केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली
माध्यमिक स्कूल परीक्षा (कक्षा दसवीं)
परीक्षार्थी प्रवेश-पत्र के अनुसार भरे

विषय Subject : SCIENCE

विषय कोड Subject Code : 086

परीक्षा का दिन एवं तिथि
Day & Date of the Examination : WEDNESDAY, 02.03.2016

उत्तर देने का माध्यम
Medium of answering the paper : ENGLISH

प्रश्न पत्र के ऊपर लिखे कोड को दर्शाए :
Write code No. as written on the top of the question paper :

Code Number	Set Number
31/3	① ② ● ④

अतिरिक्त उत्तर--पुस्तिका (ओं) की संख्या
No. of supplementary answer-book(s) used

विकलांग व्यक्ति : हाँ / नहीं
Person with Disabilities : Yes / No — NO

किसी शारीरिक अक्षमता से प्रभावित हो तो संबंधित वर्ग में ✓ का निशान लगाएँ।
If physically challenged, tick the category

B	D	H	S	C	A

B = दृष्टिहीन, D = मूक व बधिर, H = शारीरिक रूप से विकलांग, S = स्पास्टिक
C = डिस्लेक्सिक, A = ऑटिस्टिक
B = Visually Impaired, D = Hearing Impaired, H = Physically Challanged
S = Spastic, C = Dyslexic, A = Autistic

क्या लेखन – लिपिक उपलब्ध करवाया गया : हाँ / नहीं
Whether writer provided : Yes / No

यदि दृष्टिहीन हैं तो उपयोग में लाए गये सोफ्टवेयर का नाम :
If Visually challenged, name of software used :

*एक खाने में एक अक्षर लिखें। नाम के प्रत्येक भाग के बीच एक खाना रिक्त छोड़ दें। यदि परीक्षार्थी का नाम 24 अक्षरों से अधिक है, तो केवल नाम के प्रथम 24 अक्षर ही लिखें।
Each letter be written in one box and one box be left blank between each part of the name. In case Candidate's Name exceeds 24 letters, write first 24 letters.

कार्यालय उपयोग के लिए
Space for office use

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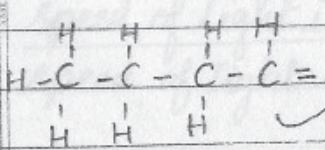
Section-A

1. 

→ Structure of Butanal.

The name of the compound is Butanal.

2. Ovary is the part of female reproductive system. Its functions are
* It secretes the female hormones called Oestrogen and Progesterone
* It also releases the female gamete called ovum for the act of fertilisation.
* It also releases ovum every month during menstrual cycle.

3. Grass → insect → Frog → Snake.
Frog comes in the third trophic level.

4. $\frac{air}{glass} = \frac{3}{2}$ $\frac{air}{water} = \frac{4}{3}$

$\frac{air}{2\times10^8 m/s} = \frac{3}{2}$ Speed of light in air = 3×10^8 m/s.

$$\frac{\text{Speed of light in air}}{\text{Speed of light in water}} = \frac{4}{3}$$

$$\frac{3 \times 10^8}{\text{Speed of light in water}} = \frac{4}{3}$$

$$\frac{9 \times 10^8}{4} = \text{Speed of light in water}$$

$$= 2.25 \times 10^8 \text{ m/s} \rightarrow \text{Speed of light in water.}$$

$$\begin{array}{r} 2.25 \\ 4\overline{)9} \\ 8 \\ \hline 10 \\ 8 \\ \hline 20 \\ 20 \\ \hline 0 \end{array}$$

5. The four stakeholders are namely;

* The people who live in and around the forest by seeking livelihood from forest products etc. i.e., habitants of forest.
* The Forest department who controls the Forest land and area by regulating the actions in forest by outsiders.
* The Industrialists who procure tendu leaves from forest for making Bidis etc..
* The wild life conservationists and enthusiasts who wants to preserve the pristine collection of flora and fauna.

