

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

Application No	
Candidate Name	
Roll No	
Test Date	
Test Time	3:00 PM - 6:00 PM
Subject	B TECH

### Section : Physics Section A

**Q.1** The escape velocities of two planets A and B are in the ratio 1 : 2. If the ratio of their radii respectively is 1 : 3, then the ratio of acceleration due to gravity of planet A to the acceleration of gravity of planet B will be :

- Options**
1.  $\frac{3}{2}$
  2.  $\frac{2}{3}$
  3.  $\frac{3}{4}$
  4.  $\frac{4}{3}$

Question Type : MCQ  
 Question ID : 7155051174  
 Option 1 ID : 7155053526  
 Option 2 ID : 7155053523  
 Option 3 ID : 7155053525  
 Option 4 ID : 7155053524  
 Status : Answered  
 Chosen Option : 1

**Q.2** Equivalent resistance between the adjacent corners of a regular n-sided polygon of uniform wire of resistance R would be :

- Options**
1.  $\frac{n^2 R}{n-1}$
  2.  $\frac{(n-1)R}{n}$
  3.  $\frac{(n-1)R}{(2n-1)}$
  4.  $\frac{(n-1)R}{n^2}$

Question Type : MCQ  
 Question ID : 7155051181  
 Option 1 ID : 7155053553  
 Option 2 ID : 7155053551  
 Option 3 ID : 7155053554  
 Option 4 ID : 7155053552  
 Status : Answered  
 Chosen Option : 4

**Q.3** Two objects A and B are placed at 15 cm and 25 cm from the pole in front of a concave mirror having radius of curvature 40 cm. The distance between images formed by the mirror is \_\_\_\_\_.

- Options
1. 100 cm
  2. 160 cm
  3. 40 cm
  4. 60 cm

Question Type : MCQ  
Question ID : 7155051186  
Option 1 ID : 7155053573  
Option 2 ID : 7155053574  
Option 3 ID : 7155053572  
Option 4 ID : 7155053571  
Status : Answered  
Chosen Option : 3

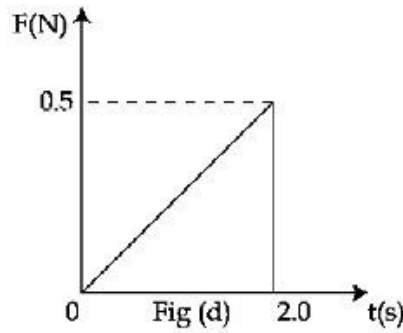
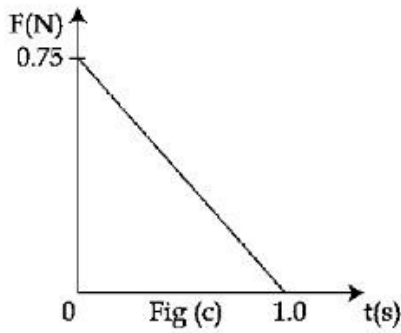
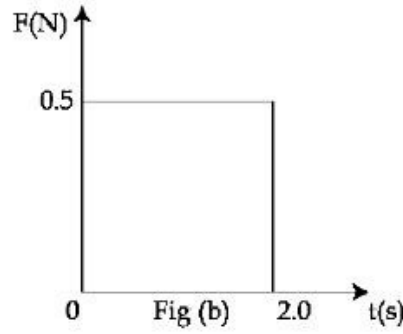
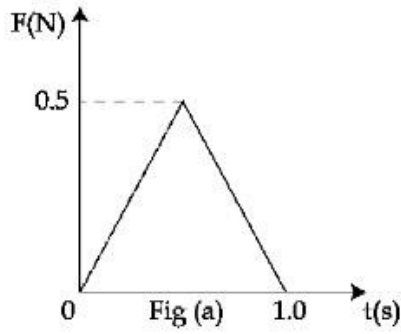
**Q.4** In an amplitude modulation, a modulating signal having amplitude of  $X$  V is superimposed with a carrier signal of amplitude  $Y$  V in first case. Then, in second case, the same modulating signal is superimposed with different carrier signal of amplitude  $2Y$  V. The ratio of modulation index in the two cases respectively will be :

- Options
1. 2 : 1
  2. 4 : 1
  3. 1 : 1
  4. 1 : 2

Question Type : MCQ  
Question ID : 7155051190  
Option 1 ID : 7155053588  
Option 2 ID : 7155053590  
Option 3 ID : 7155053589  
Option 4 ID : 7155053587  
Status : Answered  
Chosen Option : 4

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Q.5 Figures (a), (b), (c) and (d) show variation of force with time.



The impulse is highest in figure.

- Options
1. Fig (b)
  2. Fig (a)
  3. Fig (c)
  4. Fig (d)

Question Type : MCQ

Question ID : 7155051172

Option 1 ID : 7155053516

Option 2 ID : 7155053515

Option 3 ID : 7155053517

Option 4 ID : 7155053518

Status : Answered

Chosen Option : 2

Q.6 Choose the correct statement about Zener diode :

Options

1. It works as a voltage regulator in both forward and reverse bias.
2. It works as a voltage regulator in forward bias and behaves like simple pn junction diode in reverse bias.
3. It works as a voltage regulator only in forward bias.
4. It works as a voltage regulator in reverse bias and behaves like simple pn junction diode in forward bias.

Question Type : MCQ

Question ID : 7155051189

Option 1 ID : 7155053585

Option 2 ID : 7155053583

Option 3 ID : 7155053586

Option 4 ID : 7155053584

Status : Answered

Chosen Option : 4

**Q.7** Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R**.

**Assertion A** : Two metallic spheres are charged to the same potential. One of them is hollow and another is solid, and both have the same radii. Solid sphere will have lower charge than the hollow one.

**Reason R** : Capacitance of metallic spheres depend on the radii of spheres.

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

- Options**
1. **A** is false but **R** is true
  2. **A** is true but **R** is false
  3. Both **A** and **R** are true and **R** is the correct explanation of **A**
  4. Both **A** and **R** are true but **R** is **not** the correct explanation of **A**

Question Type : **MCQ**

Question ID : **7155051180**

Option 1 ID : **7155053550**

Option 2 ID : **7155053549**

Option 3 ID : **7155053547**

Option 4 ID : **7155053548**

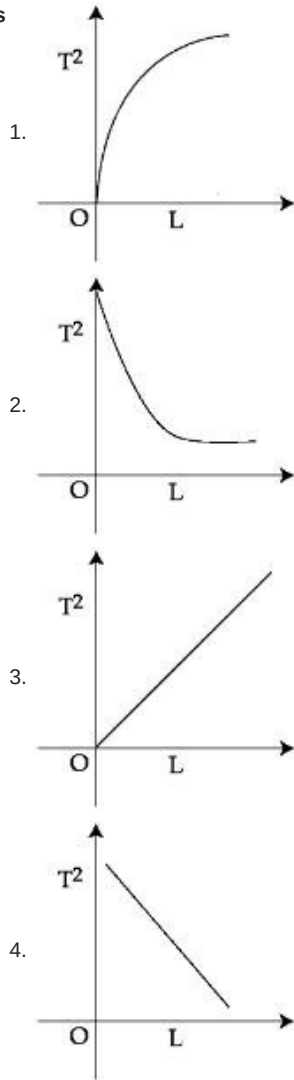
Status : **Answered**

Chosen Option : **3**

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**Q.8** Choose the correct length ( $L$ ) versus square of time period ( $T^2$ ) graph for a simple pendulum executing simple harmonic motion.

Options



Question Type : MCQ

Question ID : 7155051178

Option 1 ID : 7155053539

Option 2 ID : 7155053540

Option 3 ID : 7155053542

Option 4 ID : 7155053541

Status : Answered

Chosen Option : 1

**Q.9** The ratio of average electric energy density and total average energy density of electromagnetic wave is :

Options

1.  $\frac{1}{2}$
2. 3
3. 2
4. 1

Question Type : MCQ

Question ID : 7155051185

Option 1 ID : 7155053569

Option 2 ID : 7155053570

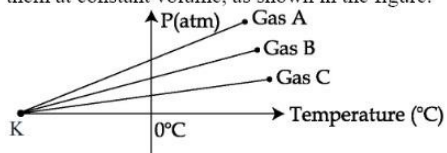
Option 3 ID : 7155053568

Option 4 ID : 7155053567

Status : Answered

Chosen Option : 4

**Q.10** For three low density gases A, B, C pressure versus temperature graphs are plotted while keeping them at constant volume, as shown in the figure.



