Series : E7FDG

SET-2

Q.P. Code 31/7/2

Roll No.

Candidates must write the Q.P. Code on the title page of the answer-book.

SCIENCE

*Time allowed : **3** hours* *Maximum Marks : **80***

NOTE

(I) *Please check that this question paper contains **14** printed pages.*

(II) *Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.*

(III) *Please check that this question paper contains **39** questions.*

(IV) *Please write down the Serial Number of the question in the answer-book at the given place before attempting it.*

(V) *15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.*

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General Instructions :

Read the following instructions carefully and follow them :

(i) *This question paper contain **39** questions. **All** questions are **compulsory**.*

(ii) *The question paper is divided into **three** sections — **A**, **B** and **C**.*
Section A : Biology (30 marks)
Section B : Chemistry (25 marks)
Section C : Physics (25 marks)

(iii) *The question paper has MCQs, VSAs, SAs, LAs and CBQs. Marks are given against each question.*

(iv) *There are case based questions (CBQs) with three sub-questions and are of **4** marks each.*

(v) ***Divide your answer sheet into three sections as per the question paper –***

Section A (Biology), Section B (Chemistry) and Section C (Physics).

It is compulsory to answer each question in its respective section. Do not mix answers of one section into the other section.

(vi) *Instructions are given with each section and question, wherever necessary.*

(vii) *Kindly note that a separate question paper has been provided for visually impaired candidates.*

(viii) *There is no overall choice in the question paper. However, an internal choice has been provided in few questions. Only one of the choices in such questions must be attempted.*

SECTION A
BIOLOGY

1. The growth of tendril in pea plant is due to which of the following ? *1*

(A) Effect of chemotropism

(B) Effect of gravity

(C) Rapid growth of part of the tendril away from the point of contact with the support (object)

(D) Rapid growth of the part of the tendril in contact with the support (object)

2. Which of the following options is ***not*** a step in the process of photosynthesis ? *1*

(A) Absorption of light energy by chlorophyll

(B) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen

(C) Reduction of carbon dioxide to carbohydrates

(D) Storage of food in roots and stems

3. Identify the gland in our body whose over-secretion will result in giant-sized children. *1*

(A) Pituitary (B) Thyroid

(C) Adrenal (D) Pancreas

4. Which of the following is ***not*** a function of transpiration ? *1*

(A) It helps in regulation of temperature.

(B) It helps in upward movement of water.

(C) It transports food to different parts of the plant body.

(D) It helps in movement of minerals from the roots to the leaves.

5. Mendel crossed pea plants having yellow seeds (YY) with pea plants having green seeds (yy). Yellow seeds are obtained in F_1 progeny which undergoes self-pollination to produce F_2 progeny. Select the option showing the result of F_2 progeny. *1*

(A) 3 green : 1 yellow (B) 1 yellow : 1 green

(C) 3 yellow : 1 green (D) 2 green : 2 yellow

6. From the following, identify the sexually transmitted diseases caused by bacteria.

(i) Warts (ii) Gonorrhoea

(iii) AIDS (iv) Syphilis

Choose the correct option : *1*

(A) (iii) and (iv) (B) (i) and (iii)

(C) (i) and (ii) (D) (ii) and (iv)

7. For the process of digestion, it is necessary to move the food in a regulated manner along the digestive tube, so that it can be processed properly in each part. The lining of the tube contracts rythmically which is known as : *1*

(A) Regulation (B) Absorption

(C) Contraction (D) Peristalsis

For Questions number 8 and 9, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

8. *Assertion (A) :* In some reptiles, the temperature at which the fertilized eggs are kept determines whether the egg will develop into a male or a female.

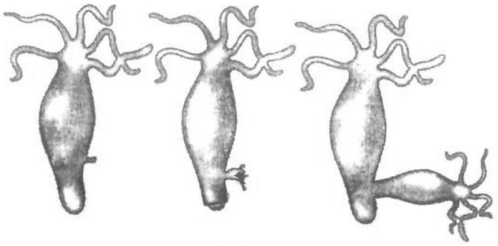
Reason (R) : In human beings, the sex is determined genetically. *1*

9. *Assertion (A) :* The lungs always contain a residual volume of air.

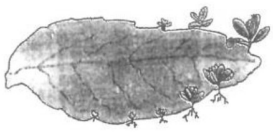
Reason (R) : The respiratory pigment is haemoglobin which has high affinity with O_2. *1*

10. In a tobacco plant, the male gametes have twenty-four chromosomes. The number of chromosomes in the female gametes is also twenty-four. What is the number of chromosomes in the zygote produced ? How is the chromosome number in the zygote re-established ? *2*

11. (a) Following are the diagrammatic representations of different organisms performing a process.



(a)



(b)

(i) Identify the organisms (a) and (b).

(ii) Name the process commonly shown in both the figures.

