

Please find below the snapshots for the same:

Sl. No	Question No	Previous answer declared	Final Answer declared
19	Q2775371	C	B and C
34	Q2786410	D	A
35	Q2786417	A	D
38	Q2786404	A	D

Row Labels	Engineering Laterals (Batch 3)
Change of Key	<b>3</b>
Multiple Answer	<b>1</b>
No Change	<b>36</b>
Nullified	<b>0</b>
<b>Grand Total (Unique Questions Claimed)</b>	<b>40</b>

1) An artificial earth satellite is in space between the earth and the sun and is situated on the line joining the centres of the earth and the sun. What is the distance from the earth at which the earth's gravitational pull on the satellite is equal to and opposite to that of the sun? Take the distance between the sun and the earth as  $d$  km and mass of the sun as  $3.6 \times 10^5$  times that of the earth.

- A)  $d/600$
- B)  $d/36$
- C)  $d/37$
- D)  $d/601$

1) एक कृत्रिम भू उपग्रह अंतरिक्ष में पृथ्वी और सूर्य के मध्य है और पृथ्वी और सूर्य के केंद्रों को मिलाने वाली रेखा पर स्थित है। पृथ्वी से कितनी दूरी पर उपग्रह पर पृथ्वी का गुरुत्वाकर्षण खिंचाव सूर्य के गुरुत्वाकर्षण खिंचाव के बराबर और विपरीत होता है? सूर्य और पृथ्वी के बीच की दूरी  $d$  km और सूर्य का द्रव्यमान पृथ्वी के  $3.6 \times 10^5$  गुना के रूप में लें।

- A)  $d/600$
- B)  $d/36$
- C)  $d/37$
- D)  $d/601$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775088

Number of Claims: 11

Declared Answer Key: D

Candidate Claim: A,B,D

Final Answer: D

**Explanation:** Let 'x' be the distance of the satellite from earth where net force of gravity due to earth and

$$\frac{GM_e m}{x^2} = \frac{GM_s m}{(d-x)^2}$$
$$\Rightarrow \frac{M_e}{x^2} = \frac{M_s}{(d-x)^2}$$
$$\Rightarrow \frac{(d-x)^2}{x^2} = \frac{M_s}{M_e} = 3.6 \times 10^5$$

sun balances one another.  $\Rightarrow \frac{(d-x)^2}{x^2} = 360000$

$$\Rightarrow \frac{d-x}{x} = 600$$

$$\Rightarrow d-x = 600x$$

$$\Rightarrow x = \frac{d}{601}$$

Option (D) is correct.

**References:** <https://byjus.com/physics/lagrangian-point/>

<https://solarsystem.nasa.gov/resources/754/what-is-a-lagrange-point/>

**Conclusion:**

The final answer is option D. There is no change in the answer key.

2) Which of the following is an example of a renewable Source of Energy?

- A) Petrol
- B) Kerosene
- C) Wind
- D) Natural gas

2) निम्नलिखित में से ऊर्जा के नवीकरणीय स्रोत का उदाहरण क्या है?

- A) पेट्रोल
- B) केरोसिन
- C) हवा
- D) प्राकृतिक गैस

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775397

Number of Claims: 2

Declared Answer Key: C

Candidate Claim: A,D

Final Answer: C

**Explanation:**

Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source

**References:**

1. <https://www.eia.gov/energyexplained/wind/wind-energy-and-the-environment.php>
2. [https://books.google.co.in/books?id=I\\_FjAgAAQBAJ&printsec=frontcover&dq=which+of+the+following+is+an+example+of+a+renewable+source+of+energy&hl=en&sa=X&ved=0ahUKEwj\\_5ornyvHnAhVNwjGhFLNDX8Q6AEIKDAA#v=onepage&q=which%20of%20the%20following%20is%20an%20example%20of%20a%20renewable%20source%20of%20energy&f=false](https://books.google.co.in/books?id=I_FjAgAAQBAJ&printsec=frontcover&dq=which+of+the+following+is+an+example+of+a+renewable+source+of+energy&hl=en&sa=X&ved=0ahUKEwj_5ornyvHnAhVNwjGhFLNDX8Q6AEIKDAA#v=onepage&q=which%20of%20the%20following%20is%20an%20example%20of%20a%20renewable%20source%20of%20energy&f=false)

**Conclusion:**

The final answer is option C. There is no change in the answer key.

3) Three identical spheres, each of mass  $m$  and radius  $R$ , are placed touching each other on a horizontal plane. What is the magnitude of the gravitational force on any one of the spheres due to the other two spheres?

3) द्रव्यमान  $m$  और त्रिज्या  $R$  वाले तीन समान गोले, एक दूसरे को क्षैतिज तल पर स्पर्श करते हुए रखे गए हैं। अन्य दो गोलों के कारण किसी एक गोले पर गुरुत्वाकर्षण बल का परिमाण क्या है?

- A)  $\sqrt{3}Gm^2/4R^2$   
 B)  $\sqrt{3}Gm^2/2R^2$   
 C)  $\sqrt{2}Gm^2/3R^2$   
 D)  $Gm^2/R^2$

- A)  $\sqrt{3}Gm^2/4R^2$   
 B)  $\sqrt{3}Gm^2/2R^2$   
 C)  $\sqrt{2}Gm^2/3R^2$   
 D)  $Gm^2/R^2$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775085

Number of Claims: 11

Declared Answer Key: A

Candidate Claim: A,B,C

Final Answer: A

**Explanation:**

The system of masses are arranged such that their centers are at the vertices of an equilateral triangle of side  $2R$ .

Each sphere will experience two gravitational forces of equal magnitude.

$$F = \frac{Gm \times m}{(2R)^2} = \frac{Gm^2}{4R^2}$$

The two forces make an angle  $\frac{\pi}{3}$  with each other.

Thus, the resultant force is,

$$\begin{aligned} & \sqrt{F^2 + F^2 + 2 \times F \times F \times \cos \frac{\pi}{3}} \\ &= F \sqrt{2 + 2 \times \cos \frac{\pi}{3}} \\ &= \frac{Gm^2}{4R^2} \sqrt{2 + 2 \times \frac{1}{2}} \\ &= \sqrt{3} \frac{Gm^2}{4R^2} \end{aligned}$$

Correct option is (A).

### **References:**

<http://edshare.soton.ac.uk/2432/3/MA215ex2qu3.pdf>

<https://www.toppr.com/ask/question/three-uniform-spheres-each-having-a-mass-m-and-radius-a-are-kept-in-such/>

### **Conclusion:**

The final answer is option A. There is no change in the answer key

4) The electric field  $E_1$  at a point on the axis and  $E_2$  on the perpendicular bisector of a dipole (distance of the point from the centre of the dipole is the same) are related as

- A)  $E_1 = 2E_2$
- B)  $E_1 = 4E_2$
- C)  $E_1 = \frac{E_2}{2}$
- D)  $E_1 = E_2$

4) अक्ष पर एक बिंदु पर विद्युत क्षेत्र  $E_1$  और द्विध्रुव के लंबवत द्विभाजक पर  $E_2$  (द्विध्रुव के केंद्र से बिंदु की दूरी समान है) संबंधित हैं

- A)  $E_1 = 2E_2$
- B)  $E_1 = 4E_2$
- C)  $E_1 = \frac{E_2}{2}$
- D)  $E_1 = E_2$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775337

Number of Claims: 1

Declared Answer Key: A

Candidate Claim: D

Final Answer: A

**Explanation:**

$$E_1 = k \cdot 2p/r^2 \text{ and } E_2 = E_1 = k \cdot p/r^2$$

$$\text{On the axis, } E_1 \propto \frac{2p}{r^3}$$

$$\text{On the bisector, } E_2 \propto \frac{p}{r^3}$$

$$\therefore \frac{E_1}{E_2} = \frac{2}{1}$$

$$\Rightarrow E_1 = 2E_2$$

Correct option is (A).

