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STUDENT EDITION

FRIDAY, MAY 14, 2021

TIMES nie Newspaper in Education

WEB EDITION

TODAY'S EDITION

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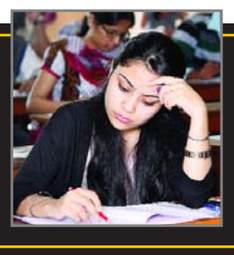

➤ Immunisation myths busted: Check out why adult immunisation remains neglected
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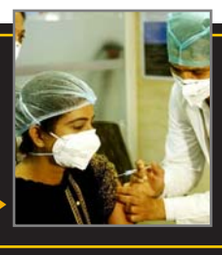

➤ Need competitions to prepare for olympics: Neeraj Chopra
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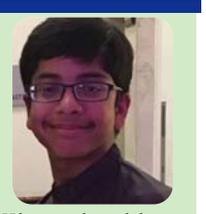
TIMES NIE Answers Your Query



Arnav Goel,
2021 passout XII, Delhi Public School RK Puram

Q When should one get vaccinated if he has just recovered from Covid-19?

There is no definitive guideline on timeline for vaccination post covid recovery. But general consensus is that you should recover from active infection before getting yourself vaccinated. So, it is prudent to wait for atleast two weeks of your first day of symptoms before you get your Covid 19 jab.

A SHOT OF HOPE

To ask queries regarding Covid-19 and Vaccination from our experts, scan the QR Code or visit https://bit.ly/331RxDn

Chandan Gadnayak,
class X, ST. Teresa School, Indirapuram

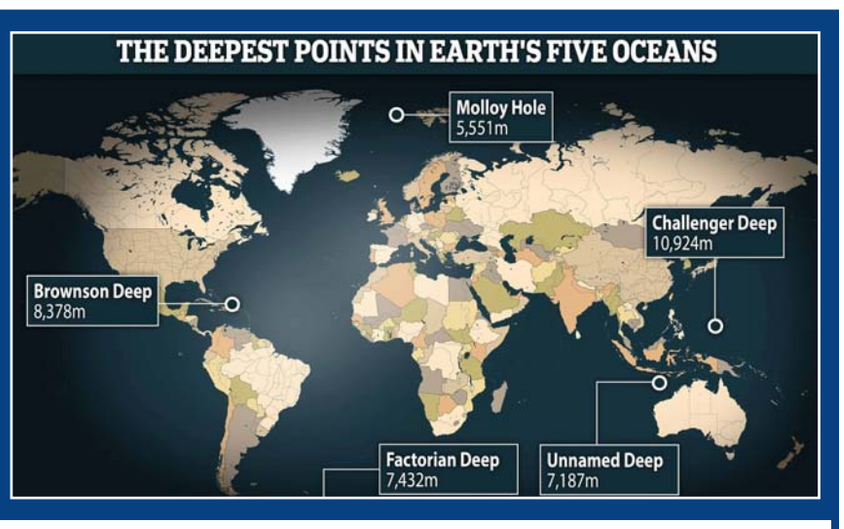
Q How do we deal with the psychological pressures of Covid-19 cases?

There is simple mantra of mindfulness meaning staying in the moment. It is a dynamic form of meditation that keeps you grounded and helps you manage your stress. Be it Covid- 19 or exam stress, it impacts the body and its immunity. Keeping away from negative news, maintaining gratitude log, meditation, mindfulness, taking a break from screen time and maintaining a dietary and sleep discipline would help you maintain your mental balance in these turbulent times.

EXPERT ADVICE GIVEN BY

Dr Sweta Singla. Senior Consultant. Unit Head. Neurology Department. Venkateshwar Hospital, Dwarka, Delhi

REVEALED! EARTH'S DEEPEST POINTS IN FIVE OCEANS



In one of the most-adventurous expeditions, scientists have revealed the deepest points in **each of the world's five major oceans.** Data from the Five Deeps Expedition (FDE), which performed dives over the course of 10 months from 2018 to 2019, confirms for the first time the locations of the deepest points of Indian Ocean and the Southern Ocean. The expedition, which covered 47,000 nautical miles, completed 39 dives using Limiting Factor (LV) – a two-person submersible built by Florida-based company Triton Submarines. LV carried the latest-generation, full-ocean depth multibeam echosounder – which emits a series of sound pulses – in order to map each part of the seafloor.

