement I : Nickel is being used as the catalyst for producing syn gas and edible fats.

Statement II : Silicon forms both electron rich and electron deficient hydrides.

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

Options
1. Statement I is correct but statement II is incorrect
2. Statement I is incorrect but statement II is correct
3. Both the statements I and II are correct
4. Both the statements I and II are incorrect

Question Type: MCQ
Question ID: 306694307
Option 1 ID: 306694827
Option 2 ID: 306694828
Option 3 ID: 306694829
Option 4 ID: 306694830
Status: Answered
Chosen Option: 2

Q.69 The set of correct statements is :

(i) Manganese exhibits +7 oxidation state in its oxide.

(ii) Ruthenium and Osmium exhibit +8 oxidation in their oxides.

Question Type: MCQ
Question ID: 306694316
Option 1 ID: 306694843
Option 2 ID: 306694837
Option 3 ID: 306694839

(iii) Sc shows +4 oxidation state which is oxidizing in nature.

(iv) Cr shows oxidising nature in +6 oxidation state.

Options
1. (ii), (iii) and (iv)
2. (i) and (iii)
3. (ii) and (iii)
4. (i), (ii) and (iv)

Option 4 ID : 306694003
Status : Answered
Chosen Option : 3

Q.56 According to MO theory the bond orders for O_2^{2-}, CO and NO^+ respectively, are

Options
1. 1, 3 and 2
2. 2, 3 and 3
3. 1, 3 and 3
4. 1, 2 and 3

Question Type : MCQ
Question ID : 306694001
Option 1 ID : 306694002
Option 2 ID : 306694004
Option 3 ID : 306694003
Option 4 ID : 306694001
Status : Answered
Chosen Option : 1

Section : Chemistry Section B

Q.51 The volume of HCl, containing 73 g L^{-1}, required to completely neutralise NaOH obtained by reacting 0.69 g of metallic sodium with water, is _____ mL. (Nearest Integer)
(Given : molar Masses of Na, Cl, O, H, are 23, 35.5, 16 and 1 g mol^{-1} respectively)

Given Answer : 3

Question Type : SA
Question ID : 306694035
Status : Answered

Q.52 When 0.01 mol of an organic compound containing 60% carbon was burnt completely, 4.4 g of CO_2 was produced. The molar mass of compound is_____ g mol^{-1} (Nearest integer).

Given Answer : –

Question Type : SA
Question ID : 306694130
Status : Not Attempted and Marked For Review

Q.53 For conversion of compound A → B, the rate constant of the reaction was found to be 4.5×10^{-5} L mol^{-1} s^{-1}. The order of the reaction is _____.

Given Answer : –

Question Type : SA
Question ID : 306694129
Status : Not Attempted and Marked For Review

Q.54 On heating, $LiNO_3$ gives how many compounds among the following?_____

Li_2O, N_2, O_2, $LiNO_2$, NO_2

Given Answer : 3

Question Type : SA
Question ID : 306694023
Status : Answered

Q.55 A metal M forms hexagonal close-packed structure. The total number of voids in 0.02 mol of it is _____ $\times 10^{21}$ (Nearest integer).

(Given $N_A = 6.02 \times 10^{23}$)

Given Answer : –

Question Type : SA
Question ID : 306694126
Status : Not Attempted and Marked For Review

Q.56 Total number of acidic oxides among N_2O_5, NO_2, N_2O, Cl_2O_7, SO_2, CO, CrO, Na_2O and NO is _____.

Given Answer : 3

Question Type : SA
Question ID : 306694024
Status : Answered

Q.57 At 298 K

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$, $K_1 = 4 \times 10^5$

$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$, $K_2 = 1.6 \times 10^{12}$

$H_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons H_2O(g)$, $K_3 = 1.0 \times 10^{13}$

Based on above equilibria, the equilibrium constant of the reaction, $2NH_3(g) + \frac{5}{2}O_2(g) \rightleftharpoons 2NO(g) + 3H_2O(g)$ is _____ $\times 10^{53}$ (Nearest integer).

Given Answer : –

Question Type : SA
Question ID : 306694127
Status : Not Attempted and Marked For Review

Q.58 The denticity of the ligand present in the Fehling's reagent is _____.

Given Answer : –

Question Type : SA
Question ID : 306694122
Status : Not Attempted and Marked For Review

Q.59 The equilibrium constant for the reaction

$Zn(s) + Sn^{2+}(aq) \rightleftharpoons Zn^{2+}(aq) + Sn(s)$ is 1×10^{20} at 298 K. The magnitude of standard electrode potential of Sn/Sn^{2+} if $E^0_{Zn^{2+}/Zn} = -0.76$ V is _____ $\times 10^{-2}$ V. (Nearest integer).