(iii) How is this process advantageous to the organisms ? *2*

OR

(b) Draw a diagram of the longitudinal section of a flower and label : Sepal, Petal, Ovary and Stigma. *2*

12. In the human digestive system, food is digested with the help of certain enzymes like trypsin and secretions from various glands like bile juice. Name the gland that secretes them and explain their action on food. *2*

13. (a) Improper waste disposal is a curse to the environment. Explain.

(b) Why are crop fields considered as artificial ecosystems ?

(c) Farmers are using pesticides on the crop plants, but the chances of accumulation of harmful chemicals is greatest in human beings. Why ? Name the phenomenon. *3*

14. (a) Which technique would you use for the propagation of varieties of grapes and roses ?

(b) Mention the parts of plants that can grow vegetatively.

(c) State the role of pollen grains in a flower. *3*

15. Read the following passage and answer the questions that follow :

Indian scientists helped crack the DNA code of 'bread-wheat' genome, which would help improve global food security. It will allow faster breeding for climate-resilient varieties with drought, heat and frost tolerance, disease-resistant and superior quality grain. It may also help people suffering from allergy to wheat gluten. The information generated will help identify genes controlling yield, grain quality, resistance to diseases, etc. A variety of grains can thus be produced.

(a) Write the full form of DNA. *1*

(b) What type of cell division is involved in the formation of gametes ? *1*

(c) (i) Variations confer an advantage to an individual to survive. Justify. *2*

OR

(c) (ii) How do genes control characteristics or traits ? *2*

16. Attempt either (a) or (b) :

(a) (i) Reflex arcs have evolved in animals because the thinking process of the brain is not fast enough for all situations. Draw a flow chart showing the path of a reflex arc. *2*

(ii) Given below are some actions/activities. Identify the part of brain involved in controlling them : *3×1=3*

(I) Taking a walk in the garden

(II) Dancing

(III) Blood pressure

OR

(b) (i) What are the limitations of electrical impulses in multicellular organisms ?

(ii) (I) In a 'Touch-me-not' plant, movement is seen on touch. Compare it with that of animals.

(II) Name the type of movement shown by the growth of pollen tube towards an ovule. *5*

SECTION B

CHEMISTRY

17. Which of the following metals is a poor conductor of heat ? *1*

(A) Na (B) Pb

(C) Cu (D) Al

18. On heating lead nitrate crystals, one would get : *1*

(A) yellow fumes (B) rotten egg smell

(C) burning smell of sulphur (D) brown fumes

19. Butanone is a four-carbon compound with the functional group : *1*

(A) Carboxylic acid (B) Aldehyde

(C) Ketone (D) Alcohol

20. The soap molecule has a : *1*

(A) Hydrophilic head and a hydrophobic tail

(B) Hydrophobic head and a hydrophilic tail

(C) Hydrophilic head and a hydrophilic tail

(D) Hydrophobic head and a hydrophobic tail

21. Which of the following are exothermic processes ? *1*

I. The decomposition of vegetable matter into compost

II. Dilution of an acid

III. Evaporation of water

IV. Sublimation of camphor

Options :

(A) I and II

(B) II and III

(C) I and IV

(D) III and IV

22. Which of the following compounds is a member of homologous series of alkyne ? *1*

(A) C_4H_{10} (B) C_3H_8

(C) C_2H_4 (D) C_3H_4

23. Turmeric is an example of : *1*

(A) Natural indicator (B) Synthetic indicator

(C) Olfactory indicator (D) Universal indicator

For Question number 24, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to this question from the codes (A), (B), (C) and (D) as given below.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

24. *Assertion (A) :* Burning of natural gas is an endothermic reaction.

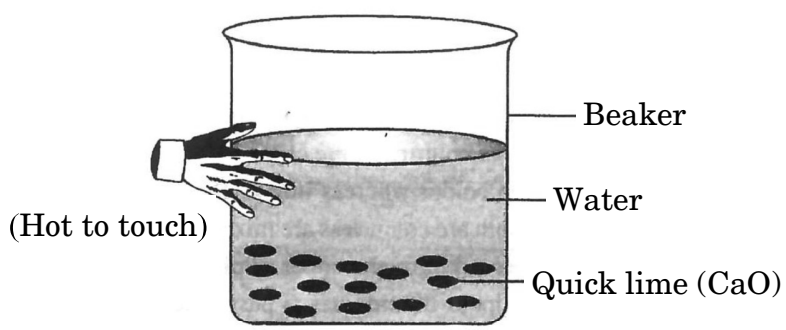
Reason (R) : Methane gas reacts with oxygen to produce CO_2 and H_2O. *1*

25. Give reasons for the following : *2*

(a) Why do acids not show acidic behaviour in the absence of water ?

(b) Why should curd and sour substances not be kept in copper vessels ?

26.



(a) Identify the type of reaction taking place and mention why does the beaker become hot.