Prior to FDE, the deepest parts of some oceans were relatively well-known, such as the lowest point on the Earth – the Challenger Deep, inside the Mariana Trench in the Pacific Ocean

At a whopping 10,924 metre, the Challenger Deep still holds the record for the deepest point on the Earth

DEEPEST POINTS

1 The deepest point of the Indian Ocean is **at 7,187 metres, within the Java Trench,** just off the coast of Indonesia, the data reveals, while the deepest point of the Southern Ocean has a depth of **7,432 metres, within the South Sandwich Trench**

2 The deepest point in the Atlantic Ocean is called **Brownson Deep in the Puerto Rico Trench,** which descends an impressive 8.378 metres

3 The new data has also shown that although the deepest point of the South Sandwich Trench is Meteor Deep at 8,265 metres, it is located **within the waters of the Atlantic Ocean – meaning Factorian Deep takes the crown**

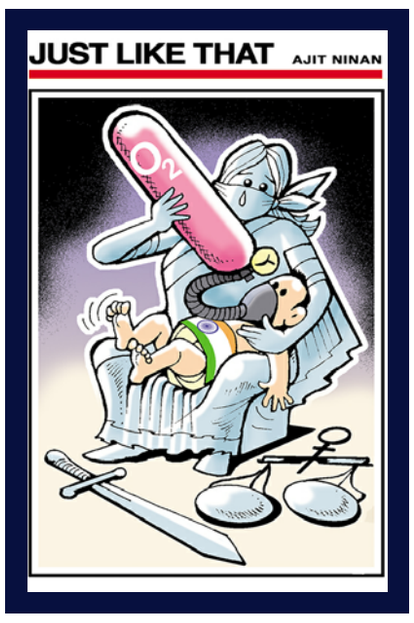
At such depths, characterised by immense pressures, extreme darkness and almost freezing temperatures, only specialised microorganisms can survive

Quote unquote

A crisis often presents an opportunity and making the right investments can have a multiplier effect in steering the economies to a recovery, while also making a monumental difference in people's life. India will have to invest heavily in infrastructure in order to recover from the economic havoc brought on by the coronavirus pandemic, even if that means going in for deficit financing. The government should prioritise two sectors, digital and health for investments.

Hamid Rashid, head, UN development research branch

JUST LIKE THAT AJIT NINAN



Prince Harry & Meghan's Archewell Foundation teams up with P&G, will focus on gender equality

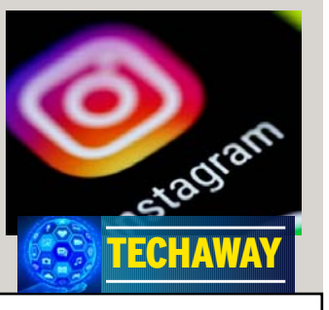
Britain's Prince Harry and his wife Meghan's Archewell Foundation has said that it has entered into a multi-year partnership with consumer goods company Procter & Gamble aimed at building more compassionate communities. The partnership would focus on gender equality, creating inclusive online spaces and "resilience and impact" through sport, the non-profit group said in a statement. It did not offer financial details.

FOR A CAUSE

- Harry and Meghan have been engaged in partnerships for social work.
- The couple, who now live in California after they left Britain and stepped away from their royal duties last year, asked for vaccine donations earlier this month to help provide Covid-19 vaccines to the world's most-vulnerable

Instagram lets users list their pronouns on profiles

Facebook-owned Instagram has announced to let users add up to four pronouns to their profiles, which they can then display publicly or only to their followers. It's another way to express yourself on Instagram and the feature is now available in a few countries, with plans for more. The company, however, did not specify which countries have this feature at the moment.