6. Social problems:

* It is because of the construction of mega projects people are displaced and no proper rehabilitation is provided.
* The oustees are not provided with the benefits of the construction of dams. Social problems also include their grievances faced after their displacement, livelihood is affected.

Environmental Problems:

* Pristine collection of flora and fauna is submerged under the dam structure.
* Biodiversity is completely destroyed which ultimately leads to loss of ecological stability.

7.

(i) Electronic configuration of calcium: 2, 8, 8, 2. 1 ,2

(ii) Valence electrons in Rb: 1 ✓ 8, 8, 1

(iii) number of shells in Sr: 5 ✓ ,32

(iv) (iv) metal ✓ 1

(v) Rb ✓ 1

(vi) Be, Mg, Ca, Rb. ✓

10. mass number = 35

no of ~~nub~~ neutrons = 18.

atomic number of X = 17

electronic configuration = 2, 8, 7.

(i) group number : 17

(ii) Period number : 3

(iii) Valency of X : 1

$$\begin{array}{r} {}^{2}\cancel{35}\,{}^{15} \\ 18 \\ \hline 17 \end{array}$$

11.

(a) The appearance of variations among the progeny formed by sexual reproduction is due

* exchange of information between the chromosomes since it involves two different parents.

* DNA inaccuracies during DNA replication for forming a complementary strand.

* It is because no biochemical reaction is absolutely reliable.

(b) (i) Pollen grain with an Exine.

(ii) By pollination through wind, water or animals by the transfer from anther to the stigma.

(iii) C is the pollen tube that carries the male gamete from (Pollen grain) stigma through style to the embryo sac to fertilise with egg.

(iv) After fertilisation is over, zygote is formed as the result of fusion between male and the female gamete.

12. The creation of new individuals from the existing individuals or individual for the species to survive is called reproduction. The consistency of the DNA is maintained inorder to reproduce similar kind of organisms with same body design for the organism to fit to a particular niche. Thus, reproduction is linked to the stability of the population of species.
It increases population size, that makes us to notice the particular organisms from a species and Thus maintaines the gene pool of a species.

13. Fully differentiated or multicellular organisms has the ability to regenerate new cut parts to a complete individual organisms. If the organism is cut or broken, the specialised cells in it which is responsible for reproduction proliferate and create

mass no of cells. These mass number of cells seperate and develop into different structures in the body in an organised sequence called development. In simple organisms like Hydra, regenarative cells proliferate and give rise to large number of cells and form into a complete organism. Whereas regeneration cannot be same as ~~regenerat~~ reproduction as organism will not depend on being cut up to be able to reproduce.

This is an asexual mode of reproduction. This also takes place in Planaria.

14. Evolution and classification are interlinked.

* classification is done according to the similarity of characteristics among organisms which possesses same "particular form or function" in a hierarchy.

* For example, a brother and a sister is closely related as they have a common ancestor in the first generation. whereas, a brother and a cousin is not that much closely related when the brother and a sister are considered. So, classification tells about the organisms from the cell

level till ~~th~~ whether the organisms are vertebrates or invertebrates. This comparison reveals that evolution and classification goes hand in hand. When we go back along this hierarchy it is found that life originated from inanimate matters in the primitive age.

Molecular Phylogeny also tells about genetic affinities and DNA sequences: This helps to organise a group with common ancestor and a super group with distant ancestor.

15. Mendel's dihybrid cross helps to know that traits are inherited independently. Various alleles remain together in hybrid union and at the time of progeny formation they assort independently. This was proved by the new mixtures of plants that were produced during cross.

RRyy (round green) — rrYY (wrinkled & Yellow)

gametes Ry — rY

RrYy (Round Yellow) — F_1

$F_1 \times F_1 \Rightarrow F_2$

RrYy x RrYy ⇒ 9 : 3 : 3 : 1 (Phenotype ratio)

Round Yellow → 9
Round green → 3
Wrinkled Yellow → 3
Wrinkled green → 1

} Phenotype.

9 combination of Genetype were produced.
New mixtures such as round Yellow, wrinkled green etc..., showed that in case of Ry, R and y are not linked and are independently inherited.