**Conclusion:**

The final answer is option A. There is no change in the answer key

5) Which of the following relationships is valid for the gravitational field  $F$  at a point inside a uniform solid sphere, if radius of the solid sphere is  $R$  and the point is at a distance  $r$  from the centre of the sphere, such that  $r < R$ ?

- A)  $F \propto 1/r^2$
- B)  $F \propto 1/r^3$
- C)  $F \propto 1/r$
- D)  $F \propto r$

5) निम्नलिखित में से कौन सा संबंध एक समान ठोस गोले के अंदर एक बिंदु पर गुरुत्वाकर्षण क्षेत्र  $F$  के लिए मान्य है, यदि ठोस गोले की त्रिज्या  $R$  है और बिंदु गोले के केंद्र से  $r$  दूरी पर है, ताकि  $r < R$  हो?

- A)  $F \propto 1/r^2$
- B)  $F \propto 1/r^3$
- C)  $F \propto 1/r$
- D)  $F \propto r$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775086

Number of Claims: 4

Declared Answer Key: D

Candidate Claim: A,C,D

Final Answer: D

**Explanation:**

The gravitational field inside a solid sphere of radius ' $R$ ' at a distance ' $r$ ' from the center is given by

$$F = -GMr/R^3$$

Thus, the gravitational field is directly proportional to distance ' $r$ ', where  $r < R$ .

Option (D) is correct.

**References:**

1. <https://byjus.com/jee/gravitational-field-intensity/>

**Conclusion:**

The final answer is option D. There is no change in the answer key

6) The mass of a bucket full of water is  $15\text{ kg}$ . It is being pulled up from a  $15\text{ m}$  deep well. Due to a hole in the bucket  $6\text{ kg}$  of water flows out of the bucket. The work done in drawing the bucket out of the well is

- A)  $900\text{ J}$
- B)  $60\text{ J}$
- C)  $1500\text{ J}$
- D)  $1800\text{ J}$

6) पानी से भरी बाल्टी का द्रव्यमान  $15\text{kg}$  है। इसे  $15\text{ m}$  गहरे कुएं से खींचा जा रहा है। बाल्टी में छेद होने के कारण बाल्टी से  $6\text{kg}$  पानी बह जाता है। बाल्टी को कुएं से बाहर निकालने में किया गया कार्य है:

- A)  $900\text{ J}$
- B)  $60\text{ J}$
- C)  $1500\text{ J}$
- D)  $1800\text{ J}$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775091

Number of Claims: 1

Declared Answer Key: D

Candidate Claim: B

Final Answer: D

**Explanation:**

Work done = Average force x distance =  $15 \cdot 9.8(15+9)/2 = 1764\text{ N}$ , NCERT PHYSICS CLASS XI PART-I, PAGE-117

Loss of water per meter of upward movement =  $6/15 = 0.4\text{ kg/m}$

At any depth  $x$ , water in the bucket is  $m = (15 - 0.4x)\text{ kg}$

Work done in pulling the bucket through a height  $dx = dW = mg(dx) = (15 - 0.4x)(10)(dx)$

Integrating from  $x = 0$  to  $x = 15$

$$W = \int_0^{15} (15 - 0.4x)10dx$$

$$\Rightarrow W = \left(15x - 0.4 \frac{x^2}{2}\right)10$$

$$\Rightarrow W = (225 - 45) \times 10 = 1800\text{ J}$$

Option (D) is correct.

**Conclusion:** The final answer is option D. There is no change in the answer key

7) Which of the following is a non-conservative force? 7) निम्नलिखित में से कौन सा बल असंरक्षी बल है?

- A) Gravitational force
- B) Electrostatic force
- C) Air resistance
- D) Elastic spring force

- A) गुरुत्वाकर्षण बल
- B) स्थिरवैद्युत बल
- C) वायु प्रतिरोध
- D) प्रत्यास्थ कमानी बल

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775087

Number of Claims: 5

Declared Answer Key: C

Candidate Claim: A,B

Final Answer: C

**Explanation:**

Electrostatic force, gravitational force and spring force are the conservative forces because the workdone by these forces is path independent  
Air resistance is a non-conservative force

**References:**

1. <https://courses.lumenlearning.com/physics/chapter/7-5-nonconservative-forces/>

**Conclusion:**

The final answer is option C. There is no change in the answer key

8) A body of mass 5 KG is thrown vertically up with a kinetic energy of  $490 J$ . The height at which the kinetic energy of the body becomes half of the original value is

A)  $25 m$

B)  $5 m$

C)  $12.5 m$

D)  $10 m$

A)  $25 m$

B)  $5 m$

C)  $12.5 m$

D)  $10 m$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775093

Number of Claims: 1

Declared Answer Key: B

Candidate Claim: A

Final Answer: B

**Explanation:**

Change in kinetic energy = work done against gravity =  $mgh$

$$\Rightarrow 490/2 = 5 \times 9.8 \times h$$

$$\Rightarrow h = 5 m$$

**Reference:**

<https://www.doubtnut.com/question-answer-physics/a-body-of-mass-5-kg-is-thrown-vertically-up-with-a-kinetic-energy-of-490-j-the-height-at-which-the-ki-474051479>

**Conclusion:**

The final answer is option B. There is no change in the answer key

9) A particle moves in a straight line with retardation proportional to its displacement. Its loss of kinetic energy for any displacement  $x$  is proportional to

9) एक कण अपने विस्थापन के समानुपाती मंदन के साथ एक सीधी रेखा में चलता है। किसी भी विस्थापन  $x$  के लिए इसकी गतिज ऊर्जा का क्षय किसके समानुपाती होता है?

- A)  $x^2$
- B)  $\log_e x$
- C)  $e^x$
- D)  $x$

- A)  $x^2$
- B)  $\log_e x$
- C)  $e^x$
- D)  $x$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775092

Number of Claims: 1

Declared Answer Key: A

Candidate Claim: None of These

Final Answer: A

**Explanation:**

$$a = -kx$$

$$\Rightarrow \frac{dv}{dt} = -kx$$

We know,  $\frac{dx}{dt} = v$

$$\Rightarrow dt = \frac{dx}{v}$$

Thus,  $\frac{dv}{dt} = -kx$

$$\Rightarrow \frac{dv}{\frac{dx}{v}} = -kx$$

$$\Rightarrow v dv = -kx dx$$

For displacement 0 to  $x$ , velocity changes from  $v_1$  to  $v_2$ .

$$\int_{v_1}^{v_2} v dv = - \int_0^x kx dx$$

$$\Rightarrow \frac{1}{2}(v_2^2 - v_1^2) = -k \frac{x^2}{2}$$

$$\Rightarrow \frac{1}{2}m(v_2^2 - v_1^2) = \frac{1}{2}m(-kx^2) = \left(-\frac{1}{2}mk\right)x^2$$

$$\Rightarrow \text{Change in kinetic energy} = \text{constant} \times x^2$$

Thus, loss of kinetic energy is proportional to  $x^2$ .

**Conclusion:**

The final answer is option A. There is no change in the answer key

10) A body of mass 2 kg moves 30 m against a frictional force of 100 N. If the work is completely converted into heat, the rise in temperature of the body due to the absorption of heat is (given specific heat the material =600 J/kg K)

- A) 1.5 K
- B) 2.5 K
- C) 2.0 K
- D) 1 K

10) 2 kg द्रव्यमान का एक पिंड 100 N के घर्षण बल के विरुद्ध 30 मीटर चलता है। यदि कार्य पूरी तरह से ऊष्मा में परिवर्तित हो जाता है, तो ऊष्मा के अवशोषण के कारण पिंड के तापमान में कितनी वृद्धि होगी? ( पदार्थ की दी गई विशिष्ट ऊष्मा =600 J/kg K)

- A) 1.5 K
- B) 2.5 K
- C) 2.0 K
- D) 1 K

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775094

Number of Claims: 1

Declared Answer Key: B

Candidate Claim: A

Final Answer: B

**Explanation:**

Work done against friction = force × displacement = 100 × 30 = 3000 J

This work done is completely converted into heat.