- People can fill out a form to have a pronoun added, if it's not already available, or just add it to their bio
- The news comes at a time when a coalition of 44 US attorneys general has signed a letter to Facebook CEO Mark Zuckerberg, urging Facebook not to launch 'Instagram for Kids', citing mental health and privacy concerns
- The 'Instagram for Kids' app will allow children under the age of 13 to begin using the popular photo-sharing app. However, the attorneys general urged Facebook to abandon its plans to launch this new platform
- Currently, children under 13 are not allowed to have an Instagram account, unless it is explicitly written in the profile description that the account is being managed by a parent or guardian

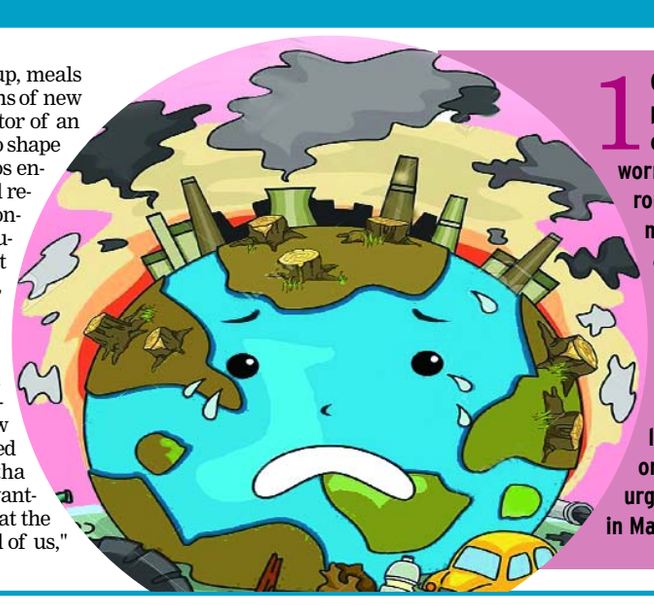
Broadway is back: 'Hamilton', 'Lion King', 'Wicked' to return to stage in September

Three of Broadway's biggest musicals, 'Hamilton', 'Wicked' and 'The Lion King' have announced that they would be back on stage in September, joining dozens of other shows that plan to reopen in New York after an 18-month pandemic-induced shutdown. Disney's stage show 'Aladdin' and the Alanis Morissette penned musical 'Jagged Little Pill' also announced dates for late September and October, while producers of a new musical about Michael Jackson said that 'MJ' would open in early 2022.

Broadway shows, a major tourist attraction, brought in some $1.8 billion in box office receipts in the 2018-2019 season, with more than half of the tickets being bought by tourists

Futuristic computer game hopes to be tonic for climate change anxiety

It is the year 2050, the planet is warming up, meals come from nutritional food packs and dozens of new zoonotic viruses are spreading. As the editor of an influential newspaper, how would you try to shape public opinion? This is one of the scenarios encountered by players of an online game launched recently, which uses humour and interactive decision-making to encourage people to think about the future of climate change, and what they can do about it. **Survive the Century** is the work of scientists, economists and writers around the world brought together by US-based research group the National Socio-Environmental Synthesis Center (SESYNC), and lets players navigate the future from 2021 to 2100. "This is a game for everyone, but particularly for climate nihilistic Gen Z's, who know about climate change and feel hopeless and frustrated at the inaction they are seeing," said Samantha Beckbessinger, an author and game creator. "We wanted to engage them with a sense of hopefulness that the future is long and there are a lot of choices ahead of us," she added.



HOW IT WORKS

1 Climate anxiety, including panic attacks, insomnia, and obsessive thinking, linked to worry about the threat of environmental disaster, has become more common in young people, according to The Lancet medical journal.