The temperature corresponding to the point 'K' is :

- Options**
1.  $-100^{\circ}\text{C}$
  2.  $-273^{\circ}\text{C}$
  3.  $-40^{\circ}\text{C}$
  4.  $-373^{\circ}\text{C}$

Question Type : MCQ

Question ID : 7155051177

Option 1 ID : 7155053535

Option 2 ID : 7155053537

Option 3 ID : 7155053536

Option 4 ID : 7155053538

Status : Answered

Chosen Option : 1

**Q.11** An electron of a hydrogen like atom, having  $Z = 4$ , jumps from 4<sup>th</sup> energy state to 2<sup>nd</sup> energy state. The energy released in this process, will be :

(Given  $Rch = 13.6 \text{ eV}$ )

Where R = Rydberg constant

$c$  = Speed of light in vacuum

$h$  = Planck's constant

- Options**
1.  $10.5 \text{ eV}$
  2.  $40.8 \text{ eV}$
  3.  $13.6 \text{ eV}$
  4.  $3.4 \text{ eV}$

Question Type : MCQ

Question ID : 7155051188

Option 1 ID : 7155053581

Option 2 ID : 7155053580

Option 3 ID : 7155053579

Option 4 ID : 7155053582

Status : Answered

Chosen Option : 4

**Q.12** Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R**.

**Assertion A** : For measuring the potential difference across a resistance of  $600 \Omega$ , the voltmeter with resistance  $1000 \Omega$  will be preferred over voltmeter with resistance  $4000 \Omega$ .

**Reason R** : Voltmeter with higher resistance will draw smaller current than voltmeter with lower resistance.

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

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

Question Type : MCQ

Question ID : 7155051183

Option 1 ID : 7155053561

Option 2 ID : 7155053560

Option 3 ID : 7155053562

Option 4 ID : 7155053559

Status : Answered

Chosen Option : 4

**Q.13** If the velocity of light  $c$ , universal gravitational constant  $G$  and Planck's constant  $h$  are chosen as fundamental quantities. The dimensions of mass in the new system is :

- Options
1.  $[h^{-1/2} c^{1/2} G^{1/2}]$
  2.  $[h^{1/2} c^{-1/2} G^1]$
  3.  $[h^{1/2} c^{1/2} G^{-1/2}]$
  4.  $[h^1 c^1 G^{-1}]$

Question Type : MCQ

Question ID : 7155051179

Option 1 ID : 7155053546

Option 2 ID : 7155053545

Option 3 ID : 7155053544

Option 4 ID : 7155053543

Status : Answered

Chosen Option : 1

- Q.14** As shown in the figure, a long straight conductor with semicircular arc of radius  $\frac{\pi}{10}$  m is carrying current  $I = 3\text{A}$ . The magnitude of the magnetic field, at the center O of the arc is :  
(The permeability of the vacuum =  $4\pi \times 10^{-7} \text{NA}^{-2}$ )



- Options
1.  $6\mu\text{T}$
  2.  $3\mu\text{T}$
  3.  $4\mu\text{T}$
  4.  $1\mu\text{T}$

Question Type : MCQ

Question ID : 7155051182

Option 1 ID : 7155053558

Option 2 ID : 7155053556

Option 3 ID : 7155053557

Option 4 ID : 7155053555

Status : Answered

Chosen Option : 1

- Q.15** The threshold frequency of a metal is  $f_0$ . When the light of frequency  $2f_0$  is incident on the metal plate, the maximum velocity of photoelectrons is  $v_1$ . When the frequency of incident radiation is increased to  $5f_0$ , the maximum velocity of photoelectrons emitted is  $v_2$ . The ratio of  $v_1$  to  $v_2$  is :

- Options
1.  $\frac{v_1}{v_2} = \frac{1}{16}$
  2.  $\frac{v_1}{v_2} = \frac{1}{8}$
  3.  $\frac{v_1}{v_2} = \frac{1}{2}$
  4.  $\frac{v_1}{v_2} = \frac{1}{4}$

Question Type : MCQ

Question ID : 7155051187

Option 1 ID : 7155053578

Option 2 ID : 7155053577

Option 3 ID : 7155053576

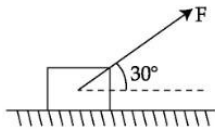
Option 4 ID : 7155053575

Status : Answered

Chosen Option : 4



- Q.16** As shown in the figure a block of mass 10 kg lying on a horizontal surface is pulled by a force  $F$  acting at an angle  $30^\circ$ , with horizontal. For  $\mu_s=0.25$ , the block will just start to move for the value of  $F$ : [Given  $g = 10 \text{ ms}^{-2}$ ]



- Options**
1. 20 N
  2. 33.3 N
  3. 25.2 N
  4. 35.7 N

Question Type : MCQ  
 Question ID : 7155051173  
 Option 1 ID : 7155053520  
 Option 2 ID : 7155053519  
 Option 3 ID : 7155053521  
 Option 4 ID : 7155053522  
 Status : Answered  
 Chosen Option : 3

- Q.17** For a body projected at an angle with the horizontal from the ground, choose the correct statement.

- Options**
1. The Kinetic Energy (K.E.) is zero at the highest point of projectile motion.
  2. The vertical component of momentum is maximum at the highest point.
  3. The horizontal component of velocity is zero at the highest point.
  4. Gravitational potential energy is maximum at the highest point.

Question Type : MCQ  
 Question ID : 7155051171  
 Option 1 ID : 7155053511  
 Option 2 ID : 7155053514  
 Option 3 ID : 7155053512  
 Option 4 ID : 7155053513  
 Status : Answered  
 Chosen Option : 1

- Q.18** The Young's modulus of a steel wire of length 6 m and cross-sectional area  $3 \text{ mm}^2$ , is  $2 \times 10^{11} \text{ N/m}^2$ . The wire is suspended from its support on a given planet. A block of mass 4 kg is attached to the free end of the wire. The acceleration due to gravity on the planet is  $\frac{1}{4}$  of its value on the earth. The elongation of wire is (Take  $g$  on the earth =  $10 \text{ m/s}^2$ ):

- Options**
1. 0.1 mm
  2. 1 mm
  3. 0.1 cm
  4. 1 cm

Question Type : MCQ  
 Question ID : 7155051175  
 Option 1 ID : 7155053527  
 Option 2 ID : 7155053529  
 Option 3 ID : 7155053528  
 Option 4 ID : 7155053530  
 Status : Answered  
 Chosen Option : 1

**Q.19** A Carnot engine operating between two reservoirs has efficiency  $\frac{1}{3}$ . When the temperature of cold reservoir raised by  $x$ , its efficiency decreases to  $\frac{1}{6}$ . The value of  $x$ , if the temperature of hot reservoir is  $99^\circ\text{C}$ , will be :

- Options**
1. 33 K
  2. 16.5 K
  3. 66 K
  4. 62 K

Question Type : MCQ  
 Question ID : 7155051176  
 Option 1 ID : 7155053532  
 Option 2 ID : 7155053531  
 Option 3 ID : 7155053534  
 Option 4 ID : 7155053533  
 Status : Answered  
 Chosen Option : 1

**Q.20** A coil is placed in magnetic field such that plane of coil is perpendicular to the direction of magnetic field. The magnetic flux through a coil can be changed :

- A. By changing the magnitude of the magnetic field within the coil.
- B. By changing the area of coil within the magnetic field.
- C. By changing the angle between the direction of magnetic field and the plane of the coil.
- D. By reversing the magnetic field direction abruptly without changing its magnitude.