$Q = \text{mass} \times \text{specific heat} \times \text{temperature change}$

$\Rightarrow \text{temperature change} = Q/(\text{mass} \times \text{specific heat}) = 3000/(2 \times 600) = 2.5 \text{ K}$

**Conclusion:**

The final answer is option B. There is no change in the answer key

- 11) The average speed of an object is obtained by
- A) adding the total distance travelled by the total time taken
  - B) dividing the total distance travelled by the total time taken
  - C) subtracting the total distance travelled by the total time taken
  - D) multiplying the total distance travelled by the total time taken

- 11) किसी वस्तु की औसत गति किसके द्वारा प्राप्त की जाती है
- A) तय की गई कुल दूरी को लिए गए कुल समय से जोड़कर
  - B) तय की गई कुल दूरी को लिए गए कुल समय से विभाजित करके
  - C) तय की गई कुल दूरी को लिए गए कुल समय से घटाकर
  - D) तय की गई कुल दूरी को लिए गए कुल समय से गुणा करके

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775610

Number of Claims: 1

Declared Answer Key: B

Candidate Claim: B

Final Answer: B

**Explanation:**

The framing of the question and the answer options is appropriate to arrive at the correct answer. Since, there is no discrepancy found between the claimed answer option and the declared answer key, there is no change in the answer key.

The speed of an object is found out by dividing the distance that the object covers by the time in which the object takes to cover this distance. If 'D' is the distance traveled in some time 'T' then the speed of the object for this journey or 's' is equal to  $s = D/T$ .

**References:**

1. <https://www.cuemath.com/average-speed-formula/>

**Conclusion:**

The final answer is option B. There is no change in the answer key

12) The incident beam in a plane mirror which reflects the beam of light to form a real image is

- A) divergent
- B) perpendicular
- C) parallel
- D) convergent

12) समतल दर्पण में आपतित किरण जो प्रकाश की किरण को परावर्तित करके वास्तविक प्रतिबिम्ब बनाती है, क्या कहलाती है?

- A) अपसारी
- B) लंबवत
- C) समानांतर
- D) अभिसारी

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775260

Number of Claims: 2

Declared Answer Key: D

Candidate Claim: A

Final Answer: D

**Explanation:**

The beam of light is convergent in nature.

A plane mirror cannot form a real image of a real object. However, for a virtual object (an image), converging rays incident on a plane mirror will form a real image.

**References:**

<https://www.doubtnut.com/question-answer-physics/a-plane-mirror-reflects-a-beam-of-light-to-form-a-real-image-the-incident-beam-should-be-10968311>

**Conclusion:**

The final answer is option D. There is no change in the answer key

13) Skaters are able to skate freely on snow because of the formation of water beneath the skates. This is because of the phenomenon of refreezing known as

13) स्केटर्स के नीचे पानी बनने के कारण स्केटर बर्फ पर स्वतंत्र रूप से स्केट करने में सक्षम होते हैं। यह रिक्रीजिंग की परिघटना के कारण होता है, जिसे

- A) Boiling point
- B) Freezing point
- C) Regelation
- D) Melting point

- A) क्वथनांक कहते हैं
- B) हिमांक कहते हैं
- C) विनियमन कहते हैं
- D) गलनांक कहते हैं

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775545

Number of Claims: 1

Declared Answer Key: C

Candidate Claim: C

Final Answer: C

**Explanation:**

The framing of the question and the answer options is appropriate to arrive at the correct answer. Since, there is no discrepancy found between the claimed answer option and the declared answer key, there is no change in the answer key.

Regelation is the phenomenon of melting under pressure and refreezing when the pressure is reduced. It is due to regelation that skating is possible on snow due to the formation of water. Water is formed due to the increase of pressure and it serves as a lubricant. The change of state from solid to liquid is called melting. The temperature at which the liquid and the vapour states of the substance coexist is called its boiling point. Freezing point is the temperature at which a liquid becomes a solid at normal atmospheric pressure.

**References:**

1. <https://en.wikipedia.org/wiki/Regelation>
2. <https://byjus.com/physics/regelation/>

**Conclusion:**

The final answer is option C. There is no change in the answer key

14) A spring when compressed by 4 cm has 2J energy stored in it. The force required to extend it by 8 cm will be

- A) 200 N  
B) 2000 N  
C) 2 N  
D) 20 N

14) एक कसानी को जब 4 cm संपीडित किया जाता है तो उसमें 2J ऊर्जा संग्रहित हो जाती है। इसे 8 cm तक बढ़ाने के लिए आवश्यक बल क्या होगा?

- A) 200 N  
B) 2000 N  
C) 2 N  
D) 20 N

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775102

Number of Claims: 1

Declared Answer Key: A

Candidate Claim: B

Final Answer: A

**Explanation:**

$$E = \frac{1}{2} kx^2$$

$$\Rightarrow 2 = \frac{1}{2} \times k \times 0.04^2$$

$$\Rightarrow k = 2500 \text{ N/m}$$

$$\therefore \text{Force} = kx = 2500 \times 0.08 = 200 \text{ N}$$

**References:**

<https://books.google.co.in/books?id=UyTHgJTRFhcC&pg=SA13-PA5&dq=A+spring+when+compressed+by+4+cm+has+2+j+energy+stored+in+it.+The+force+required+to+extend+it+by+8+cm+will+be&hl=en&sa=X&ved=0ahUKEwjxevUxJnTAhVLI5QKHLYLIBMEQ6AEIGTAA#v=onepage&q=A%20spring%20when%20compressed%20by%204%20cm%20has%202%20j%20energy%20stored%20in%20it.%20The%20force%20required%20to%20extend%20it%20by%208%20cm%20will%20be&f=false>

[http://electron6.phys.utk.edu/101/CH3/elastic\\_potential\\_energy.htm](http://electron6.phys.utk.edu/101/CH3/elastic_potential_energy.htm)

**Conclusion:**

The final answer is option A. There is no change in the answer key

15) The relation between  $Y$ ,  $\eta$  and  $\sigma$  is

- A)  $2Y = 2\eta ( 1 + \sigma )$
- B)  $Y = \eta ( 1 + 2\sigma )$
- C)  $Y = 2\eta ( 1 + \sigma )$
- D)  $Y = \eta ( 1 + \sigma )$

15)  $Y$ ,  $\eta$  और  $\sigma$  के बीच संबंध है

- A)  $2Y = 2\eta ( 1 + \sigma )$
- B)  $Y = \eta ( 1 + 2\sigma )$
- C)  $Y = 2\eta ( 1 + \sigma )$
- D)  $Y = \eta ( 1 + \sigma )$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775169

Number of Claims: 1

Declared Answer Key: C

Candidate Claim: D

Final Answer: C

**Explanation:**

The relation between  $Y$ ,  $\eta$  and  $\sigma$  is  $Y = 2\eta ( 1 + \sigma )$ . This is a standard equation.

**References:**

1. <https://physicsrvce.files.wordpress.com/2019/02/unit-4-elasticity.pdf>
2. <https://www.doubtnut.com/question-answer-physics/the-relation-between-youngs-modulus-y-modulus-of-rigidity-eta-and-poisson-ratio-sigma-is-127797165>

**Conclusion:**

The final answer is option C. There is no change in the answer key

16) Two artificial earth satellites A and B revolve around the earth in circular orbits of radius  $4R$  and  $R$  respectively. If the speed of A is  $4v$  then the speed of B is

- A)  $4v$
- B)  $8v$
- C)  $2v$
- D)  $v$

16) दो कृत्रिम भू उपग्रह A और B क्रमशः त्रिज्या  $4R$  और  $R$  की वृत्ताकार कक्षाओं में पृथ्वी की परिक्रमा करते हैं। यदि A की गति  $4v$  है तो B की गति क्या होगी?