2 This is partly-linked to youth being at the forefront of climate protests, with about 1.6 million student protesters calling on their governments to urgently tackle climate change in March 2019

- While the UN Climate Change Conference (COP26) due to take place in November could accelerate moves by the world's biggest polluters to reduce climate risks, Survive the Century's creators wanted to bring ordinary people into the debate too
- The game takes players through different decision-making scenarios, based on science– from vaccine roll-outs to funding technological innovations that can help restore order or trigger anarchy
- At the end of the game, players are directed to a climate organisation near them

In the beginning there was nothing, which exploded.

-Terry Pratchett

UTILISE TIME ON HAND TO PRACTICE & CLEAR DOUBTS

EXAMS Rfun

CLASS: XII - 2020-21

SUBJECT:
PHYSICS (THEORY) (CBSE)

Time Allowed: 3 Hours

Maximum Marks: 70

PRACTICE PAPER SET BY SUNITHA GUJJULA, WEST BERRY SCHOOL, VISAKHAPATNAM

GENERAL INSTRUCTIONS

1. You may use the following values of physical constants wherever necessary.

$c = 3 \times 10^8$ m/s
$h = 6.63 \times 10^{-34}$ Js
$e = 1.6 \times 10^{-19}$ C
$\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1}
$\varepsilon_0 = 8.854 \times 10^{-12}$ C^2 N^{-1} m^{-2}
$\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$ N m^2 C^{-2}
mass of neutron (m_e) $= 9.1 \times 10^{-31}$ kg
mass of neutron $= 1.675 \times 10^{-27}$ kg
mass of proton $= 1.673 \times 10^{-27}$ kg
Avogadro's number = 6.023×10^{23} per gram mole
Boltzmann constant $= 1.38 \times 10^{-23}$ JK^{-1}

SECTION-A

Note: *Select the most appropriate option from those given below each question*

Q1. If the net electric flux through a closed surface is zero, then we can infer [1]
(A) no net charge is enclosed by the surface.
(B) uniform electric field exists within the surface.
(C) electric potential varies from point to point inside the surface.
(D) charge is present inside the surface.

Q2. An electric dipole consisting of charges +q and –q separated by a distance L is in stable equilibrium in a uniform electric field $\vec{E}$. The electrostatic potential energy of the dipole is [1]
(A) qLE **(B)** zero **(C)** – qLE **(D)** – 2 qEL

Q3. A potentiometer can measure emf of a cell because [1]
(A) the sensitivity of potentiometer is large.
(B) no current is drawn from the cell at balance.
(C) no current flows in the wire of potentiometer at balance.
(D) internal resistance of cell is neglected.

Q4. Two resistors R_1 and R_2 of 4 Ω and 6 Ω are connected in parallel across a battery. The ratio of power dissipated in them, $P_1 : P_2$ will be [1]
(A) 4 : 9 **(B)** 3 : 2 **(C)** 9 : 4 **(D)** 2 : 3

Q5. The magnetic dipole moment of a current carrying coil does *not* depend upon [1]
(A) number of turns of the coil.
(B) cross-sectional area of the coil.
(C) current flowing in the coil.
(D) material of the turns of the coil.

Q6. Larger aperture of objective lens in an astronomical telescope [1]
(A) increases the resolving power of telescope.
(B) decreases the brightness of the image.
(C) increases the size of the image.
(D) decreases the length of the telescope.

Q7. A biconvex lens of glass having refractive index 1·47 is immersed in a liquid. It becomes invisible and behaves as a plane glass plate. The refractive index of the liquid is [1]
(A) 1·47 **(B)** 1·62 **(C)** 1·33 **(D)** 1·51

Q8. For a glass prism, the angle of minimum deviation will be smallest for the light of [1]
(A) red colour. **(B)** blue colour.
(C) yellow colour. **(D)** green colour

Q9. Which of the following statements is *not* correct according to Rutherford model? [1]
(A) Most of the space inside an atom is empty.
(B) The electrons revolve around the nucleus under the influence of coulomb force acting on them.
(C) Most part of the mass of the atom and its positive charge are concentrated at its centre.
(D) The stability of atom was established by the model.