16. a) It is necessary to conserve the environment for Sustainable development
* fulfill our needs from the resources that ~~wer~~ we are very much relied upon by tailoring our requirements.
* To make our future generation to use it for their material aspirations and to save our ecosystem.
* To save biodiversity to avoid ecological imbalance.

b) The segregation of waste such as biodegradable and non-biodegradable wastes for recycling is useful.
It saves our time and energy.
The various things can be appropriately disposed.

c) Sensitive towards environmental degradation.
Active citizen, aware of current issues related to Environment.
Caring student.

17. $m = -2$

$V = -30\,cm$

$u = ?$

$m = \frac{-V}{u}$

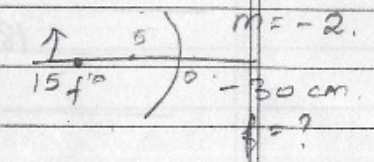
$+2 = +\frac{(-30)}{u}$

$u = \frac{-30}{2}$ $\boxed{u = -15\,cm}$ The object distance is 15 cm

Mirror Formula $= \frac{1}{V} + \frac{1}{u} = \frac{1}{f}$

$\frac{-1}{30} - \frac{1}{15} = \frac{-15-30}{450} = \frac{\cancel{+45}^{1}}{\cancel{450}_{-10}} = \frac{1}{f}$

$\boxed{f = -10\,cm}$ The focal length is 10 cm.



$\begin{array}{r} 15 \\ 3 \\ \hline 45 \end{array}$

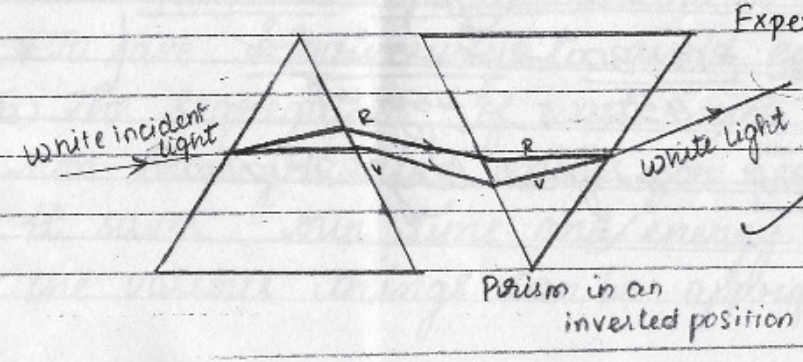
If the object is moved 10 cm towards the mirror, the image will be of the nature Virtual and erect and the size will be enlarged.

18. Sir Isaac Newton did the experiment of dispersion of white light using prism for the first time.

Things needed: Two prisms, Screen.

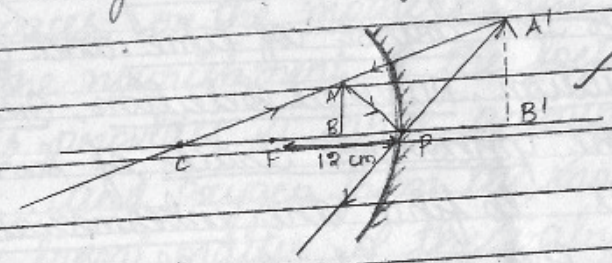
Method: Send a white incident light into a glass prism. The incident white light splits into seven colours of the spectrum. Then keep an inverted prism near the first glass prism and allow the seven colours to pass through it. It recombines and comes out as a white light on the other side of the prism. This white light can be observed with or without the screen.

Experiment of Sir Isaac Newton:

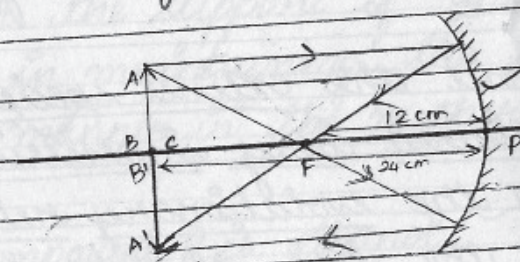


19 (i) The object has to be placed between 0 to -12 cm in front of the concave mirror. Between F and P.