- A)  $4v$
- B)  $8v$
- C)  $2v$
- D)  $v$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775081

Number of Claims: 50

Declared Answer Key: B

Candidate Claim: A,B,C,D,None of These,Wrong Framing of Question

Final Answer: B

**Explanation:**

The question has been framed correctly and candidate should not face any difficulty in arriving at the correct answer. Velocity  $v$  of a satellite varies inversely as the square root of the orbit of radius  $r$ .

$$v \propto \frac{1}{\sqrt{r}}$$

$$\therefore \frac{V_A}{V_B} = \frac{\sqrt{R_B}}{\sqrt{R_A}} = \sqrt{\frac{R}{4R}} = \frac{1}{2}$$

$$\Rightarrow \frac{4v}{V_b} = \frac{1}{2}$$

$$\Rightarrow V_B = 8v$$

Correct option is (B).

**Reference:**

<https://www.toppr.com/ask/question/two-satellites-a-and-b-go-round-the-planet-p/>

**Conclusion:**

The final answer is option B. There is no change in the answer key

17) The angle of contact of mercury with glass is

- A) 0
- B) Less than  $90^\circ$
- C)  $90^\circ$
- D) More than  $90^\circ$

17) कांच के साथ पारे का स्पर्श कोण है

- A) 0
- B)  $90^\circ$  से कम
- C)  $90^\circ$
- D)  $90^\circ$  से अधिक

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775170

Number of Claims: 1

Declared Answer Key: D

Candidate Claim: B

Final Answer: D

**Explanation:**

The angle of contact of mercury with glass is nearly 140 degrees.

Option (D) is correct.

**References:**

1. <https://www.ias.ac.in/public/Volumes/seca/007/02/0113-0117.pdf>

**Conclusion:**

The final answer is option D. There is no change in the answer key

18) The physical quantity that does not undergo any change when a ray of light passes from a denser to rarer medium is

- A) frequency
- B) refractive index
- C) wavelength
- D) velocity

18) वह भौतिक मात्रा क्या है जिसमें प्रकाश की किरण के सघन माध्यम से विरल माध्यम में जाने पर कोई परिवर्तन नहीं होता है?

- A) आवृत्ति
- B) अपवर्तक सूचकांक
- C) तरंग दैर्घ्य
- D) वेग

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775263

Number of Claims: 2

Declared Answer Key: A

Candidate Claim: B

Final Answer: A

**Explanation:**

Wavelength decreases but frequency remains the same as it is its characteristics.

Frequency of light depends on its Energy, and vice versa

$$E=hf$$

Thus to change frequency of light the energy should be changed.

But light is **quantized**, it can not lose or gain its energy partially, this means that light frequency should not be changed.

**References:**

1. <https://www.tulane.edu/~sanelson/eens211/proplight.htm>

**Conclusion:**

The final answer is option A. There is no change in the answer key

19) Which of the following is responsible for obtaining high temperatures in a solar cooker? 19) सोलर कुकर में उच्च तापमान प्राप्त करने के लिए निम्नलिखित में से कौन जिम्मेदार है?

- A) Radiation of heat
- B) Use of reflectors
- C) Greenhouse effect
- D) Absorption of heat

- A) ऊष्मा का विकिरण
- B) परावर्तकों (रिफ्लेक्टर) का उपयोग
- C) ग्रीनहाउस प्रभाव
- D) ऊष्मा का अवशोषण

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2775371

Number of Claims: 1

Declared Answer Key: C

Candidate Claim: D

Final Answer: B and C

**Explanation:**

In a solar cooker sun rays are converted into heat energy that cook the food. This heat energy is retained by glass sheets that reflects the heat radiation and trap it within the cooker. As a result, the temperature inside the cooker increases rapidly. This phenomenon is similar to greenhouse effect (C).

Use of reflectors causes the heat to be trapped in the cooker. So, option (B) is also correct.

Both option (B) and (C) are correct.

**References:**

1. <https://www.solarcooker-at-cantinawest.com/solarcooking-howitworks.html>
2. <https://www.vedantu.com/question-answer/which-part-of-the-solar-cooker-is-responsible-class-11-physics-cbse-5f63e609b12a162d4fdad117>

**Conclusion:**

Both options B and C are correct. Multiple answers.

20) Which one of the following is the sacrificial metal in galvanization process? 20) गैल्वनीकरण प्रक्रिया में निम्नलिखित में से कौन सा विकल्प बलि धातु (सैक्रिफिशियल मेटल) है?

- A) Fe
- B) Sn
- C) Zn
- D) Pb

- A) Fe
- B) Sn
- C) Zn
- D) Pb

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786641

Number of Claims: 2

Declared Answer Key: C

Candidate Claim: A, C

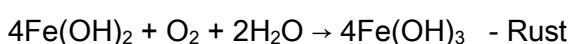
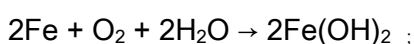
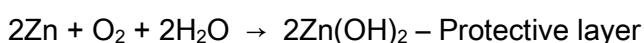
Final Answer: C

**Explanation:**

Sacrificial metals are widely used to prevent other metals from corroding: for example in galvanised steel. Many steel objects are coated with a layer of zinc, which is more reactive than iron, and thus oxidises in preference to the iron, preventing the iron from rusting.

Standard Reduction potential of Zinc ( $E^{\circ}_{Zn} = -0.76 \text{ V}$ ) is more negative than Standard Reduction potential of Iron ( $E^{\circ}_{Fe} = -0.44 \text{ V}$ ). During galvanization process, Zinc undergoes oxidation in preference to iron and forms protective layer over iron and prevent iron from rusting. Standard Reduction potential of Tin ( $E^{\circ}_{Sn} = -0.14 \text{ V}$ ) and Standard Reduction potential of Lead ( $E^{\circ}_{Pb} = -0.13 \text{ V}$ ) are less negative than Standard Reduction potential of Iron ( $E^{\circ}_{Fe} = -0.44 \text{ V}$ ). So, they will not undergo oxidation in preference to iron and cannot prevent iron from rusting.

Zinc occupies higher position than iron in EMF series and hence it undergoes oxidation in preference to iron. Both Tin and Lead occupy lower position than iron in EMF series and hence it cannot undergo oxidation in preference to iron.



Zinc forms protective layer of zinc hydroxide and prevent the formation of rust from iron.

Galvanization or galvanizing is the process of applying a protective zinc coating to steel or iron, to prevent rusting.

The snapshot below can be referred to.

Sacrificial anodes generally come in three metals: magnesium, aluminum, and zinc. Magnesium has the most negative electropotential of the three (see galvanic series, right) and is more suitable for on-shore pipelines where the electrolyte (soil or water) resistivity is higher. If the difference in electropotential is too great, the protected surface (cathode) may become brittle or cause disbonding of the coating.

**References:**

General and Inorganic Chemistry by P.K. Dutt, Sarat Book House, 8th Edn, 1986, p-216

<https://www.nationalmaterial.com/galvanized-steel-types-uses-benefits/>

**Conclusion:**

The final answer is option C. There is no change in the answer key.

21) Hair dyes contain

- A) Copper sulphate
- B) Copper nitrate
- C) Silver nitrate
- D) Gold chloride

21) बालों के रंगों (हेयर डाय) में क्या मिला होता है?

- A) कॉपर सल्फेट
- B) कॉपर नाइट्रेट
- C) सिल्वर नाइट्रेट
- D) गोल्ड क्लोराइड

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786622

Number of Claims: 3

Declared Answer Key: C

Candidate Claim: A,B,D

Final Answer: C

**Explanation:**

Silver nitrate get reduced due to proteins of hair.

When hair dye containing silver nitrate is treated with hair, the proteins of hair reduces silver nitrate to silver, which is black in colour. Proteins of hair will not react with copper salts. Gold salts will not give black colour.