Given : $\frac{2.303RT}{F} = 0.059$ V

Given Answer : –

Question Type : SA
Question ID : 306694123
Status : Not Attempted and Marked For Review

Q.60 Assume that the radius of the first Bohr orbit of hydrogen atom is 0.6 Å. The radius of the third Bohr orbit of He^+ is _____ picometer. (Nearest Integer)

Given Answer : 3

Question Type : SA
Question ID : 306694031
Status : Answered

Section : Mathematics Section A

Q.31 Let $S = \{w_1, w_2, \ldots\}$ be the sample space associated to a random experiment. Let $P(w_n) = \frac{P(w_{n-1})}{2}$, $n \geq 2$. Let $A = \{2k : k \in \mathbb{N}\}$ and $B = \{w_n : n \in A\}$. Then $P(B)$ is equal to

Options
1. $\frac{1}{32}$
2. $\frac{3}{64}$
3. $\frac{3}{32}$
4. $\frac{1}{16}$

Question Type : MCQ
Question ID : 3366041347
Option 1 ID : 3366041357
Option 2 ID : 3366041358
Option 3 ID : 3366041356
Option 4 ID : 3366041355
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.32 The statement $S \Rightarrow ((\sim A) \vee B)$ is equivalent to :

Options
1. $S \Rightarrow (A \Rightarrow B)$
2. $S \Rightarrow ((\sim A) \Rightarrow B)$
3. $A \Rightarrow (A \Leftrightarrow B)$
4. $A \Rightarrow ((\sim A) \Rightarrow B)$

Question Type : MCQ
Question ID : 3366041339
Option 1 ID : 3366041347
Option 2 ID : 3366041349
Option 3 ID : 3366041348
Option 4 ID : 3366041346
Status : Answered
Chosen Option : 4

Q.33 The number of 3 digit numbers, that are divisible by either 3 or 4 but not divisible by 48, is

Options
1. 472
2. 432
3. 507
4. 400

Question Type : MCQ
Question ID : 3366041341
Option 1 ID : 3366041332
Option 2 ID : 3366041334
Option 3 ID : 3366041335
Option 4 ID : 3366041333
Status : Answered
Chosen Option : 1

Q.34 Consider a function $f : \mathbb{N} \to \mathbb{R}$, satisfying

$f(1) + 2f(2) + 3f(3) + \ldots + xf(x) = x(x+1)f(x)$, $x \geq 2$ with $f(1) = 1$.

Then $\frac{1}{f(2022)} + \frac{1}{f(2028)}$ is equal to

Options
1. 8100
2. 8200
3. 8000
4. 8400

Question Type : MCQ
Question ID : 3366041333
Option 1 ID : 3366041301
Option 2 ID : 3366041300
Option 3 ID : 3366041302
Option 4 ID : 3366041299
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.35 Let K be the sum of the coefficients of the odd powers of x in the expansion of $(1 + x)^{99}$. Let a be the middle term in the expansion of $\left(x + \frac{1}{\sqrt{2}}\right)^{200}$. If $\frac{^{200}C_{99}K}{a} = \frac{2^4 m}{n}$, where m and n are odd numbers, then the ordered pair (m, n) is equal to

Options
1. (51,99)
2. (50,101)
3. (50,51)
4. (51,101)

Question Type : MCQ
Question ID : 3366041334
Option 1 ID : 3366041304
Option 2 ID : 3366041303
Option 3 ID : 3366041306
Option 4 ID : 3366041305
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.36 The shortest distance between the lines $\frac{x-1}{2} = \frac{y+8}{-7} = \frac{z-4}{5}$ and $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-6}{-3}$ is

Options
1. $5\sqrt{3}$
2. $3\sqrt{3}$
3. $5\sqrt{5}$
4. $4\sqrt{3}$

Question Type : MCQ
Question ID : 3366041343
Option 1 ID : 3366041341
Option 2 ID : 3366041342
Option 3 ID : 3366041339
Option 4 ID : 3366041340
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.37 The value of the integral $\int_1^2 \left(\frac{x^4+1}{x^2+1}\right) dx$ is