(ii) The image will be larger than the object.



(iii) The image will be behind the mirror.



If the object is placed at C the image is also obtained at C of the same size.

$$\frac{1}{v}+\frac{1}{u}=\frac{1}{f} \qquad \frac{1}{v}=\frac{1}{f}-\frac{1}{u}; \quad \frac{1}{v}=\frac{-1}{12}+\frac{1}{24}=\frac{-24+12}{288}=\frac{-12}{288}$$

$\boxed{v=-24\text{cm}}$ $\boxed{u=-24\text{cm}}$ Hence the proof.

$$\begin{array}{r} 24 \\ 12 \\ \hline 48 \\ 24\times \\ \hline 288 \end{array}$$

20. Evolution the process of change from simple life forms to complex life forms by gradual change. It is generating diversity and shaping the diversity.

* It occurs over the course of time and generations by Variation, Speciation, Natural Selection; Genetic drift etc..

Fossils are the preserved traces of living organisms.

* It helps us to find the intermediate forms inbetween two classes etc.. For example fossil of Archeopteryx helps us to know better about the intermediate form between reptiles and Aves.

* It it tells us about the extinct species through the fossil or their retained body impressions.

* It helps to know the evolutionary relationships.

* This also shows the line of development from primitive to complex organisms. eg: Ammonite, trilobite, Rajasaurus etc.. according to the depth of the layer in which it is found.

21.

25

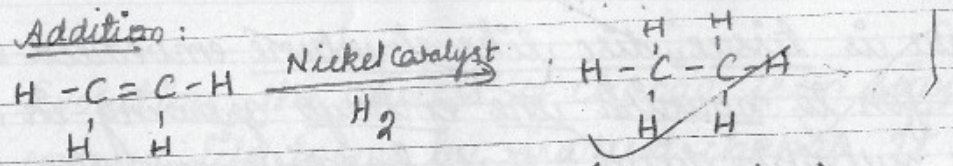
21. Placenta is tissue, disc like structure embedded on the uterine wall for to nourish the embryo growing in the uterus. It is a nutritive tissue that has villi on the embryo side and blood spaces on the mother's side to perform various functions for the nourishment of the foetus.

* This provides a large amount of space for the transport of Glucose and oxygen from the mother's blood to the foetus.
* The faecal matter of the baby is removed and sent to the mother's blood.
* With the support of umbilical cord, Placenta plays a major part in maintaining the health of the baby. It is nourished in this manner in the mother's womb.

22. The compound P is ethanol. 1½
compound Q is Ethene
compound R is Ethane

$$\underset{\text{(Compound P)}}{CH_3CH_2OH} \xrightarrow[\substack{H_2SO_4 \\ (443K)}]{\text{conc.}} \underset{\text{(Compound Q)}}{CH_2=CH_2} + H_2O$$ 1½

Addition:



(compound Q) (compound R)

combustion:

$$C_2H_6 + O_2 \longrightarrow 2CO_2 + 3H_2O + \text{Heat and Light}$$

(compound R)

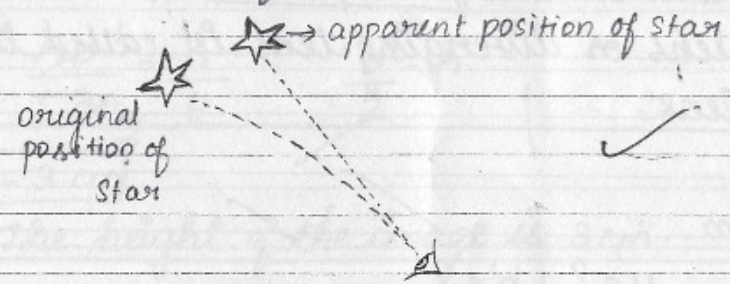
The compounds P, Q, R are Ethanol, Ethene and Ethane respectively.