Hair dye is used to get black colour for hair and hence silver nitrate is used in hair dye.

The snapshot below can be referred to.

Silver nitrate is used in making hair dyes because it reduced to metallic silver and finely divided silver is black in colour.

**References:**

Dinesh Objective Chemistry, by P.N. Kapil, Vol-3,p-I-589

<https://www.zigya.com/previous-year-papers/JEE/12/Chemistry/2008/JEE2008005/CHENJE12192494/10>

[https://en.wikipedia.org/wiki/Hair\\_coloring](https://en.wikipedia.org/wiki/Hair_coloring)

**Conclusion:**

The final answer is option C. There is no change in the answer key.

22) The first scientist to coin the term SMOG is

- A) Stephen Hawking
- B) Sigmund Freud
- C) Charles Darwin
- D) Dr. Henry Antoine Des Voeux

22) SMOG शब्द को गढ़ने वाले पहले वैज्ञानिक का नाम है

- A) स्टीफन हॉकिंग
- B) सिगमंड फ्रायड
- C) चार्ल्स डार्विन
- D) डॉ. हेनरी एंटनी डेस वोक्स

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2785540

Number of Claims: 1

Declared Answer Key: D

Candidate Claim: B

Final Answer: D

**Explanation:**

Environmental Protection Act was enacted in the year 1986.

Smog is a mixture of smoke and fog in the air. Smog gives air pollution. In 1905, smoke known as photochemical smog, is coined by Dr.Henry Antoine Des Voeux.

Stephen Hawking inventing the theoretical prediction about black holes emit the radiation.

Sigmund Freud is famous for inventing and developing the technique of psychoanalysis.

Charles Darwin's theory of evolution states that evolution happens by natural selection.

Coinage of the term "smog" is often attributed to Dr. Henry Antoine Des Voeux in his 1905 paper, "Fog and Smoke" for a meeting of the Public Health Congress.

Smog is formed due to the reactions of carbon monoxide, nitrogen oxides, volatile organic compounds and hydrocarbons.

The first scientist to coin the term SMOG is Dr. Henry Antoine Des Voeux.

The snapshot below can be referred to.

## How Did Smog Get Its Name?

The term "**smog**" was first used in London during the early 1900's to describe the combination of smoke and fog that often blanketed the city. According to several sources, the term was first coined by Dr. Henry Antoine des Voeux in his paper, "**Fog and Smoke**," which he presented at a meeting of the Public Health Congress in July 1905. The type of smog described by Dr. des Voeux was a combination of smoke and sulphur dioxide, which resulted from the heavy use of coal to heat homes and businesses and to run factories in Victorian England.

### References:

General Science Standard Eight, Maharashtra State Bureau of Textbook Production & Curriculum Research, Pune

<http://cart.ebalbharati.in/BalBooks/pdfs/803020012.pdf>

[http://nbriervis.nic.in/Database/Smog\\_2051.aspx?format=Print](http://nbriervis.nic.in/Database/Smog_2051.aspx?format=Print)

<https://en.wikipedia.org/wiki/Smog>

### Conclusion:

The final answer is option D. There is no change in the answer key.

- 23) The sources of power plant pollution can be classified as
- 23) बिजली संयंत्र प्रदूषण के स्रोतों को वर्गीकृत किया जा सकता है:
- A) Diffuse
- A) बिखरा हुआ
- B) Point source
- B) बिंदु स्रोत
- C) Both point and diffuse
- C) बिंदु स्रोत और बिखरा हुआ दोनों
- D) Neither point nor diffuse
- D) न बिंदु स्रोत और न ही बिखरा हुआ

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2785550

Number of Claims: 2

Declared Answer Key: A

Candidate Claim: B, Wrong Framing of Question

Final Answer: A

**Explanation:**

The question has been framed correctly and candidate should not face any difficulty in arriving at the correct answer.

Point-source pollution comes from a single place.

Diffuse does not originate from a single discrete source. It comes from many places.

Though Factories and power plants can be a source of point-source pollution, affecting both air and water, they are major contributors to acid rain. Acid rain forms in the atmosphere when sulphur dioxide and nitrogen oxides combine with water. Because acid rain results from the long-range movement of those pollutants from many factories and power plants, it is considered nonpoint-source pollution (Diffuse).

Power plants can contribute to the formation of acid rain (nitric acid, sulphuric acid and hydrochloric acid, etc.) since they produce oxides of nitrogen and sulphur through their exhaust. So, the sources of power plant pollution can be classified as Diffuse.

**References:**

<https://www.nationalgeographic.org/encyclopedia/point-source-and-nonpoint-sources-pollution/>

**Conclusion:**

The final answer is option A. There is no change in the answer key.

- 24) The metal which mostly found in native state is 24) प्राकृत अवस्था में सर्वाधिक पायी जाने वाली धातु कौन सी है?
- A) Calcium A) कैल्शियम
- B) gold B) गोल्ड
- C) copper C) कॉपर
- D) silver D) सिल्वर

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786616

Number of Claims: 1

Declared Answer Key: B

Candidate Claim: C

Final Answer: B

**Explanation:**

Metal which are not reactive occur in nature in free state. As gold is not reactive, so it is found in free state.

Standard Reduction potential of gold is ( $E^{\circ}_{Au} = +1.50$  V) which is more positive than that of copper ( $E^{\circ}_{Cu} = +0.34$  V), silver ( $E^{\circ}_{Ag} = +0.80$  V) and calcium ( $E^{\circ}_{Ca} = -2.87$  V). So gold is less reactive. Hence, the metal which mostly found in native state is gold.

The most important ore mineral of silver is argentite ( $Ag_2S$ , silver sulfide).

There are two main copper ore types of interest, copper oxide ores and copper sulfide ores.

The most common calcium compound found on Earth is calcium carbonate.

The major ore of gold contain gold in its native form.

[Note: Though copper may be available in its native form, its availability is very less.]

The snapshot below can be referred to.

Gold, silver, platinum, etc occur in free state. Since Gold, Platinum and Silver are the least reactive metals, hence they are found in free state in nature.

**References:**

Inorganic Chemistry: Chemical Elements and their Compound by R.L. Dutta, 6th Edn, The New Book Stall, 2010, p- 460

<https://www.google.com/search?q=ore+of+gold+name&oq=ore+of+gol&aqs=chrome..69i57j0i512i4j0i22i30i5.7744j0j7&sourceid=chrome&ie=UTF-8>

<https://byjus.com/questions/name-the-metal-which-is-found-in-free-state/>

<https://www.google.com/search?q=ore+of+silver+name&oq=ore+of+silver+name&aqs=chrome..69i57j0i8i30i4j0i390.11122j0j7&sourceid=chrome&ie=UTF-8>

<https://www.google.com/search?q=ore+of+calcium+name&oq=ore+of+calcium+name&aqs=chrome..69i57j0i8i30j0i390i2.12953j0j7&sourceid=chrome&ie=UTF-8>

[https://en.wikipedia.org/wiki/List\\_of\\_copper\\_ores](https://en.wikipedia.org/wiki/List_of_copper_ores)

**Conclusion:**

The final answer is option B. There is no change in the answer key.

25) Which of the following elements improves the corrosion resistance in steel?

- A) Vanadium
- B) Manganese
- C) Chromium
- D) Nickel

25) निम्नलिखित में से कौन सा तत्व इस्पात (स्टील) के संक्षारण प्रतिरोध में सुधार करता है?

- A) वैनेडियम
- B) मँगनीज
- C) क्रोमियम
- D) निकल

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786534

Number of Claims: 1

Declared Answer Key: C

Candidate Claim: D

Final Answer: C

**Explanation:**

Corrosion resistance was improved via the formation of an oxide film by selective oxidation.

Both manganese and chromium improve corrosion resistance of steel; however, chromium has a greater effect than manganese.

Corrosion resistance of steel is not improved by Vanadium and Nickel.