Choose the most appropriate answer from the options given below :

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

Question Type : MCQ  
 Question ID : 7155051184  
 Option 1 ID : 7155053565  
 Option 2 ID : 7155053563  
 Option 3 ID : 7155053566  
 Option 4 ID : 7155053564  
 Status : Answered  
 Chosen Option : 1

Section : Physics Section B

**Q.21** A force  $F = (5 + 3y^2)$  acts on a particle in the  $y$ -direction, where  $F$  is in newton and  $y$  is in meter. The work done by the force during a displacement from  $y = 2\text{m}$  to  $y = 5\text{m}$  is \_\_\_\_\_ J.

Given 21  
 Answer :

Question Type : SA  
 Question ID : 7155051192  
 Status : Answered

**Q.22** For a train engine moving with speed of  $20\text{ ms}^{-1}$ , the driver must apply brakes at a distance of 500 m before the station for the train to come to rest at the station. If the brakes were applied at half of this distance, the train engine would cross the station with speed  $\sqrt{x}\text{ ms}^{-1}$ . The value of  $x$  is

\_\_\_\_\_.  
 (Assuming same retardation is produced by brakes)

Given 2  
 Answer :

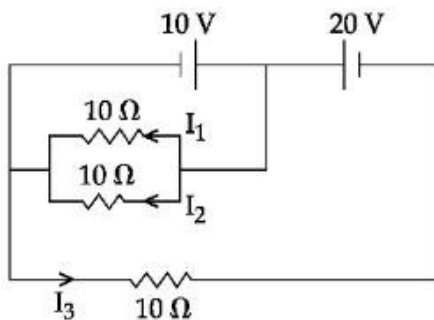
Question Type : SA  
 Question ID : 7155051191  
 Status : Answered

- Q.23** A cubical volume is bounded by the surfaces  $x = 0, x = a, y = 0, y = a, z = 0, z = a$ . The electric field in the region is given by  $\vec{E} = E_0 x \hat{i}$ . Where  $E_0 = 4 \times 10^4 \text{ NC}^{-1}\text{m}^{-1}$ . If  $a = 2 \text{ cm}$ , the charge contained in the cubical volume is  $Q \times 10^{-14} \text{ C}$ . The value of  $Q$  is \_\_\_\_\_.  
Take  $\epsilon_0 = 9 \times 10^{-12} \text{ C}^2/\text{Nm}^2$

Given --  
Answer :

Question Type : SA  
Question ID : 7155051196  
Status : Not Attempted and Marked For Review

- Q.24** In the given circuit, the value of  $\left| \frac{I_1 + I_3}{I_2} \right|$  is \_\_\_\_\_



Given 2  
Answer :

Question Type : SA  
Question ID : 7155051197  
Status : Answered

- Q.25** A square shaped coil of area  $70 \text{ cm}^2$  having 600 turns rotates in a magnetic field of  $0.4 \text{ wbm}^{-2}$ , about an axis which is parallel to one of the side of the coil and perpendicular to the direction of field. If the coil completes 500 revolution in a minute, the instantaneous emf when the plane of the coil is inclined at  $60^\circ$  with the field, will be \_\_\_\_\_ V. (Take  $\pi = \frac{22}{7}$ )

Given 44  
Answer :

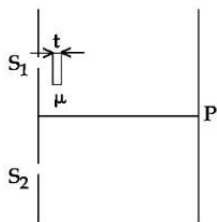
Question Type : SA  
Question ID : 7155051198  
Status : Answered

- Q.26** A block is fastened to a horizontal spring. The block is pulled to a distance  $x = 10 \text{ cm}$  from its equilibrium position (at  $x = 0$ ) on a frictionless surface from rest. The energy of the block at  $x = 5 \text{ cm}$  is  $0.25 \text{ J}$ . The spring constant of the spring is \_\_\_\_\_  $\text{Nm}^{-1}$ .

Given --  
Answer :

Question Type : SA  
Question ID : 7155051195  
Status : Not Answered

- Q.27** As shown in the figure, in Young's double slit experiment, a thin plate of thickness  $t = 10\mu\text{m}$  and refractive index  $\mu = 1.2$  is inserted in front of slit  $S_1$ . The experiment is conducted in air ( $\mu = 1$ ) and uses a monochromatic light of wavelength  $\lambda = 500\text{ nm}$ . Due to the insertion of the plate, central maxima is shifted by a distance of  $x\beta_0$ .  $\beta_0$  is the fringe-width before the insertion of the plate. The value of the  $x$  is \_\_\_\_\_.



Given --  
Answer :

Question Type : SA  
Question ID : 7155051199  
Status : Not Answered

- Q.28** Moment of inertia of a disc of mass  $M$  and radius ' $R$ ' about any of its diameter is  $\frac{MR^2}{4}$ . The moment of inertia of this disc about an axis normal to the disc and passing through a point on its edge will be,  $\frac{x}{2}MR^2$ . The value of  $x$  is \_\_\_\_\_.

Given --  
Answer :

Question Type : SA  
Question ID : 7155051193  
Status : Not Answered

- Q.29** The surface of water in a water tank of cross section area  $750\text{ cm}^2$  on the top of a house is  $h$  m above the tap level. The speed of water coming out through the tap of cross section area  $500\text{ mm}^2$  is  $30\text{ cm/s}$ . At that instant,  $\frac{dh}{dt}$  is  $x \times 10^{-3}\text{ m/s}$ . The value of  $x$  will be \_\_\_\_\_.

Given --  
Answer :

Question Type : SA  
Question ID : 7155051194  
Status : Not Answered

- Q.30** Nucleus A having  $Z = 17$  and equal number of protons and neutrons has  $1.2\text{ MeV}$  binding energy per nucleon. Another nucleus B of  $Z = 12$  has total 26 nucleons and  $1.8\text{ MeV}$  binding energy per nucleons. The difference of binding energy of B and A will be \_\_\_\_\_ MeV.

Given **45.6**  
Answer :

Question Type : SA  
Question ID : 7155051200  
Status : Answered

Section : Chemistry Section A

**Q.31** Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A) :**  $\text{Cu}^{2+}$  in water is more stable than  $\text{Cu}^+$ .

**Reason (R) :** Enthalpy of hydration for  $\text{Cu}^{2+}$  is much less than that of  $\text{Cu}^+$ .

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

Options 1. **(A)** is not correct but **(R)** is correct

2.

Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

3. **(A)** is correct but **(R)** is not correct

4.

Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**

Question Type : MCQ

Question ID : 7155051209

Option 1 ID : 7155053636

Option 2 ID : 7155053633

Option 3 ID : 7155053635

Option 4 ID : 7155053634

Status : Answered

Chosen Option : 2

**Q.32** The effect of addition of helium gas to the following reaction in equilibrium state, is :  
 $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$

Options 1.

the equilibrium will go backward due to suppression of dissociation of  $\text{PCl}_5$ .

2.

the equilibrium will shift in the forward direction and more of  $\text{Cl}_2$  and  $\text{PCl}_3$  gases will be produced.

3. helium will deactivate  $\text{PCl}_5$  and reaction will stop.

4. addition of helium will not affect the equilibrium.

Question Type : MCQ

Question ID : 7155051203

Option 1 ID : 7155053610

Option 2 ID : 7155053611

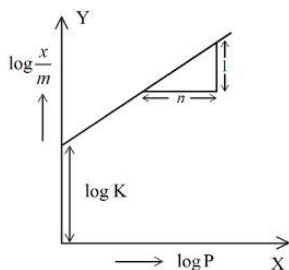
Option 3 ID : 7155053612

Option 4 ID : 7155053609

Status : Answered

Chosen Option : 4

- Q.33** In figure, a straight line is given for Freundlich Adsorption ( $y = 3x + 2.505$ ). The value of  $\frac{1}{n}$  and  $\log K$  are respectively.