Q10. Photons of energies 1 eV and 2 eV are successively incident on a metallic surface of work function 0·5 eV. The ratio of kinetic energy of most energetic photoelectrons in the two cases will be [1]
(A) 1 : 2 **(B)** 1 : 1 **(C)** 1 : 3 **(D)** 1 : 4

Note: *Fill in the blanks with appropriate answer*

Q11. The magnetic field and angle of dip at a place on the earth are 0·3 G and 30°, respectively. The value of vertical component of the earth's magnetic field at the place is _____ . [1]

Q12. Laminated iron sheets are used to minimize _____ currents in the core of a transformer. [1]

Q13. The number of turns of a solenoid are doubled without changing its length and area of cross-section. The self-inductance of the solenoid will become _____ times. [1]

Q14. According to Bohr's atomic model, the circumference of the electron orbit is always an _____ multiple of de Broglie wavelength. [1]

OR

In β-decay, the parent and daughter nuclei have the same number of _____.

Q15. A ray of light on passing through an equilateral glass prism, suffers a minimum deviation equal to the angle of the prism. The value of refractive index of the material of the prism is _____. [1]

Note: *Answer the following*

Q16. Write the mathematical form of Ampere-Maxwell circuital law. [1]

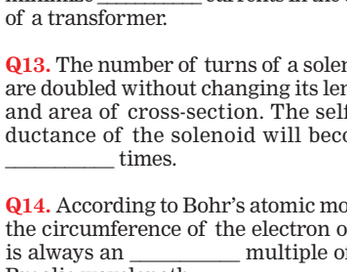
Q17. How does an increase in doping concentration affect the width of depletion layer of a p-n junction diode? [1]

Q18. The nuclear radius of $^{27}_{13}$Al is 3·6 fermi. Find the nuclear radius of $^{64}_{29}$CU. [1]

OR

A proton and an electron have equal speeds. Find the ratio of de Broglie wavelengths associated with them.

Q19. The variation of the stopping potential (V_o) with the frequency (υ) of the light incident on two different photosensitive surfaces M_1 and M_2 is shown in the figure. Identify the surface which has greater value of the work function.

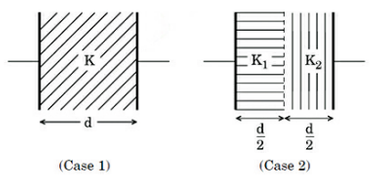


Q20. Why cannot we use Si and Ge in fabrication of visible LEDs ? [1]

SECTION-B

Q21. Explain the principle of working of a meter bridge. Draw the circuit diagram for determination of an unknown resistance using it. [2]

Q22. The space between the plates of a parallel plate capacitor is completely filled in two ways. In the first case, it is filled with a slab of dielectric constant K. In the second case, it is filled with two slabs of equal thickness and dielectric constants K_1 and K_2 respectively as shown in the figure. The capacitance of the capacitor is same in the two cases. Obtain the relationship between K, K_1 and K_2. [2]



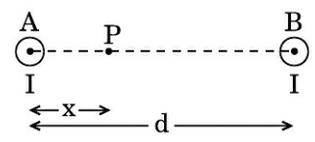
Q23. Define the term 'Half-life' of a radioactive substance. Two different radioactive substances have half-lives T_1 and T_2 and number of undecayed atoms at an instant, N_1 and N_2, respectively. Find the ratio of their activities at that instant. [2]

Q24. Define wavefront of a travelling wave. Using Huygens principle, obtain the law of refraction at a plane interface when light passes from a denser to rarer medium. [2]

OR

Using lens maker's formula, derive the thin lens formula $\frac{1}{f} = \frac{1}{v} \frac{1}{u}$ for a biconvex lens.

Q25. Two long straight parallel wires A and B separated by a distance d, carry equal current I flowing in same direction as shown in the figure. [2]



(a) Find the magnetic field at a point P situated between them at a distance x from one wire.
(b) Show graphically the variation of the magnetic field with distance x for 0<x<d.