23. The refraction of light rays when it passes through the atmosphere bend towards the normal and reaches us. This ~~atmosphere in~~ phenomena of refraction in the atmosphere is called atmospheric refraction.

(a) Twinkling of Stars:

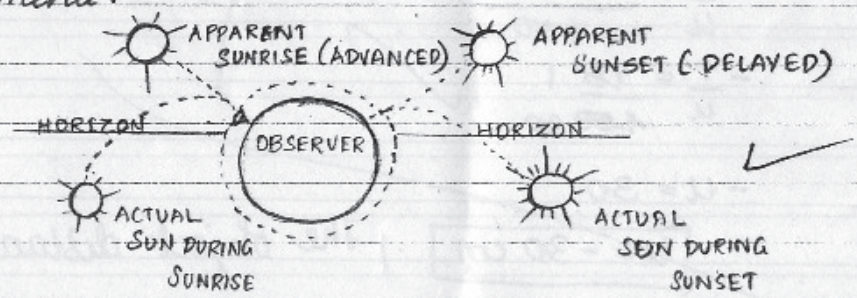
The starlight on entering the atmosphere undergoes refraction completely and continuously. It bend towards the normal. Since, the atmosphere is not stationary, the apparant position of Star changes. It appears slightly higher up. The amount of starlight that enters the

eye fluctuates. So, the star flickers and causes the twinkling effect. So, the star appears to be twinkling and this is because of the atmospheric refraction.



b) Advanced sunrise and delayed sunset:

Sunrise and sunset is actually the crossing of horizon by the sun. The advanced sunrise and delayed sunset is due to atmospheric refraction. The difference between the actual sunrise and apparent sunrise is two minutes. Likewise the difference between the actual sunset and apparent sunset is two minutes. The flattening of sun's disc is also due to this phenomena.



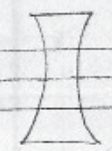
24.

(a) The distance between the principal focus and the optical centre of the concave lens or diverging lens is called the focal length of a diverging lens.

(b) $f = -30$ cm.

~~h~~ $h = 6$ cm.

$v = -15$ cm. $u = ?$ $h' = ?$



Lens formula:

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \qquad \frac{-1}{u} = \frac{1}{f} - \frac{1}{v}$$

$$\frac{-1}{15} - \frac{1}{u} = \frac{-1}{30} \qquad \frac{-1}{u} = \frac{-1}{30} - \left(\frac{-1}{15}\right)$$

$$-\frac{1}{u} = -\frac{1}{30} + \frac{1}{15}$$

$$-\frac{1}{u} = \frac{-15+30}{450}$$

$$-\frac{1}{u} = \frac{\cancel{15}\,1}{\cancel{450}\,30}$$

$$-u = 30$$

$$\boxed{u = -30 \text{ cm}}$$ The object distance is -30 cm.

centre of
length of a

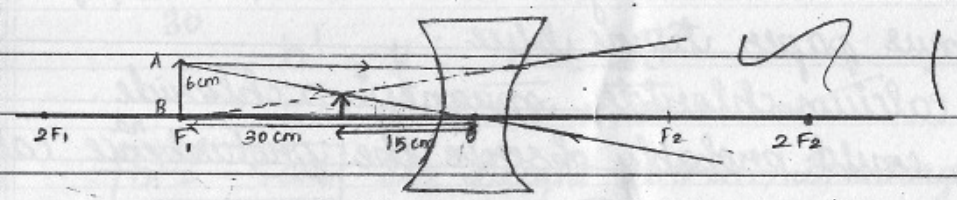
$$m = \frac{V}{u} = \frac{h'}{h}$$

$$\frac{+15}{+30} = \frac{h'}{6} \qquad \frac{6}{2} = h'$$

$$\boxed{h' = 3\ cm}$$

The height of the image is 3 cm.