Options 1. 0.3 and  $\log 2.505$

2. 3 and 2.505  
3. 3 and 0.7033  
4. 0.3 and 0.7033

Question Type : MCQ

Question ID : 7155051204

Option 1 ID : 7155053614

Option 2 ID : 7155053613

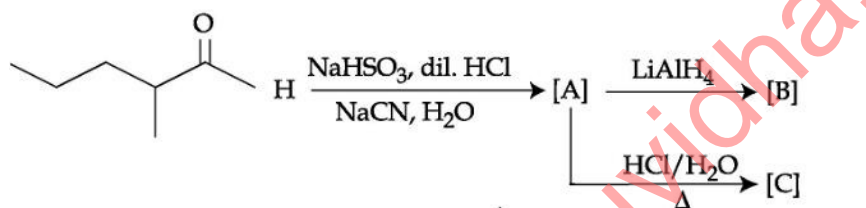
Option 3 ID : 7155053616

Option 4 ID : 7155053615

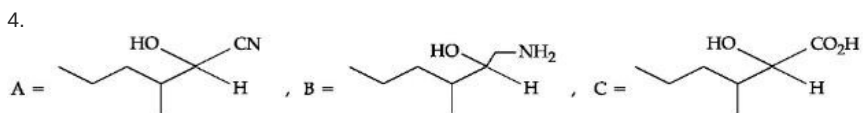
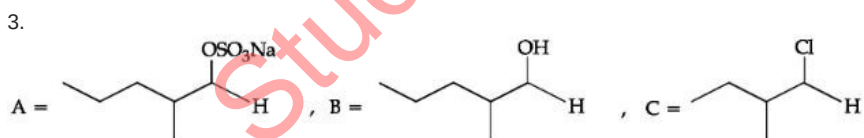
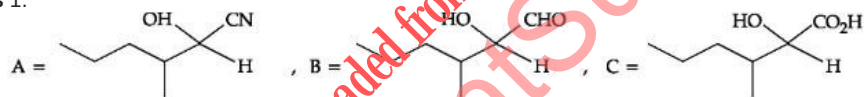
Status : Answered

Chosen Option : 2

- Q.34** The structures of major products A, B and C in the following reaction are sequence.



Options 1.



Question Type : MCQ

Question ID : 7155051216

Option 1 ID : 7155053664

Option 2 ID : 7155053661

Option 3 ID : 7155053663

Option 4 ID : 7155053662

Status : Answered

Chosen Option : 1

**Q.35** Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A)** : Gypsum is used for making fireproof wall boards.

**Reason (R)** : Gypsum is unstable at high temperatures.

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

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

Question Type : MCQ  
Question ID : 7155051207  
Option 1 ID : 7155053628  
Option 2 ID : 7155053626  
Option 3 ID : 7155053625  
Option 4 ID : 7155053627  
Status : Answered  
Chosen Option : 2

**Q.36** Which element is not present in Nessler's reagent ?

- Options
1. Mercury
  2. Iodine
  3. Potassium
  4. Oxygen

Question Type : MCQ  
Question ID : 7155051218  
Option 1 ID : 7155053672  
Option 2 ID : 7155053671  
Option 3 ID : 7155053669  
Option 4 ID : 7155053670  
Status : Answered  
Chosen Option : 4

**Q.37** The starting material for convenient preparation of deuterated hydrogen peroxide ( $D_2O_2$ ) in laboratory is :

- Options
1.  $K_2S_2O_8$
  2. BaO
  3. BaO<sub>2</sub>
  4. 2-ethylanthraquinol

Question Type : MCQ  
Question ID : 7155051206  
Option 1 ID : 7155053623  
Option 2 ID : 7155053621  
Option 3 ID : 7155053622  
Option 4 ID : 7155053624  
Status : Answered  
Chosen Option : 2

**Q.38** Which one of the following sets of ions represents a collection of isoelectronic species ?  
(Given : Atomic Number : F : 9, Cl : 17, Na = 11, Mg = 12, Al = 13, K = 19, Ca = 20, Sc = 21)

- Options
1.  $\text{N}^{3-}$ ,  $\text{O}^{2-}$ ,  $\text{F}^-$ ,  $\text{S}^{2-}$
  2.  $\text{Ba}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$
  3.  $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$
  4.  $\text{K}^+$ ,  $\text{Cl}^-$ ,  $\text{Ca}^{2+}$ ,  $\text{Sc}^{3+}$

Question Type : MCQ  
 Question ID : 7155051201  
 Option 1 ID : 7155053601  
 Option 2 ID : 7155053604  
 Option 3 ID : 7155053603  
 Option 4 ID : 7155053602  
 Status : Answered  
 Chosen Option : 1

**Q.39** Given below are two statements :

**Statement I :** Sulphanilic acid gives esterification test for carboxyl group.

**Statement II :** Sulphanilic acid gives red colour in Lassaigne's test for extra element detection.

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 **Statement I** and **Statement II** are correct
  3. Both **Statement I** and **Statement II** are incorrect
  4. **Statement I** is correct but **Statement II** is incorrect

Question Type : MCQ  
 Question ID : 7155051212  
 Option 1 ID : 7155053648  
 Option 2 ID : 7155053645  
 Option 3 ID : 7155053646  
 Option 4 ID : 7155053647  
 Status : Answered  
 Chosen Option : 2

**Q.40** Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A) :** An aqueous solution of KOH when used for volumetric analysis, its concentration should be checked before the use.

**Reason (R) :** On aging, KOH solution absorbs atmospheric  $\text{CO}_2$ .

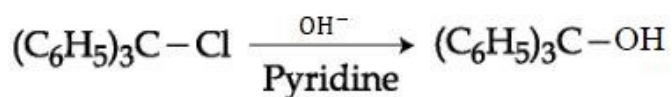
In the light of the above statements, choose the **correct** answer from the options given below :

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

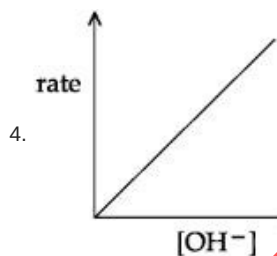
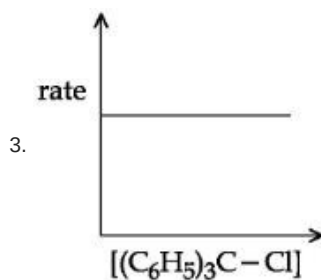
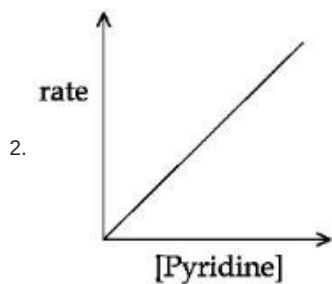
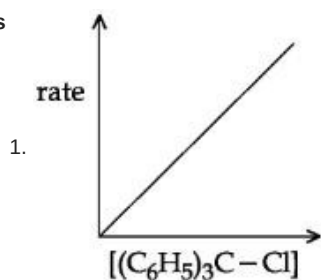
Question Type : MCQ  
 Question ID : 7155051220  
 Option 1 ID : 7155053678  
 Option 2 ID : 7155053677  
 Option 3 ID : 7155053679  
 Option 4 ID : 7155053680  
 Status : Answered  
 Chosen Option : 1



Q.41 The graph which represents the following reaction is :



Options



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Question Type : MCQ

Question ID : 7155051214

Option 1 ID : 7155053653

Option 2 ID : 7155053654

Option 3 ID : 7155053656

Option 4 ID : 7155053655

Status : Answered

Chosen Option : 1

**Q.42** O – O bond length in  $\text{H}_2\text{O}_2$  is  $\underline{X}$  than the O – O bond length in  $\text{F}_2\text{O}_2$ . The O – H bond length in  $\text{H}_2\text{O}_2$  is  $\underline{Y}$  than that of the O – F bond in  $\text{F}_2\text{O}_2$ .