The element which improves the corrosion resistance in steel is chromium. Chromium forms oxide layer over steel and improve its corrosion resistance.

The snapshot below can be referred to.

Chromium added to carbon steel in percentages usually greater than 11% creates [stainless steel](#). At this percentage and greater, the corrosion resistance of a steel vastly increases and oxidation of the iron is prevented in many conditions. The iron does not oxidize because the chromium will oxidize first and form a protective layer over the steel. Chromium also helps to improve mechanical properties, even in smaller amounts. It will increase the steel's strength, hardness, and ability to be heat treated.

**References:**

<https://www.metalsupermarkets.com/5-common-alloying-elements/>

<https://www.hindawi.com/journals/amse/2018/7638274/>

**Conclusion:**

The final answer is option C. There is no change in the answer key.

26) The alloy 'stellites' contains

- A) Zn
- B) Mn
- C) Cu
- D) Co

26) मिश्र धातु 'स्टेलाइट' में क्या मिला होता है?

- A) Zn
- B) Mn
- C) Cu
- D) Co

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786633

Number of Claims: 1

Declared Answer Key: D

Candidate Claim: C

Final Answer: D

**Explanation:**

The alloy 'stellites' contains mainly Iron and Cobalt. It is used as a hard corrosive resistant alloy.

Stellite alloys are a range of cobalt-based alloys. All Stellite alloys will not contain zinc, copper and manganese.

The alloy 'stellites' contains Co. They are designed to be resistant to wear and corrosion.

The snapshot below can be referred to.

The Stellite alloys are mostly cobalt based with additions of Cr, C, W, and/or Mo. They are resistant to cavitation, corrosion, erosion, abrasion, and galling. The lower carbon alloys are generally recommended for cavitation, sliding wear, or moderate galling. The higher carbon alloys are usually selected for abrasion, severe galling, or low- angle erosion. Stellite 6 is our most popular alloy as it provides a good balance of all of these properties.

**References:**

Inorganic Chemistry: Chemical Elements and their Compounds by R.L. Dutta, 6th Edn, The New Book Stall, 2010, p-438.

[https://www.cocralloys.com/supply/cobalt-chromium-tungsten-alloy-6?gclid=EAlaIQobChMI-pnyzquk8wIVztGWCh3cQQ9REAAAYASAAEgLM-PD\\_BwE](https://www.cocralloys.com/supply/cobalt-chromium-tungsten-alloy-6?gclid=EAlaIQobChMI-pnyzquk8wIVztGWCh3cQQ9REAAAYASAAEgLM-PD_BwE)

**Conclusion:**

The final answer is option D. There is no change in the answer key.

27) In which of the following electrostatic spray painting operation an electrode is immersed in the paint supply reservoir or the paint supply conduit?

- A) Fast charging
- B) Tribo charging
- C) Direct charging
- D) Post-atomization charging

27) निम्नलिखित में से किस इलेक्ट्रोस्टैटिक स्प्रे पेंटिंग ऑपरेशन में पेंट आपूर्ति जलाशय या पेंट आपूर्ति नाली में एक इलेक्ट्रोड डुबोया जाता है?

- A) फास्ट चार्जिंग
- B) ट्राइबो चार्जिंग
- C) डायरेक्ट चार्जिंग
- D) परमाणुकरण के बाद चार्जिंग

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786517

Number of Claims: 1

Declared Answer Key: C

Candidate Claim: C

Final Answer: C

**Explanation:**

The framing of the question and the answer options is appropriate to arrive at the correct answer. Since, there is no discrepancy found between the claimed answer option and the declared answer key, there is no change in the answer key.

- Direct charging: An electrode is immersed in the paint supply reservoir or the paint supply conduit.
- Tribo charging: This uses the friction of the fluid which is forced through the barrel of the paint gun. It rubs against the side of the barrel and builds up an electrostatic charge.
- Post-atomization charging: The atomized fluid comes into contact with an electrostatic field downstream of the outlet nozzle. The electrostatic field may be created by electrostatic induction or corona, or by one or more electrodes (electrode ring, mesh, or grid).
- Fast charging is not used in spray painting.

**In Direct charging**, an electrode is immersed in the paint supply reservoir or the paint supply conduit. It is an electrostatic spray painting operation.

**References:**

ITI - Painter general - NIMI & DGT Pattern - Computech publications - M.P. Singh

<https://www.anest-iwata.co.jp/english/coating/electrostaticequipment/ta2vfs0000004gpm.html>

[https://en.wikipedia.org/wiki/Spray\\_painting](https://en.wikipedia.org/wiki/Spray_painting)

**Conclusion:** The final answer is option C. There is no change in the answer key.

28) The percentage of carbon in steel is approximately

- A) 10%
- B) 2%
- C) 5%
- D) 3%

28) स्टील में कार्बन का प्रतिशत लगभग कितना होता है?

- A) 10%
- B) 2%
- C) 5%
- D) 3%

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786634

Number of Claims: 5

Declared Answer Key: B

Candidate Claim: B

Final Answer: B

**Explanation:**

The framing of the question and the answer options is appropriate to arrive at the correct answer. Since, there is no discrepancy found between the claimed answer option and the declared answer key, there is no change in the answer key.

Carbon steel is a steel with carbon content from about 0.05 up to 2.1 percent by weight.

As the carbon percentage content rises, steel has the ability to become harder and stronger through heat treating; however, it becomes less ductile. Regardless of the heat treatment, higher carbon content reduces weldability. In carbon steels, the higher carbon content lowers the melting point.

The percentage of carbon content in steel is approximately 2%. Higher percentages of carbon should not be used in steel.

**References:**

Inorganic Chemistry: Chemical Elements and their Compounds by R.L. Dutta, 6th Edn, The New Book Stall, 2010

<https://www.metalsupermarkets.com/types-of-steel/>

[https://en.wikipedia.org/wiki/Carbon\\_steel](https://en.wikipedia.org/wiki/Carbon_steel)

**Conclusion:**

The final answer is option B. There is no change in the answer key.

29) Hollow thermoplastic products are primarily fabricated by

- A) Compression moulding
- B) Rotational moulding
- C) Calendering
- D) Injection moulding

29) खोखले थर्मोप्लास्टिक उत्पाद प्राथमिक रूप से इसके द्वारा बनाया जाता है

- A) संपीड़न मोल्डिंग
- B) घूर्णी मोल्डिंग
- C) वर्णनावली
- D) इंजेक्शन मोल्डिंग

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786597

Number of Claims: 1

Declared Answer Key: B

Candidate Claim: A

Final Answer: B

**Explanation:**

Rotational moulding is a process used for producing hollow plastic products. By using additional post-moulding operations, complex components can be produced enabling the process to compete effectively with other moulding and extrusion practices.

Compression Moulding is the common technique for moulding thermosets. Compound or blend is placed in mould and heated under pressure within the platens of a steam-heated press. When reaction is complete, product is cooled and ejected.

Injection Moulding is a fast process and is used to produce large numbers of identical items from high precision engineering components to disposable consumer goods. Injection Moulding of thermosets is used to avoid hardening of the plastic in the machine.

Calendering is a speciality process for high-volume, high quality plastic film and sheet, mainly used for PVC as well as for certain other modified thermoplastics. The melted polymer is subject to heat and pressure in an extruder and formed into sheet or film by calendering rolls.

Hollow thermoplastic products are primarily Rotational moulding. It provides the following advantages: Economically produced large products, Minimum design constraints, Stress-free products, No polymer weld lines and Comparatively low mould costs.

The snapshot below can be referred to.

Rotational moulding (often referred to as Rotamoulding or Rotomoulding) is a process used for producing hollow plastic products. By using additional post-moulding operations, complex components can be produced enabling the process to compete effectively with other moulding and extrusion practices.