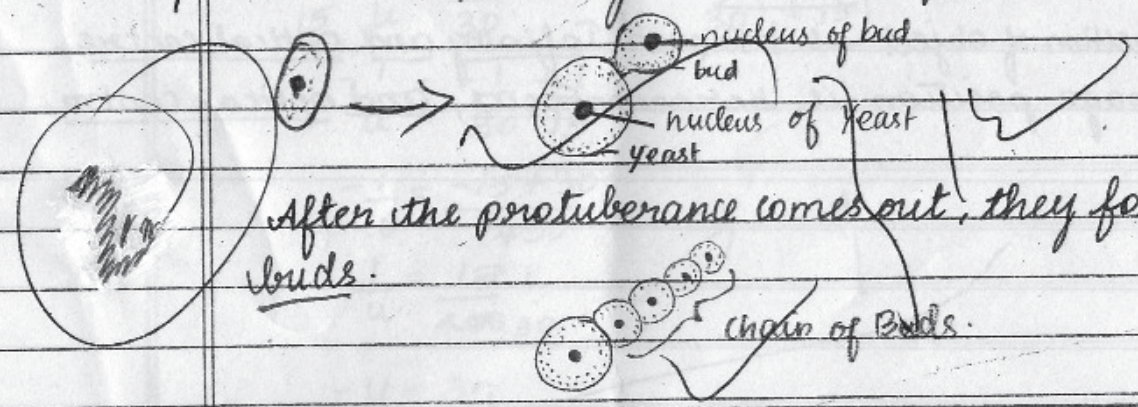
(C)



Position of object is between Infinity and optical centre.
Image position is between Focus, and optical centre.

SECTION - B.

25. (d) Radicle, cotyledon, Plumule.
26. (a) carrot and Radish.
27. (d) $\angle r$, $\angle A$ and $\angle D$.
28. (a) $\angle i$ is more than $\angle r$, but nearly equal to $\angle e$.
29. (b) inverted and diminished.
30. (a) lens slightly towards the screen.
31. (c) castor oil and Sodium hydroxide.
32. (c) There is no change in the blue litmus paper and the red litmus paper turns blue.
33. ~~32.~~ (d) calcium chloride, magnesium chloride.
34. He could probably observe the protuberance called bud.



After the protuberance comes out, they form colony of chain of buds.

35. $h = 2.5\,cm$.

$u = -15\,cm$

$f = +10\,cm$

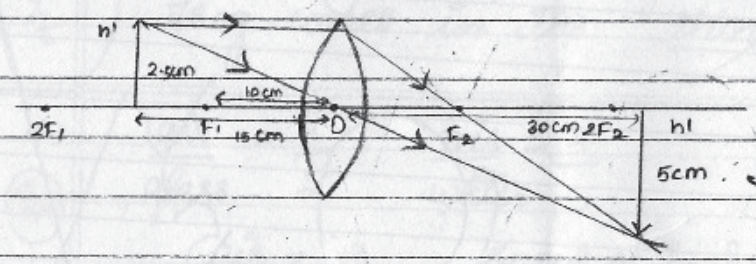
$$\frac{1}{V} - \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{V} = \frac{1}{f} + \frac{1}{u}\,; \quad \frac{1}{V} = \frac{1}{10} - \frac{1}{15} = \frac{15-10}{150} = \frac{1}{V}$$

$$\frac{\cancel{5}^{1}}{\cancel{150}_{30}} = \frac{1}{V} \qquad \boxed{V = 30\,cm}$$

$$\frac{h'}{h} = \frac{V}{u} \qquad \frac{h'}{2.5} = \frac{\cancel{30}^{-2}}{\cancel{-15}}$$

$\boxed{h' = -5\,cm}$ The height is 5 cm, is enlarged.



36. $CH_3COOH + NaHCO_3 \longrightarrow CH_3COONa + CO_2 + H_2O$

(ethanoic acid) (Sodium Hydrogencarbonate) (Sodium ethanoate)

2

The two observations are;

(i) A brisk Effervescence is observed.

(ii) An odourless and colourless carbondioxide is released.

This is can be checked as the CO_2 is send through limewater which turns its milky.