Choose the correct option for  $\underline{X}$  and  $\underline{Y}$  from those given below :

- Options**
1.  $\underline{X}$  - longer,  $\underline{Y}$  - longer
  2.  $\underline{X}$  - shorter,  $\underline{Y}$  - shorter
  3.  $\underline{X}$  - shorter,  $\underline{Y}$  - longer
  4.  $\underline{X}$  - longer,  $\underline{Y}$  - shorter

Question Type : MCQ

Question ID : 7155051202

Option 1 ID : 7155053605

Option 2 ID : 7155053606

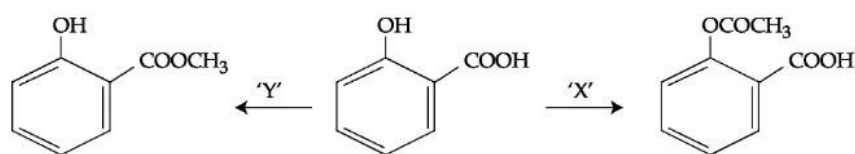
Option 3 ID : 7155053608

Option 4 ID : 7155053607

Status : Answered

Chosen Option : 2

**Q.43** In a reaction,



reagents 'X' and 'Y' respectively are :

- Options**
1.  $\text{CH}_3\text{OH}/\text{H}^+$ ,  $\Delta$  and  $(\text{CH}_3\text{CO})_2\text{O}/\text{H}^+$
  2.  $\text{CH}_3\text{OH}/\text{H}^+$ ,  $\Delta$  and  $\text{CH}_3\text{OH}/\text{H}^+$ ,  $\Delta$
  3.  $(\text{CH}_3\text{CO})_2\text{O}/\text{H}^+$  and  $(\text{CH}_3\text{CO})_2\text{O}/\text{H}^+$
  4.  $(\text{CH}_3\text{CO})_2\text{O}/\text{H}^+$  and  $\text{CH}_3\text{OH}/\text{H}^+$ ,  $\Delta$

Question Type : MCQ

Question ID : 7155051215

Option 1 ID : 7155053657

Option 2 ID : 7155053659

Option 3 ID : 7155053660

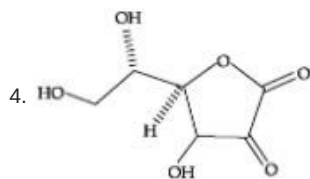
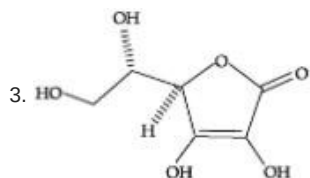
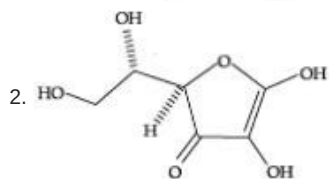
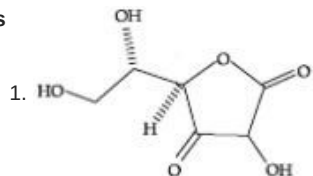
Option 4 ID : 7155053658

Status : Answered

Chosen Option : 1

Q.44 All structures given below are of vitamin C. Most stable of them is :

Options



Question Type : MCQ

Question ID : 7155051219

Option 1 ID : 7155053675

Option 2 ID : 7155053676

Option 3 ID : 7155053673

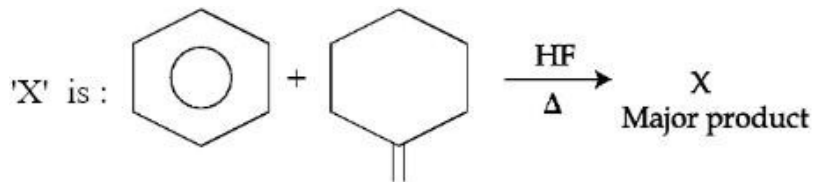
Option 4 ID : 7155053674

Status : Answered

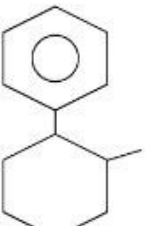
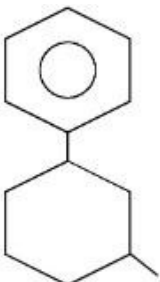
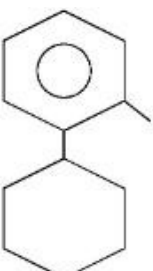
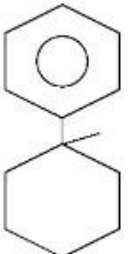
Chosen Option : 2

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Q.45



Options

1. 
2. 
3. 
4. 

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Question Type : MCQ

Question ID : 7155051213

Option 1 ID : 7155053651

Option 2 ID : 7155053652

Option 3 ID : 7155053650

Option 4 ID : 7155053649

Status : Answered

Chosen Option : 2

**Q.46** The industrial activity held least responsible for global warming is :

- Options**
1. Electricity generation in thermal power plants
  2. Industrial production of urea
  3. manufacturing of cement
  4. steel manufacturing

Question Type : **MCQ**

Question ID : **7155051211**

Option 1 ID : **7155053642**

Option 2 ID : **7155053641**

Option 3 ID : **7155053643**

Option 4 ID : **7155053644**

Status : **Answered**

Chosen Option : **3**

**Q.47** For electron gain enthalpies of the elements denoted as  $\Delta_{\text{eg}}H$ , the incorrect option is :

- Options**
1.  $\Delta_{\text{eg}}H (\text{I}) < \Delta_{\text{eg}}H (\text{At})$
  2.  $\Delta_{\text{eg}}H (\text{Cl}) < \Delta_{\text{eg}}H (\text{F})$
  3.  $\Delta_{\text{eg}}H (\text{Te}) < \Delta_{\text{eg}}H (\text{Po})$
  4.  $\Delta_{\text{eg}}H (\text{Se}) < \Delta_{\text{eg}}H (\text{S})$

Question Type : **MCQ**

Question ID : **7155051205**

Option 1 ID : **7155053620**

Option 2 ID : **7155053618**

Option 3 ID : **7155053619**

Option 4 ID : **7155053617**

Status : **Answered**

Chosen Option : **3**

**Q.48** The correct order of bond enthalpy ( $\text{kJ mol}^{-1}$ ) is :

- Options**
1.  $\text{C} - \text{C} > \text{Si} - \text{Si} > \text{Ge} - \text{Ge} > \text{Sn} - \text{Sn}$
  2.  $\text{C} - \text{C} > \text{Si} - \text{Si} > \text{Sn} - \text{Sn} > \text{Ge} - \text{Ge}$
  3.  $\text{Si} - \text{Si} > \text{C} - \text{C} > \text{Ge} - \text{Ge} > \text{Sn} - \text{Sn}$
  4.  $\text{Si} - \text{Si} > \text{C} - \text{C} > \text{Sn} - \text{Sn} > \text{Ge} - \text{Ge}$

Question Type : **MCQ**

Question ID : **7155051208**

Option 1 ID : **7155053632**

Option 2 ID : **7155053629**

Option 3 ID : **7155053630**

Option 4 ID : **7155053631**

Status : **Answered**

Chosen Option : **1**

**Q.49** Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A)** :  $\alpha$ -halocarboxylic acid on reaction with dil  $\text{NH}_3$  gives good yield of  $\alpha$ -amino carboxylic acid whereas the yield of amines is very low when prepared from alkyl halides.

**Reason (R)** : Amino acids exist in zwitter ion form in aqueous medium.

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

Options 1.

Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)

2. (A) is not correct but (R) is correct

3. (A) is correct but (R) is not correct

4.