Options
1. $\tan^{-1}2 - \frac{1}{3}\tan^{-1}8 + \frac{\pi}{3}$
2. $\tan^{-1}2 + \frac{1}{3}\tan^{-1}8 - \frac{\pi}{3}$
3. $\tan^{-1}\frac{1}{2} + \frac{1}{3}\tan^{-1}8 - \frac{\pi}{2}$
4. $\tan^{-1}\frac{1}{2} - \frac{1}{3}\tan^{-1}8 + \frac{\pi}{3}$

Question Type : MCQ
Question ID : 3366041337
Option 1 ID : 3366041318
Option 2 ID : 3366041317
Option 3 ID : 3366041315
Option 4 ID : 3366041316
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.38 Let f and g be twice differentiable functions on $\mathbb{R}$ such that

$f''(x) = g''(x) + 6x$

$f'(1) = 4g'(1) - 3 = 9$

$f'(2) = 3g(2) = 12$

Then which of the following is **NOT** true?

Question Type : MCQ
Question ID : 3366041336
Option 1 ID : 3366041353
Option 2 ID : 3366041352
Option 3 ID : 3366041351
Option 4 ID : 3366041350
Status : Answered
Chosen Option : 3

Options
1. If $-1 < x < 2$, then $|f(x) - g(x)| < 8$
2. $|f'(x) - g'(x)| < 6 \Rightarrow -1 < x < 1$
3. $g(-2) - f(-2) = 20$
4. There exists $x_0 \in (1,3/2)$ such that $f'(x_0) = g(x_0)$

Q.69 Let R be a relation defined on $\mathbb{N}$ as $a\,R\,b$ if $2a + 3b$ is a multiple of 5, $a, b \in \mathbb{N}$. Then R is

Options
1. transitive but not symmetric
2. an equivalence relation
3. not reflexive
4. symmetric but not transitive

Question Type : MCQ
Question ID : 366984335
Option 1 ID : 366984003
Option 2 ID : 366984004
Option 3 ID : 366984005
Option 4 ID : 366984002
Status : Answered
Chosen Option : 2

Q.70 If the tangent at a point P on the parabola $y^2 = 3x$ is parallel to the line $x + 2y = 1$ and the tangents at the points Q and R on the ellipse $\frac{x^2}{4} + \frac{y^2}{1} = 1$ are perpendicular to the line $x - y = 2$, then the area of the triangle PQR is :

Options
1. $\frac{3}{2}\sqrt{5}$
2. $5\sqrt{3}$
3. $3\sqrt{5}$
4. $\frac{9}{\sqrt{5}}$

Question Type : MCQ
Question ID : 366984342
Option 1 ID : 366984025
Option 2 ID : 366984026
Option 3 ID : 366984024
Option 4 ID : 366984027
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.71 If $\vec{a} = \hat{i} + 2\hat{j}$, $\vec{b} = \hat{i} + \hat{j} + \hat{k}$, $\vec{c} = 7\hat{i} - 3\hat{j} + 4\hat{k}$, $\vec{r} \times \vec{b} + \vec{b} \times \vec{c} = \vec{0}$ and $\vec{r} \cdot \vec{a} = 0$. Then $\vec{r} \cdot \vec{c}$ is equal to

Options
1. 30
2. 32
3. 36
4. 34

Question Type : MCQ
Question ID : 366984348
Option 1 ID : 366984062
Option 2 ID : 366984061
Option 3 ID : 366984059
Option 4 ID : 366984060
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.72 If the lines $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z+3}{1}$ and $\frac{x-a}{2} = \frac{y+2}{3} = \frac{z-3}{1}$ intersect at the point P, then the distance of the point P from the plane $z = a$ is :

Options
1. 10
2. 22
3. 28
4. 16

Question Type : MCQ
Question ID : 366984344
Option 1 ID : 366984043
Option 2 ID : 366984040
Option 3 ID : 366984045
Option 4 ID : 366984044
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.73 The value of the integral $\int_{\frac{1}{2}}^{2} \frac{\tan^{-1} x}{x}\,dx$ is equal to

Options
1. $\frac{\pi}{4}\log_e 2$
2. $\pi \log_e 2$
3. $\frac{\pi}{2}\log_e 2$
4. $\frac{1}{2}\log_e 2$

Question Type : MCQ
Question ID : 366984338
Option 1 ID : 366984018
Option 2 ID : 366984022
Option 3 ID : 366984020
Option 4 ID : 366984021
Status : Answered
Chosen Option : 3

Q.74 The plane $2x - y + z = 4$ intersects the line segment joining the points A $(a, -2, 4)$ and B $(2, b, -3)$ at the point C in the ratio 2:1 and the distance of the point C from the origin is $\sqrt{8}$. If $ab < 0$ and P is the point $(a - b, b, 2b - a)$ then CP^2 is equal to