Q26. Using Bohr's atomic model, derive the expression for the radius of nth orbit of the revolving electron in a hydrogen atom. [2]

OR

(a) Write two main observations of photoelectric effect experiment which could only be explained by Einstein's photoelectric equation.
(b) Draw a graph showing variation of photocurrent with the anode potential of a photocell.

Q27. Explain the terms 'depletion layer' and 'potential barrier' in a p-n junction diode. How are the **(a)** width of depletion layer, and **(b)** value of potential barrier affected when the p-n junction is forward biased ? [2]

SECTION-C

Q28. **(a)** Two cells of emf E_1 and E_2 have their internal resistances r_1 and r_2, respectively. Deduce an expression for the equivalent emf and internal resistance of their parallel combination when connected across an external resistance R. Assume that the two cells are supporting each other.
(b) In case the two cells are identical, each of emf E = 5 V and internal resistance r = 2 Ω , calculate the voltage across the external resistance R = 10 Ω . [3]

Q29. **(a)** Write an expression of magnetic moment associated with a current (I) carrying circular coil of radius r having N turns.
(b) Consider the above mentioned coil placed in YZ plane with its centre at the origin. Derive expression for the value of magnetic field due to it at point (x, 0, 0).

OR

(a) Define current sensitivity of a galvanometer. Write its expression.
(b) A galvanometer has resistance G and shows full scale deflection for current I_g.
(i) How can it be converted into an ammeter to measure current up to I_0 ($I_0 > I_g$)?
(ii) What is the effective resistance of this ammeter? [3]

Q30. A resistance R and a capacitor C are connected in series to a source $V = V_0 \sin \omega t$. [3]
Find:
(a) The peak value of the voltage across the **(i)** resistance and **(ii)** capacitor.
(b) The phase difference between the applied voltage and current. Which of them is ahead?

Q31. What is the effect on the interference fringes in Young's double slit experiment due to each of the following operations? Justify your answers. [3]
(a) The screen is moved away from the plane of the slits.
(b) The separation between slits is increased.
(c) The source slit is moved closer to the plane of double slit.

Q32. **(a)** Write the expression for the speed of light in a material medium of relative permittivity ε_r and relative magnetic permeability μ_r.
(b) Write the wavelength range and name of the electromagnetic waves which are used in **(i)** radar systems for aircraft navigation, and **(ii)** Earth satellites to observe the growth of the crops. [3]

Q33. The nucleus $^{235}_{92}$Y, initially at rest, decays into $^{231}_{90}$X by emitting an α-particle.

$^{235}_{92}Y \longrightarrow ^{231}_{90}X + ^{4}_{2}He$ + energy.

The binding energies per nucleon of the parent nucleus, the daughter nucleus and α-particle are 7.8 MeV, 7.835 MeV and 7.07 MeV, respectively. Assuming the daughter nucleus to be formed in the unexcited state and neglecting its share in the energy of the reaction, find the speed of the emitted α-particle. (Mass of α-particle $= 6.68 \times 10^{-27}$ kg) [3]

Q34. **(a)** Draw circuit diagram and explain the working of a zener diode as a dc voltage regulator with the help of its I-V characteristic.
(b) What is the purpose of heavy doping of p- and n-sides of a zener diode? [3]

SECTION-D

Q35. **(a)** Using Gauss law, derive expression for electric field due to a spherical shell of uniform charge distribution σ and radius R at a point lying at a distance x from the centre of shell, such that
(i) 0 < x < R, and **(ii)** x > R.
(b) An electric field is uniform and acts along + x direction in the region of positive x. It is also uniform with the same magnitude but acts in – x direction in the region of negative x. The value of the field is E = 200 N/C for x > 0 and E = – 200 N/C for x < 0. A right circular cylinder of length 20 cm and radius 5 cm has its centre at the origin and its axis along the x-axis so that one flat face is at x = + 10 cm and the other is at x = – 10 cm.
Find: (i) The net outward flux through the cylinder.
(ii) The net charge present inside the cylinder. [5]

OR

(a) Find the expression for the potential energy of a system of two point charges q_1 and q_2 located at $\vec{r}_1$ and $\vec{r}_2$, respectively in an external electric field $\vec{E}$.
(b) Draw equipotential surfaces due to an isolated point charge (–q) and depict the electric field lines.
(c) Three point charges + 1 μC, –1 μC and + 2 μC are initially infinite distance apart. Calculate the work done in assembling these charges at the vertices of an equilateral triangle of side 10 cm.