**References:**

<https://www.bpf.co.uk/plastipedia/processes/default.aspx>

<https://officemianye.com/hxak/production-process-of-manufacturing-plastic-products>

**Conclusion:**

The final answer is option B. There is no change in the answer key.

30) The reaction at anode, in a lead acid battery during discharge is

- A)  $Pb + PbO_2 + 2H_2SO_4 \longrightarrow 2PbSO_4 + 2H_2O$   
 B)  $Pb^{2+} + 2e^- \longrightarrow Pb$   
 C)  $Pb + H_2SO_4 \longrightarrow PbSO_4 + 2H^+ + 2e^-$   
 D)  $PbSO_4 + 2H_2O \longrightarrow PbO_2 + SO_4^{2-} + 4H^+ + 2e^-$

30) डिस्चार्ज के दौरान, लेड एसिड बैटरी में एनोड पर निम्नलिखित अभिक्रिया होती है।

- A)  $Pb + PbO_2 + 2H_2SO_4 \longrightarrow 2PbSO_4 + 2H_2O$   
 B)  $Pb^{2+} + 2e^- \longrightarrow Pb$   
 C)  $Pb + H_2SO_4 \longrightarrow PbSO_4 + 2H^+ + 2e^-$   
 D)  $PbSO_4 + 2H_2O \longrightarrow PbO_2 + SO_4^{2-} + 4H^+ + 2e^-$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2780874

Number of Claims: 3

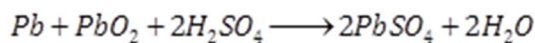
Declared Answer Key: C

Candidate Claim: B

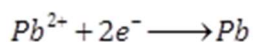
Final Answer: C

**Explanation:**

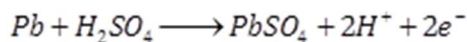
i) Overall reaction for discharging process of lead acid battery is



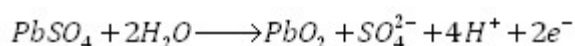
ii) Anode reaction for recharging process of lead acid battery is



iii) Anode reaction for discharging process of lead acid battery is



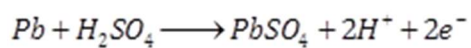
iv) Cathode reaction for recharging process of lead acid battery is



Option C: At anode, for lead acid battery during discharge, lead reacts with sulphuric acid to give lead sulphate.

Lead acid battery is a secondary battery.

The reaction at anode, in a lead acid battery during discharge is

**References:**

[https://www.google.co.in/books/edition/Oswaal\\_Gujarat\\_GSEB\\_NCERT\\_Solutions\\_Text/bcGkDwAAQBAJ?hl=en&gbpv=1&dq=The+reaction+at+anode,+in+a+lead+acid+battery+during+discharge+is&pg=PA74&printsec=frontcover](https://www.google.co.in/books/edition/Oswaal_Gujarat_GSEB_NCERT_Solutions_Text/bcGkDwAAQBAJ?hl=en&gbpv=1&dq=The+reaction+at+anode,+in+a+lead+acid+battery+during+discharge+is&pg=PA74&printsec=frontcover)

[https://en.wikipedia.org/wiki/Lead%E2%80%93acid\\_battery](https://en.wikipedia.org/wiki/Lead%E2%80%93acid_battery)

**Conclusion:**

The final answer is option C. There is no change in the answer key.

31) Which of the following combination is CORRECTLY explaining spectral series?

- A) Balmer,  $n_1=1$  to  $n_2=3,4,\dots$ ; Pascher,  $n_1=1$  to  $n_2=4,5,\dots$ ; Bracket,  $n_1=1$  to  $n_2=4,5,6,\dots$
- B) Balmer,  $n_1=1$  to  $n_2=2,3,4,\dots$ ; Pascher,  $n_1=1$  to  $n_2=3,4,5,\dots$ ; Bracket,  $n_1=1$  to  $n_2=4,5,6,\dots$
- C) Balmer,  $n_1=1$  to  $n_2=3,4,\dots$ ; Pascher,  $n_1=1$  to  $n_2=2,3,4,5,\dots$ ; Bracket,  $n_1=1$  to  $n_2=4,5,6,\dots$
- D) Balmer,  $n_1=1$  to  $n_2=3,4,\dots$ ; Pascher,  $n_1=1$  to  $n_2=4,5,\dots$ ; Bracket,  $n_1=1$  to  $n_2=5,6,\dots$

31) निम्नलिखित में से कौन सा संयोजन, स्पेक्ट्रल श्रृंखला की सही व्याख्या कर रहा है?

- A) बॉमर,  $n_1=1$  से  $n_2=3,4,\dots$ ; पास्चर,  $n_1=1$  से  $n_2=4,5,\dots$ ; ब्रैकेट,  $n_1=1$  से  $n_2=4,5,6,\dots$
- B) बॉमर,  $n_1=1$  से  $n_2=2,3,4,\dots$ ; पास्चर,  $n_1=1$  से  $n_2=3,4,5,\dots$ ; ब्रैकेट,  $n_1=1$  से  $n_2=4,5,6,\dots$
- C) बॉमर,  $n_1=1$  से  $n_2=3,4,\dots$ ; पास्चर,  $n_1=1$  से  $n_2=2,3,4,5,\dots$ ; ब्रैकेट,  $n_1=1$  से  $n_2=4,5,6,\dots$
- D) बॉमर,  $n_1=1$  से  $n_2=3,4,\dots$ ; पास्चर,  $n_1=1$  से  $n_2=4,5,\dots$ ; ब्रैकेट,  $n_1=1$  से  $n_2=5,6,\dots$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2780526

Number of Claims: 3

Declared Answer Key: D

Candidate Claim: None of These

Final Answer: D

**Explanation:**

In Balmer series, transition of electron from any other shell (third, fourth etc) to second shell occurs.

In Pascher series, transition of electron from any other shell (fourth, fifth etc) to third shell occurs.

In Bracket series, transition of electron from any other shell (fifth, sixth etc) to fourth shell occurs.

Option A) Bracket,  $n_2=4,5,6,\dots$  is not correct

Option B) Balmer,  $n_2=2,3,4,\dots$ ; Pascher,  $n_2=3,4,5,\dots$ ; Bracket,  $n_2=4,5,6,\dots$  are not correct

Option C) Pascher,  $n_2=2,3,4,5,\dots$ ; Bracket,  $n_2=4,5,6,\dots$  are not correct

The correct answer is Option D) Balmer,  $n_1=2$  to  $n_2=3,4,\dots$ ; Pascher,  $n_1=3$  to  $n_2=4,5,\dots$ ; Bracket,  $n_1=4$  to  $n_2=5,6,\dots$

**References:** [https://en.wikipedia.org/wiki/Hydrogen\\_spectral\\_series](https://en.wikipedia.org/wiki/Hydrogen_spectral_series)

**Conclusion:**

The final answer is option D. There is no change in the answer key.

$$32) \cot 7\frac{1}{2}^\circ =$$

- A)  $\sqrt{2} - \sqrt{3} + \sqrt{4} + \sqrt{6}$
- B)  $\sqrt{2} + \sqrt{3} - \sqrt{4} + \sqrt{6}$
- C)  $\sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6}$
- D)  $\sqrt{2} + \sqrt{3} + \sqrt{4} - \sqrt{6}$

$$32) \cot 7\frac{1}{2}^\circ =$$

- A)  $\sqrt{2} - \sqrt{3} + \sqrt{4} + \sqrt{6}$
- B)  $\sqrt{2} + \sqrt{3} - \sqrt{4} + \sqrt{6}$
- C)  $\sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6}$
- D)  $\sqrt{2} + \sqrt{3} + \sqrt{4} - \sqrt{6}$

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2780927

Number of Claims: 2

Declared Answer Key: C

Candidate Claim: B, D

Final Answer: C

**Explanation:**

$$\textcircled{18} \cot 7\frac{1}{2}^\circ = ?$$

$$\text{Let } \theta = 7\frac{1}{2}^\circ, \Rightarrow \text{Then } \cot 2\theta = \tan(90^\circ - 2\theta) = \cot \theta$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{2 \cos^2 \theta}{2 \sin \theta \cos \theta} = \frac{1 + \cos 2\theta}{\sin 2\theta}$$

$$\cot 15^\circ = \frac{1 + \cos 30^\circ}{\sin 30^\circ} = \frac{1 + \frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{2 + \sqrt{3}}{1} = 2 + \sqrt{3}$$

$$\cot 7\frac{1}{2}^\circ = \frac{1 + \frac{\sqrt{3}+1}{2\sqrt{2}}}{\frac{\sqrt{3}-1}{2\sqrt{2}}} = \frac{2\sqrt{2} + \sqrt{3} + 1}{\sqrt{3}-1} = \frac{(2\sqrt{2} + \sqrt{3} + 1)(\sqrt{3}+1)}{3-1}$$

$$= \frac{2\sqrt{6} + 2\sqrt{2} + 4 + 2\sqrt{3}}{2} = \sqrt{6} + \sqrt{2} + 2 + \sqrt{3}$$

Ans (3) cl level A3.