Options
1. $\frac{16}{3}$
2. $\frac{17}{3}$
3. $\frac{73}{3}$
4. $\frac{97}{3}$

Question Type : MCQ
Question ID : 366984345
Option 1 ID : 366984047
Option 2 ID : 366984048
Option 3 ID : 366984049
Option 4 ID : 366984050
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.75 The area of the region $A = \left\{(x, y) : |\cos x - \sin x| \le y \le \sin x,\ 0 \le x \le \frac{\pi}{2}\right\}$ is

Options
1. $\sqrt{5} - 2\sqrt{2} + 1$
2. $1 - \frac{3}{\sqrt{2}} + \frac{4}{\sqrt{5}}$
3. $\frac{3}{\sqrt{2}} - \frac{3}{\sqrt{2}} + 1$
4. $\sqrt{5} + 2\sqrt{2} - 4$

Question Type : MCQ
Question ID : 366984339
Option 1 ID : 366984023
Option 2 ID : 366984025
Option 3 ID : 366984022
Option 4 ID : 366984024
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.76 The letters of the word OUGHT are written in all possible ways and these words are arranged as in a dictionary, in a series. Then the serial number of the word TOUGH is

Options
1. 79
2. 86
3. 84
4. 89

Question Type : MCQ
Question ID : 366984333
Option 1 ID : 366984008
Option 2 ID : 366984010
Option 3 ID : 366984009
Option 4 ID : 366984007
Status : Answered
Chosen Option : 3

Q.77 Let $\vec{u}=4\hat{i}+3\hat{j}$ and $\vec{v}=3\hat{i}-4\hat{j}+5\hat{k}$. If $\vec{c}$ is a vector such that $\vec{c}\times(\vec{u}\times\vec{v})+25=0$, $\vec{c}\cdot(\hat{i}+\hat{j}+\hat{k})=4$, and projection of $\vec{c}$ on $\vec{u}$ is 1, then the projection of $\vec{c}$ on $\vec{v}$ equals

Options
1. $\frac{5}{\sqrt{2}}$
2. $\frac{1}{5}$
3. $\frac{1}{\sqrt{2}}$
4. $\frac{5}{\sqrt{2}}$

Question Type : MCQ
Question ID : 368694340
Option 1 ID : 368694951
Option 2 ID : 368694953
Option 3 ID : 368694952
Option 4 ID : 368694954
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.78 The set of all values of λ for which the equation $\cos^2 2x - 2\sin^4 x - 2\cos^2 x = \lambda$ has a real solution x, is

Options
1. $\left[-1,-\frac{1}{2}\right]$
2. $\left[-\frac{3}{2},-1\right]$
3. $\left[-2,-\frac{3}{2}\right]$
4. $[-2,-1]$

Question Type : MCQ
Question ID : 368694341
Option 1 ID : 368694963
Option 2 ID : 368694965
Option 3 ID : 368694966
Option 4 ID : 368694964
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.79 The set of all values of $t \in \mathbb{R}$, for which the matrix $\begin{bmatrix} e^t & e^{-t}(\sin t-2\cos t) & e^{-t}(-2\sin t-\cos t) \\ e^t & e^{-t}(2\sin t+\cos t) & e^{-t}(\sin t-2\cos t) \\ e^t & e^{-t}\cos t & e^{-t}\sin t \end{bmatrix}$ is invertible, is

Options
1. $\left\{(2k+1)\frac{\pi}{2}, k\in\mathbb{Z}\right\}$
2. $\mathbb{R}$
3. $\left\{k\pi+\frac{\pi}{4}, k\in\mathbb{Z}\right\}$
4. $\left\{k\pi, k\in\mathbb{Z}\right\}$

Question Type : MCQ
Question ID : 368694332
Option 1 ID : 368694965
Option 2 ID : 368694967
Option 3 ID : 368694966
Option 4 ID : 368694968
Status : Not Attempted and Marked For Review
Chosen Option : --

Q.80 Let $y=y(x)$ be the solution of the differential equation $x\log_e x\frac{dy}{dx}+y=x^2\log_e x$, $(x>1)$.
If $y(2)=2$, then $y(e)$ is equal to

Options
1. $\frac{2+e^2}{2}$
2. $\frac{1+e^2}{2}$
3. $\frac{1+e^2}{4}$
4. $\frac{4+e^2}{4}$

Question Type : MCQ
Question ID : 368694342
Option 1 ID : 368694969
Option 2 ID : 368694970
Option 3 ID : 368694968
Option 4 ID : 368694967
Status : Answered
Chosen Option : 2

Section : Mathematics Section B

Q.81 The total number of 4-digit numbers whose greatest common divisor with 54 is 2, is _____.