Both (A) and (R) are correct and (R) is the correct explanation of (A)

Question Type : MCQ

Question ID : 7155051217

Option 1 ID : 7155053666

Option 2 ID : 7155053668

Option 3 ID : 7155053667

Option 4 ID : 7155053665

Status : Answered

Chosen Option : 1

**Q.50** The complex cation which has two isomers is :

Options 1.  $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$

2.  $[\text{Co}(\text{NH}_3)_5\text{NO}_2]^{2+}$

3.  $[\text{Co}(\text{NH}_3)_5\text{Cl}]^+$

4.  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$

Question Type : MCQ

Question ID : 7155051210

Option 1 ID : 7155053640

Option 2 ID : 7155053639

Option 3 ID : 7155053637

Option 4 ID : 7155053638

Status : Answered

Chosen Option : 2

Section : Chemistry Section B

**Q.51** The molality of a 10% (v/v) solution of di-bromine solution in  $\text{CCl}_4$  (carbon tetrachloride) is 'x'.

$x = \underline{\hspace{2cm}} \times 10^{-2}$  M. (Nearest integer)

[Given : molar mass of  $\text{Br}_2 = 160 \text{ g mol}^{-1}$

atomic mass of C =  $12 \text{ g mol}^{-1}$

atomic mass of Cl =  $35.5 \text{ g mol}^{-1}$

density of dibromine =  $3.2 \text{ g cm}^{-3}$

density of  $\text{CCl}_4 = 1.6 \text{ g cm}^{-3}$ ]

Given 1583

Answer :

Question Type : SA

Question ID : 7155051221

Status : Answered

**Q.52**  $A \rightarrow B$   
The above reaction is of zero order. Half life of this reaction is 50 min. The time taken for the concentration of A to reduce to one-fourth of its initial value is \_\_\_\_\_ min.  
(Nearest integer)

Given **0.7**  
Answer :

Question Type : SA  
Question ID : 7155051226  
Status : Answered

**Q.53** 0.3 g of ethane undergoes combustion at  $27^\circ\text{C}$  in a bomb calorimeter. The temperature of calorimeter system (including the water) is found to rise by  $0.5^\circ\text{C}$ . The heat evolved during combustion of ethane at constant pressure is \_\_\_\_\_  $\text{kJ mol}^{-1}$ .  
(Nearest integer)

[Given : The heat capacity of the calorimeter system is  $20 \text{ kJ K}^{-1}$ ,  $R = 8.3 \text{ JK}^{-1} \text{ mol}^{-1}$ .  
Assume ideal gas behaviour.  
Atomic mass of C and H are 12 and 1  $\text{g mol}^{-1}$  respectively]

Given --  
Answer :

Question Type : SA  
Question ID : 7155051224  
Status : Not Answered

**Q.54** The spin only magnetic moment of  $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$  complexes is \_\_\_\_\_ B.M. (Nearest integer)

(Given: Atomic no. of Mn is 25)

Given --  
Answer :

Question Type : SA  
Question ID : 7155051227  
Status : Not Answered

**Q.55** 20% of acetic acid is dissociated when its 5 g is added to 500 mL of water. The depression in freezing point of such water is \_\_\_\_\_  $10^{-3}^\circ\text{C}$ .  
Atomic mass of C, H and O are 12, 1 and 16 a.m.u. respectively.  
[Given : Molal depression constant and density of water are  $1.86 \text{ K kg mol}^{-1}$  and  $1 \text{ g cm}^{-3}$  respectively.]

Given --  
Answer :

Question Type : SA  
Question ID : 7155051223  
Status : Not Answered

**Q.56** A metal M crystallizes into two lattices :- face centred cubic (fcc) and body centred cubic (bcc) with unit cell edge length of 2.0 and 2.5 Å respectively. The ratio of densities of lattices fcc to bcc for the metal M is \_\_\_\_\_.  
(Nearest integer)

Given --  
Answer :

Question Type : SA  
Question ID : 7155051222  
Status : Not Answered

Q.57 Among the following, the number of tranquilizer/s is/are \_\_\_\_\_.

- A. Chloroliazepoxide
- B. Veronal
- C. Valium
- D. Salvarsan

Given 2  
Answer :

Question Type : SA  
Question ID : 7155051229  
Status : Answered

Q.58 Among following compounds, the number of those present in copper matte is \_\_\_\_\_.

- A.  $\text{CuCO}_3$
- B.  $\text{Cu}_2\text{S}$
- C.  $\text{Cu}_2\text{O}$
- D.  $\text{FeO}$

Given 3  
Answer :

Question Type : SA  
Question ID : 7155051228  
Status : Answered

Q.59  $1 \times 10^{-5} \text{ M AgNO}_3$  is added to 1 L of saturated solution of  $\text{AgBr}$ . The conductivity of this solution at 298 K is \_\_\_\_\_  $\times 10^{-8} \text{ S m}^{-1}$ .

[Given :  $K_{\text{sp}}(\text{AgBr}) = 4.9 \times 10^{-13}$  at 298 K

$$\lambda_{\text{Ag}^+}^0 = 6 \times 10^{-3} \text{ S m}^2 \text{ mol}^{-1}$$

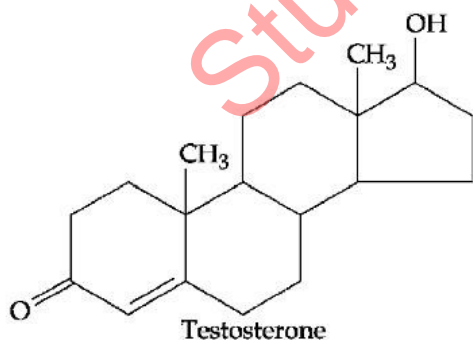
$$\lambda_{\text{Br}^-}^0 = 8 \times 10^{-3} \text{ S m}^2 \text{ mol}^{-1}$$

$$\lambda_{\text{NO}_3^-}^0 = 7 \times 10^{-3} \text{ S m}^2 \text{ mol}^{-1}]$$

Given --  
Answer :

Question Type : SA  
Question ID : 7155051225  
Status : Not Answered

Q.60 Testosterone, which is a steroidal hormone, has the following structure.



The total number of asymmetric carbon atom/s in testosterone is \_\_\_\_\_.

Given 13  
Answer :

Question Type : SA  
Question ID : 7155051230  
Status : Answered



## Section : Mathematics Section A

**Q.61** The number of integral values of  $k$ , for which one root of the equation  $2x^2 - 8x + k = 0$  lies in the interval  $(1, 2)$  and its other root lies in the interval  $(2, 3)$ , is :

- Options 1. 0  
2. 1  
3. 2  
4. 3

Question Type : MCQ  
Question ID : 7155051233  
Option 1 ID : 7155053699  
Option 2 ID : 7155053700  
Option 3 ID : 7155053701  
Option 4 ID : 7155053702  
Status : Answered  
Chosen Option : 3

**Q.62** Let  $\alpha x = \exp(x^\beta y^\gamma)$  be the solution of the differential equation  $2x^2y \, dy - (1 - xy^2) \, dx = 0$ ,  $x > 0$ ,  $y(2) = \sqrt{\log_e 2}$ . Then  $\alpha + \beta - \gamma$  equals :

- Options 1. 3  
2. 1  
3. 0  
4. -1

Question Type : MCQ  
Question ID : 7155051242  
Option 1 ID : 7155053736  
Option 2 ID : 7155053735  
Option 3 ID : 7155053738  
Option 4 ID : 7155053737  
Status : Answered  
Chosen Option : 3

**Q.63** The area of the region given by  $\{(x, y) : xy \leq 8, 1 \leq y \leq x^2\}$  is :

- Options 1.  $16 \log_e 2 - \frac{14}{3}$   
2.  $16 \log_e 2 + \frac{7}{3}$   
3.  $8 \log_e 2 - \frac{13}{3}$   
4.  $8 \log_e 2 + \frac{7}{6}$

Question Type : MCQ  
Question ID : 7155051241  
Option 1 ID : 7155053732  
Option 2 ID : 7155053734  
Option 3 ID : 7155053733  
Option 4 ID : 7155053731  
Status : Answered  
Chosen Option : 2

**Q.64** Let  $9 = x_1 < x_2 < \dots < x_7$  be in an A.P. with common difference  $d$ . If the standard deviation of  $x_1, x_2, \dots, x_7$  is 4 and the mean is  $\bar{x}$ , then  $\bar{x} + x_6$  is equal to :

Options

1.  $2\left(9 + \frac{8}{\sqrt{7}}\right)$
2. 25
3.  $18\left(1 + \frac{1}{\sqrt{3}}\right)$
4. 34

Question Type : MCQ

Question ID : 7155051247

Option 1 ID : 7155053757

Option 2 ID : 7155053755

Option 3 ID : 7155053758

Option 4 ID : 7155053756

Status : Answered

Chosen Option : 4

**Q.65** For the system of linear equations  $\alpha x + y + z = 1, x + \alpha y + z = 1, x + y + \alpha z = \beta$ , which one of the following statements is NOT correct ?