Q36. **(a)** Derive the expression for the torque acting on the rectangular current carrying coil of a galvanometer. Why is the magnetic field made radial?
(b) An α-particle is accelerated through a potential difference of 10 kV and moves along x-axis. It enters in a region of uniform magnetic field $B = 2 \times 10^{-3}$ T acting along y-axis. Find the radius of its path. (Take mass of α-particle $= 6.4 \times 10^{-27}$ kg) [5]

Q37. **(a)** Draw the ray diagram of an astronomical telescope when the final image is formed at infinity. Write the expression for the resolving power of the telescope.
(b) An astronomical telescope has an objective lens of focal length 20 m and eyepiece of focal length 1 cm.
(i) Find the angular magnification of the telescope.
(ii) If this telescope is used to view the Moon, find the diameter of the image formed by the objective lens. Given the diameter of the Moon is 3.5×10^6 m and radius of lunar orbit is 3.8×10^8 m. [5]

OR

(a) An object is placed in front of a concave mirror. It is observed that a virtual image is formed. Draw the ray diagram to show the image formation and hence derive the mirror equation $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
(b) An object is placed 30 cm in front of a plano-convex lens with its spherical surface of radius of curvature 20 cm. If the refractive index of the material of the lens is 1.5, find the position and nature of the image formed.

These questions are meant for practice purpose only. Students are advised to check format, syllabus and marks for Board test papers with their teachers. Questions have been given by teachers and NIE is not responsible for them.

QUICK REVISION

ENGLISH PAPER 1
15 MARKS TIME: 10 MIN
CLASS XII, ISC

Q1. In each of the following items, sentence A is complete, while sentence B is not.
Complete sentence B, making it as similar as possible to sentence A.
Write sentence B in each case. [5]

EXAMPLE:
(A) All nooks and corners were checked.
(B) No.....
ANSWER: (0) No nook or corner was left unchecked.

1 (A) He is so old that he cannot remember events of the past.
(B) He is too.....

2 (A) As soon as the bell rings, the children run out to play.
(B) No sooner.....

3 (A) No other planet is as big as Jupiter.
(B) Jupiter.....

4 (A) He is forgetful as well as careless with his work.
(B) Besides.....

5 (A) It is probable that the ship will reach the shore.
(B) In all.....

Q2. Fill in each blank with a suitable word. (Do not write the sentence.) [5]

1. She turned _____ the offer to work at the factory.

2. To everyone's surprise, he turned _____ at the party.

3. He broke _____ in the middle of his speech at the function.

4. The burglars broke _____ the house when the family was away.

5. He agreed to carry _____ the manager's orders.

6. Sita's daughter carried _____ the family business when Sita went abroad.

7 He ran _____ from home at the age of ten.

8 I ran _____ my old friend in the market place.

9 Her aunt looks _____ her aging grandparents.

10 The Principal looks _____ matters of complaint from teachers and students.

Q3. Fill in the blanks in the passage given below with the appropriate form of the verb given in brackets. Do not write the passage, but write the verbs in the correct order. [5]

One day I _____(1)(be) in the lunch line, and there I saw a pile of apples. The teacher-in-charge _____ (2) (stare) at me and said, "Just _____(3) (take) one. God _____ (4) (watch)".

So, I _____(5) (take) an apple, and the line _____(6)(move) along. At the next table there _____(7) (be) a pile of chocolate chip cookies. I _____(8) (not know) what to do.

"Psst," the kid behind me _____ (9) (whisper). "_____(10)(take) all you want. God's watching the apples."