Given Answer : --

Question Type : SA
Question ID : 368694354
Status : Not Attempted and Marked For Review

Q.82 If the equation of the normal to the curve $y=\frac{x-a}{(x+b)(x-2)}$ at the point $(1,-3)$ is $x-4y=13$, then the value of $a+b$ is equal to _____.

Given Answer : -1

Question Type : SA
Question ID : 368694357
Status : Answered

Q.83 Let $X=\{11,12,13,\ldots,40,41\}$ and $Y=\{61,62,63,\ldots,90,91\}$ be the two sets of observations. If $\bar{x}$ and $\bar{y}$ are their respective means and σ^2 is the variance of all the observations in $X\cup Y$, then $\left|\bar{x}+\bar{y}-\sigma^2\right|$ is equal to _____.

Given Answer : --

Question Type : SA
Question ID : 368694360
Status : Not Attempted and Marked For Review

Q.84 A triangle is formed by the tangents at the point (2, 2) on the curves $y^2=2x$ and $x^2+y^2=4x$, and the line $x+y+2=0$. If r is the radius of its circumcircle, then r^2 is equal to _____.

Given Answer : --

Question Type : SA
Question ID : 368694359
Status : Not Attempted and Marked For Review

Q.85 Let $\alpha_1,\alpha_2,\ldots,\alpha_7$ be the roots of the equation $x^7+3x^5-13x^3-15x=0$ and $|\alpha_1|\geq|\alpha_2|\geq\ldots\geq|\alpha_7|$. Then $\alpha_1\alpha_2+\alpha_3\alpha_4+\alpha_5\alpha_6$ is equal to _____.

Given Answer : --

Question Type : SA
Question ID : 368694351
Status : Not Attempted and Marked For Review

Q.86 Let A be a symmetric matrix such that $|A|=2$ and $\begin{bmatrix} 2 & 1 \\ \lambda & \frac{\lambda}{2} \end{bmatrix}A=\begin{bmatrix} 1 & 2 \\ \alpha & \beta \end{bmatrix}$.

If the sum of the diagonal elements of A is 5, then $\frac{2\alpha}{\lambda}$ is equal to _____.

Given Answer : --

Question Type : SA
Question ID : 368694353
Status : Not Attempted and Marked For Review

Question Type : SA
Question ID : 168604356
Status : Not Attempted and Marked For Review

Let $a_1 = b_1 = 1$ and $a_n = a_{n-1} + (n-1)$, $b_n = b_{n-1} + a_{n-1}$, $\forall\ n \geq 2$. If $S = \sum_{n=1}^{\infty} \frac{b_n}{2^n}$ and $T = \sum_{n=1}^{8} \frac{n}{2^{n-1}}$, then $2^7(2S - T)$ is equal to _____.

Given Answer: --

Q.88 A circle with centre $(2, 3)$ and radius 4 intersects the line $x + y = 3$ at the points P and Q. If the tangents at P and Q intersect at the point $S(\alpha, \beta)$, then $4\alpha - 7\beta$ is equal to _____.

Question Type : SA
Question ID : 168604358
Status : Not Attempted and Marked For Review

Given Answer: --

Q.89 Let $\{a_k\}$ and $\{b_k\}$, $k \in \mathbb{N}$, be two G.P.s with common ratios r_1 and r_2 respectively such that $a_1 = b_1 = 4$ and $r_1 < r_2$. Let $c_k = a_k + b_k$, $k \in \mathbb{N}$. If $c_2 = 5$ and $c_3 = \frac{13}{4}$, then $\sum_{k=1}^{\infty} c_k - (12a_4 + 8b_4)$ is equal to _____.

Question Type : SA
Question ID : 168604355
Status : Not Attempted and Marked For Review

Given Answer: --

Q.90 Let $\alpha = 8 - 14i$, $A = \left\{z \in \mathbb{C} : \frac{\alpha z - \bar{\alpha}\bar{z}}{z^2 - (\bar{z})^2 - 112i} = 1\right\}$ and $B = \{z \in \mathbb{C} : |z + 3i| = 4\}$.

Then $\sum_{z \in A \cap B} (\mathrm{Re}\, z - \mathrm{Im}\, z)$ is equal to _____.

Question Type : SA
Question ID : 168604352
Status : Not Attempted and Marked For Review

Given Answer: --