Options

1. It has no solution if  $\alpha = -2$  and  $\beta = 1$
2. It has infinitely many solutions if  $\alpha = 1$  and  $\beta = 1$
3.  $x + y + z = \frac{3}{4}$  if  $\alpha = 2$  and  $\beta = 1$
4. It has infinitely many solutions if  $\alpha = 2$  and  $\beta = -1$

Question Type : MCQ

Question ID : 7155051235

Option 1 ID : 7155053708

Option 2 ID : 7155053707

Option 3 ID : 7155053710

Option 4 ID : 7155053709

Status : Answered

Chosen Option : 1

**Q.66** Let  $P(S)$  denote the power set of  $S = \{1, 2, 3, \dots, 10\}$ . Define the relations  $R_1$  and  $R_2$  on  $P(S)$  as  $A R_1 B$  if  $(A \cap B^c) \cup (B \cap A^c) = \emptyset$  and  $A R_2 B$  if  $A \cup B^c = B \cup A^c, \forall A, B \in P(S)$ . Then :

Options

1. only  $R_1$  is an equivalence relation
2. both  $R_1$  and  $R_2$  are not equivalence relations
3. both  $R_1$  and  $R_2$  are equivalence relations
4. only  $R_2$  is an equivalence relation

Question Type : MCQ

Question ID : 7155051231

Option 1 ID : 7155053692

Option 2 ID : 7155053694

Option 3 ID : 7155053691

Option 4 ID : 7155053693

Status : Answered

Chosen Option : 1

**Q.67** Let  $P(x_0, y_0)$  be the point on the hyperbola  $3x^2 - 4y^2 = 36$ , which is nearest to the line  $3x + 2y = 1$ .  
Then  $\sqrt{2} (y_0 - x_0)$  is equal to :

- Options
1.  $-9$
  2.  $-3$
  3.  $3$
  4.  $9$

Question Type : MCQ  
Question ID : 7155051243  
Option 1 ID : 7155053739  
Option 2 ID : 7155053742  
Option 3 ID : 7155053741  
Option 4 ID : 7155053740  
Status : Not Answered  
Chosen Option : --

**Q.68** Let  $S = \left\{ x \in \mathbf{R} : 0 < x < 1 \text{ and } 2 \tan^{-1} \left( \frac{1-x}{1+x} \right) = \cos^{-1} \left( \frac{1-x^2}{1+x^2} \right) \right\}$ .

If  $n(S)$  denotes the number of elements in  $S$  then :

- Options
1.  $n(S) = 1$  and the element in  $S$  is less than  $\frac{1}{2}$ .
  2.  $n(S) = 0$
  3.  $n(S) = 1$  and the elements in  $S$  is more than  $\frac{1}{2}$ .
  4.  $n(S) = 2$  and only one element in  $S$  is less than  $\frac{1}{2}$ .

Question Type : MCQ  
Question ID : 7155051249  
Option 1 ID : 7155053763  
Option 2 ID : 7155053764  
Option 3 ID : 7155053766  
Option 4 ID : 7155053765  
Status : Answered  
Chosen Option : 1

**Q.69** Let  $\vec{a} = 2\hat{i} - 7\hat{j} + 5\hat{k}$ ,  $\vec{b} = \hat{i} + 2\hat{j} - 3\hat{k}$  and  $\vec{c} = \hat{i} + 2\hat{j} - 3\hat{k}$  be three given vectors. If  $\vec{r}$  is a vector such that  $\vec{r} \times \vec{a} = \vec{c} \times \vec{a}$  and  $\vec{r} \cdot \vec{b} = 0$ , then  $|\vec{r}|$  is equal to :

- Options
1.  $\frac{11}{7}$
  2.  $\frac{11}{7}\sqrt{2}$
  3.  $\frac{11}{5}\sqrt{2}$
  4.  $\frac{\sqrt{914}}{7}$

Question Type : MCQ  
Question ID : 7155051245  
Option 1 ID : 7155053747  
Option 2 ID : 7155053748  
Option 3 ID : 7155053749  
Option 4 ID : 7155053750  
Status : Answered  
Chosen Option : 2

**Q.70** Two dice are thrown independently. Let A be the event that the number appeared on the 1<sup>st</sup> die is less than the number appeared on the 2<sup>nd</sup> die, B be the event that the number appeared on the 1<sup>st</sup> die is even and that on the second die is odd, and C be the event that the number appeared on the 1<sup>st</sup> die is odd and that on the 2<sup>nd</sup> is even. Then :

- Options
1. B and C are independent
  2. the number of favourable cases of the events A, B and C are 15, 6 and 6 respectively
  3. A and B are mutually exclusive
  4. the number of favourable cases of the event  $(A \cup B) \cap C$  is 6

Question Type : MCQ  
 Question ID : 7155051246  
 Option 1 ID : 7155053752  
 Option 2 ID : 7155053751  
 Option 3 ID : 7155053753  
 Option 4 ID : 7155053754  
 Status : Answered  
 Chosen Option : 4

**Q.71** Let  $a, b$  be two real numbers such that  $ab < 0$ . If the complex number  $\frac{1+ai}{b+i}$  is of unit modulus and  $a + ib$  lies on the circle  $|z - I| = |2z|$ , then a possible value of  $\frac{1+[a]}{4b}$ , where  $[t]$  is greatest integer function, is :

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

Question Type : MCQ  
 Question ID : 7155051232  
 Option 1 ID : 7155053695  
 Option 2 ID : 7155053698  
 Option 3 ID : 7155053697  
 Option 4 ID : 7155053696  
 Status : Answered  
 Chosen Option : 4

**Q.72** If  $A = \frac{1}{2} \begin{bmatrix} 1 & \sqrt{3} \\ -\sqrt{3} & 1 \end{bmatrix}$ , then :

- Options
1.  $A^{30} + A^{25} - A = I$
  2.  $A^{30} = A^{25}$
  3.  $A^{30} + A^{25} + A = I$
  4.  $A^{30} - A^{25} = 2I$

Question Type : MCQ  
 Question ID : 7155051234  
 Option 1 ID : 7155053706  
 Option 2 ID : 7155053703  
 Option 3 ID : 7155053705  
 Option 4 ID : 7155053704  
 Status : Answered  
 Chosen Option : 2

**Q.73** Let the plane P pass through the intersection of the planes  $2x + 3y - z = 2$  and  $x + 2y + 3z = 6$ , and be perpendicular to the plane  $2x + y - z + 1 = 0$ . If d is the distance of P from the point  $(-7, 1, 1)$ , then  $d^2$  is equal to :

- Options
1.  $\frac{25}{83}$
  2.  $\frac{250}{83}$
  3.  $\frac{250}{82}$
  4.  $\frac{15}{53}$

Question Type : MCQ

Question ID : 7155051244

Option 1 ID : 7155053746

Option 2 ID : 7155053743

Option 3 ID : 7155053744

Option 4 ID : 7155053745

Status : Answered

Chosen Option : 1

**Q.74**

The value of the integral  $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{x + \frac{\pi}{4}}{2 - \cos 2x} dx$  is :

- Options
1.  $\frac{\pi^2}{6\sqrt{3}}$
  2.  $\frac{\pi^2}{3\sqrt{3}}$
  3.  $\frac{\pi^2}{6}$
  4.  $\frac{\pi^2}{12\sqrt{3}}$

Question Type : MCQ

Question ID : 7155051240

Option 1 ID : 7155053729

Option 2 ID : 7155053727

Option 3 ID : 7155053728

Option 4 ID : 7155053730

Status : Answered

Chosen Option : 3

**Q.75** Let  $\vec{a} = 5\hat{i} - \hat{j} - 3\hat{k}$  and  $\vec{b} = \hat{i} + 3\hat{j} + 5\hat{k}$  be two vectors. Then which one of the following statements is TRUE ?