**Conclusion:**

The final answer is option C. There is no change in the answer key.

- 33) Number of terms in partial fraction resolving  $\frac{2x^2+x+3}{x^2-9}$  of  $\frac{2x^2+x+3}{x^2-9}$  को हल करने में आंशिक भिन्न में पदों की संख्या क्या होगी?
- A) 2  
B) 3  
C) 4  
D) 1
- A) 2  
B) 3  
C) 4  
D) 1

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786423

Number of Claims: 1

Declared Answer Key: B

Candidate Claim: D

Final Answer: B

**Explanation:**

$$\text{Fraction} = \frac{4}{x-3} - \frac{3}{x+3} + 2$$

Hence: 3 terms.

**Conclusion:**

The final answer is option B. There is no change in the answer key.

- 34) Mantissa part of in finding the antilog of -2.7080      34) -2.7080 के एंटीलॉग को ज्ञात करने में अपूर्णाश (मंटिसा) का भाग क्या है?
- A) 0.292      A) 0.292  
B) 2      B) 2  
C) 3      C) 3  
D) 0.708      D) 0.708

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786410

Number of Claims: 1

Declared Answer Key: D

Candidate Claim: A

Final Answer: A

**Explanation:**

$-2.7080 + 3 - 3 = -3 + 0.292$ , Hence mantissa is 0.292.

**Conclusion:**

The final answer is option A. There is change from option D to A.

35) Number of partial fractions in the resolving of  $\frac{x-1}{(x-1)(x-2)}$  35)  $\frac{x-1}{(x-1)(x-2)}$  को हल करने में आंशिक भिन्नों की संख्या क्या होगी?

- A) 2
- B) 4
- C) 3
- D) 1

- A) 2
- B) 4
- C) 3
- D) 1

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786417

Number of Claims: 2

Declared Answer Key: A

Candidate Claim: B, C

Final Answer: D

**Explanation:**

Simplifying and writing as  $1/(x-2)$

Hence: 1 term.

**Conclusion:**

The final answer is option D. There is change from option A to D.

36) Parts of Logarithm of any number

- A) Base and exponent
- B) base and mantissa
- C) characteristic and exponent
- D) characteristic and mantissa

36) किसी भी संख्या के लघुगणक के भाग

- A) आधार और घातांक है
- B) आधार और अपूर्णाश (मंटिसा) है
- C) अभिलक्षणिक और घातांक है
- D) अभिलक्षणिक और अपूर्णाश (मंटिसा) है

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786405

Number of Claims: 1

Declared Answer Key: D

Candidate Claim: C

Final Answer: D

**Explanation:**

By definition of logarithm.

**Conclusion:**

The final answer is option D. There is no change in the answer key.

37) Sign of second order derivative for a function to be minimum

- A) positive
- B) can be positive or negative
- C) negative
- D) no sign

37) किसी फलन के न्यूनतम होने के लिए दूसरे क्रम के व्युत्पन्न/द्वितीय अवकलज का चिह्न क्या होना चाहिए?

- A) धनात्मक
- B) धनात्मक या ऋणात्मक हो सकता है
- C) ऋणात्मक
- D) कोई चिन्ह नहीं

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786432

Number of Claims: 1

Declared Answer Key: A

Candidate Claim: A

Final Answer: A

**Explanation:**

By definition.

The framing of the question and the answer options is appropriate to arrive at the correct answer. Since, there is no discrepancy found between the claimed answer option and the declared answer key, there is no change in the answer key.

**Conclusion:**

The final answer is option A. There is no change in the answer key.

38) Power of 10 in the standard form of 0.004132

- A) -6
- B) -1
- C) -4
- D) -3

38) 0.004132 के मानक रूप में 10 का घात क्या है?

- A) -6
- B) -1
- C) -4
- D) -3

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2786404

Number of Claims: 6

Declared Answer Key: A

Candidate Claim: A, B, D, Wrong Framing of Question

Final Answer: D

**Explanation:**

**4.132 X 10<sup>-3</sup>**

**References:**

**Conclusion:**

**The final answer is option D. There is change from option A to D.**

39)If

$\vec{OA}=2\hat{i}+\hat{j}+3\hat{k}$  ,  $\vec{OB}=\hat{i}-\hat{j}+\hat{k}$  ,  $\vec{OC}=n\hat{i}+\hat{j}$  and  $\cos(\hat{A}\hat{B}\hat{C})=0$  , then the value of 'n' is

- A) -1
- B) -2
- C) 1
- D) 2

39)यदि

$\vec{OA}=2\hat{i}+\hat{j}+3\hat{k}$  ,  $\vec{OB}=\hat{i}-\hat{j}+\hat{k}$  ,  $\vec{OC}=n\hat{i}+\hat{j}$  and  $\cos(\hat{A}\hat{B}\hat{C})=0$  , तो 'n' का मान है

- A) -1
- B) -2
- C) 1
- D) 2

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2781079

Number of Claims: 2

Declared Answer Key: A

Candidate Claim: Wrong Framing of Question

Final Answer: A

**Explanation:**

The question has been framed correctly and candidate should not face any difficulty in arriving at the correct answer.

$$\vec{BA} \cdot \vec{BC} = 0 \Rightarrow (1, 2, 2) \cdot (n-1, 2, -1) = 0$$
$$\Rightarrow n-1+4-2=0 \Rightarrow n+1=0 \Rightarrow n=-1$$

**Conclusion:** The final answer is option A. There is no change in the answer key.

40) If  $(\sin \theta_1 + \sin \theta_2 + \sin \theta_3) = 3$  then  $(\cos \theta_1 + \cos \theta_2 + \cos \theta_3) =$  40) यदि  $(\sin \theta_1 + \sin \theta_2 + \sin \theta_3) = 3$  है, तो  $(\cos \theta_1 + \cos \theta_2 + \cos \theta_3) =$

- A) 2
- B) 3
- C) 0
- D) 1

- A) 2
- B) 3
- C) 0
- D) 1

Domain Name	Batch	Question No
Engineering Laterals	Batch 3	Q2780924

Number of Claims: 2

Declared Answer Key: C

Candidate Claim: B

Final Answer: C

Explanation:

$(14) \sin \theta_1 + \sin \theta_2 + \sin \theta_3 = 3$   
 $\Rightarrow \sin \theta_1 = \sin \theta_2 = \sin \theta_3 = 1 \Rightarrow \theta_1 = \theta_2 = \theta_3 = \frac{\pi}{2}$   
 $\Rightarrow \cos \theta_1 = \cos \theta_2 = \cos \theta_3 = 0$   
 $\Rightarrow \cos \theta_1 + \cos \theta_2 + \cos \theta_3 = 0$   
Ans (1) cl Level A3

Conclusion:

The final answer is option C. There is no change in the answer key.