**Options** 1.

Projection of  $\vec{a}$  on  $\vec{b}$  is  $\frac{-17}{\sqrt{35}}$  and the direction of the projection vector is opposite to the direction of  $\vec{b}$ .

2.

Projection of  $\vec{a}$  on  $\vec{b}$  is  $\frac{17}{\sqrt{35}}$  and the direction of the projection vector is opposite to the direction of  $\vec{b}$ .

3.

Projection of  $\vec{a}$  on  $\vec{b}$  is  $\frac{17}{\sqrt{35}}$  and the direction of the projection vector is same as of  $\vec{b}$ .

4.

Projection of  $\vec{a}$  on  $\vec{b}$  is  $\frac{-17}{\sqrt{35}}$  and the direction of the projection vector is same as of  $\vec{b}$ .

Question Type : MCQ

Question ID : 7155051248

Option 1 ID : 7155053760

Option 2 ID : 7155053762

Option 3 ID : 7155053761

Option 4 ID : 7155053759

Status : Answered

Chosen Option : 1

**Q.76** If  $y(x) = x^x$ ,  $x > 0$ , then  $y''(2) - 2y'(2)$  is equal to :

**Options** 1.  $8 \log_e 2 - 2$

2.  $4 \log_e 2 + 2$

3.  $4 (\log_e 2)^2 + 2$

4.  $4 (\log_e 2)^2 - 2$

Question Type : MCQ

Question ID : 7155051238

Option 1 ID : 7155053719

Option 2 ID : 7155053721

Option 3 ID : 7155053720

Option 4 ID : 7155053722

Status : Answered

Chosen Option : 1

Q.77 Let  $f : \mathbb{R} - \{0,1\} \rightarrow \mathbb{R}$  be a function such that  $f(x) + f\left(\frac{1}{1-x}\right) = 1+x$ . Then  $f(2)$  is equal to

- Options
1.  $\frac{7}{3}$
  2.  $\frac{7}{4}$
  3.  $\frac{9}{2}$
  4.  $\frac{9}{4}$

Question Type : MCQ

Question ID : 7155051236

Option 1 ID : 7155053713

Option 2 ID : 7155053714

Option 3 ID : 7155053711

Option 4 ID : 7155053712

Status : Answered

Chosen Option : 4

Q.78 The sum  $\sum_{n=1}^{\infty} \frac{2n^2 + 3n + 4}{(2n)!}$  is equal to :

- Options
1.  $\frac{11e}{2} + \frac{7}{2e} - 4$
  2.  $\frac{13e}{4} + \frac{5}{4e} - 4$
  3.  $\frac{11e}{2} + \frac{7}{2e}$
  4.  $\frac{13e}{4} + \frac{5}{4e}$

Question Type : MCQ

Question ID : 7155051237

Option 1 ID : 7155053718

Option 2 ID : 7155053717

Option 3 ID : 7155053716

Option 4 ID : 7155053715

Status : Answered

Chosen Option : 3

Q.79 Which of the following statements is a tautology ?

- Options
1.  $p \vee (p \wedge q)$
  2.  $p \rightarrow (p \wedge (p \rightarrow q))$
  3.  $(p \wedge (p \rightarrow q)) \rightarrow \sim q$
  4.  $(p \wedge q) \rightarrow (\sim(p) \rightarrow q)$

Question Type : MCQ

Question ID : 7155051250

Option 1 ID : 7155053769

Option 2 ID : 7155053767

Option 3 ID : 7155053770

Option 4 ID : 7155053768

Status : Answered

Chosen Option : 4

**Q.80** The sum of the absolute maximum and minimum values of the function

$f(x) = |x^2 - 5x + 6| - 3x + 2$  in the interval  $[-1, 3]$  is equal to :

- Options
1. 12
  2. 24
  3. 13
  4. 10

Question Type : MCQ

Question ID : 7155051239

Option 1 ID : 7155053724

Option 2 ID : 7155053726

Option 3 ID : 7155053725

Option 4 ID : 7155053723

Status : Answered

Chosen Option : 4

Section : Mathematics Section B

**Q.81** The point of intersection C of the plane  $8x + y + 2z = 0$  and the line joining the points  $A(-3, -6, 1)$  and  $B(2, 4, -3)$  divides the line segment AB internally in the ratio  $k : 1$ . If  $a, b, c$  ( $|a|, |b|, |c|$  are coprime) are the direction ratios of the perpendicular from the point C on the line  $\frac{1-x}{1} = \frac{y+4}{2} = \frac{z+2}{3}$ , then  $|a + b + c|$  is equal to \_\_\_\_\_.

Given --  
Answer :

Question Type : SA

Question ID : 7155051260

Status : Not Answered

**Q.82** If the  $x$ -intercept of a focal chord of the parabola  $y^2 = 8x + 4y + 4$  is 3, then the length of this chord is equal to \_\_\_\_\_.

Given 14  
Answer :

Question Type : SA

Question ID : 7155051258

Status : Answered

**Q.83** Number of integral solutions to the equation  $x + y + z = 21$ , where  $x \geq 1, y \geq 3, z \geq 4$ , is equal to \_\_\_\_\_.

Given 0  
Answer :

Question Type : SA

Question ID : 7155051255

Status : Answered

**Q.84** If  $\int_0^{\pi} \frac{5^{\cos x} (1 + \cos x \cos 3x + \cos^2 x + \cos^3 x \cos 3x) dx}{1 + 5^{\cos x}} = \frac{k\pi}{16}$ , then  $k$  is equal to \_\_\_\_\_.

Given 2  
Answer :

Question Type : SA

Question ID : 7155051256

Status : Answered



**Q.85** The sum of the common terms of the following three arithmetic progressions.  
 3, 7, 11, 15, . . . . ., 399,  
 2, 5, 8, 11, . . . . ., 359 and  
 2, 7, 12, 17, . . . . ., 197,  
 is equal to \_\_\_\_\_.

Given 0  
 Answer :

Question Type : SA  
 Question ID : 7155051253  
 Status : Answered

**Q.86** The line  $x = 8$  is the directrix of the ellipse  $E: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  with the corresponding focus  $(2, 0)$ . If the tangent to  $E$  at the point  $P$  in the first quadrant passes through the point  $(0, 4\sqrt{5})$  and intersects the  $x$ -axis at  $Q$ , then  $(3PQ)^2$  is equal to \_\_\_\_\_.

Given --  
 Answer :

Question Type : SA  
 Question ID : 7155051259  
 Status : Not Answered

**Q.87** If the term without  $x$  in the expansion of  $\left(x^{\frac{2}{3}} + \frac{\alpha}{x^3}\right)^{22}$  is 7315, then  $|\alpha|$  is equal to \_\_\_\_\_.

Given --  
 Answer :

Question Type : SA  
 Question ID : 7155051254  
 Status : Not Answered

**Q.88** Let  $ax + \beta y + \gamma z = 1$  be the equation of a plane passing through the point  $(3, -2, 5)$  and perpendicular to the line joining the points  $(1, 2, 3)$  and  $(-2, 3, 5)$ . Then the value of  $\alpha\beta\gamma$  is equal to \_\_\_\_\_.

Given --  
 Answer :

Question Type : SA  
 Question ID : 7155051257  
 Status : Not Answered

**Q.89** Let the sixth term in the binomial expansion of  $\left(\sqrt{2^{\log_2(10-3^x)}} + \sqrt[5]{2^{(x-2)\log_2 3}}\right)^m$ , in the increasing powers of  $2^{(x-2)\log_2 3}$ , be 21. If the binomial coefficients of the second, third and fourth terms in the expansion are respectively the first, third and fifth terms of an A.P., then the sum of the squares of all possible values of  $x$  is \_\_\_\_\_.

Given --  
 Answer :

Question Type : SA  
 Question ID : 7155051252  
 Status : Not Answered

**Q.90** The total number of six digit numbers, formed using the digits 4, 5, 9 only and divisible by 6, is

\_\_\_\_\_.

Given 2

Answer :

Question Type : SA

Question ID : 7155051251

Status : Answered

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