(b) Write the balanced chemical equation. *2+1=3*

27. Attempt either (a) or (b) :

(a) A neutral organic compound 'A' (molecular formula C_2H_6O) reacts with acidified $K_2Cr_2O_7$ and on oxidation gives an acidic compound 'B'. Compound 'A' reacts with compound 'B' on warming, in the presence of concentrated H_2SO_4 to give a sweet smelling substance 'C'. What are A, B and C ? Also write their structures. *3*

OR

(b) Give reasons for the following : *3×1=3*

(i) Unsaturated hydrocarbons show addition reactions.

(ii) Detergents are better cleansing agents than soaps.

(iii) Carbon forms only covalent compounds.

28. Read the following passage and answer the questions that follow :

Salts are formed by reactions of acids and bases. Strong acids react with strong bases to form neutral salts. Weak acids react with strong bases to form basic salts. Acidic salts are formed by strong acids and weak bases. Na_2CO_3 and $NaHCO_3$ are salts of strong base (NaOH) and weak acid (H_2CO_3). Bleaching powder is prepared when slaked lime reacts with dry chlorine gas. Crystalline salts are hydrated and lose water on heating. Gypsum on heating at 373 K gives Plaster of Paris.

(a) What is the formula of POP (Plaster of Paris) ? What is its chemical name ? *1*

(b) Name the compound of sodium which is used for softening hard water. What is its chemical formula ? *1*

(c) (i) (I) What is water of crystallization ?

(II) Write the preparation of bleaching powder. *2*

OR

(c) (ii) (I) Name an indicator used by visually impaired children.

(II) Give one use of bleaching powder. *2*

29. Attempt either (a) or (b) :

(a) (i) Write the balanced chemical equation involved in the extraction of :

(I) Hg from HgS

(II) Zn from $ZnCO_3$

(III) Na from NaCl

(ii) Why does sodium chloride :

(I) not conduct electricity in solid state ?

(II) have very high melting point ? *3+2=5*

OR

(b) During extraction of metals, electrolytic refining is used to obtain pure metals.

(i) Which material will be used as cathode and anode for refining of zinc metal by this process ?

(ii) Name the electrolyte used in this process. Where do we get pure zinc after passing electric current ?

(iii) How does zinc prevent rusting of iron ? Also, name the process. *1+2+2=5*

SECTION C

PHYSICS

30. During a lab experiment, Bhavna uses a solenoid connected to a battery. She notes down the following facts :

(i) The pattern of magnetic field lines inside the solenoid is similar to a bar magnet.

(ii) The north pole and south pole of the current-carrying solenoid can be identified by applying the right hand thumb rule.

(iii) A solenoid can be used to magnetise a piece of a soft iron, making it an electromagnet.

Choose the option enlisting all the correct statements : *1*

(A) (i) and (iii) (B) (ii) and (iii)

(C) (i) and (ii) (D) (i), (ii) and (iii)

31. Pushkar was studying a light phenomenon and wrote down the following statements in that context :

(i) A concave mirror can be used as a shaving mirror because it can form an enlarged, virtual image when the object is placed between the pole and focus.

(ii) A convex lens always forms real, inverted images, regardless of the position of the object.

(iii) The relationship between object distance (u), image distance (v) and focal length (f) of the lens is given by $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$.

Choose the option enlisting all the correct statements : *1*

(A) (i) and (ii) (B) (i) and (iii)

(C) (ii) and (iii) (D) (i), (ii) and (iii)

For Question number 32, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to this question from the codes (A), (B), (C) and (D) as given below.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

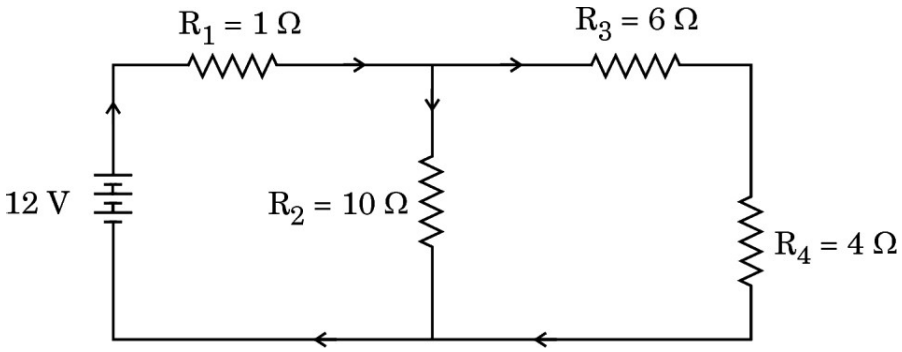
(D) Assertion (A) is false, but Reason (R) is true.

32. *Assertion (A) :* For a medium of given refractive index, the value of the angle of refraction corresponding to an angle of incidence is not a constant.

Reason (R) : With change in angle of incidence, the value of angle of refraction changes. Hence, the ratio of sine of angle of incidence to sine of angle of refraction remains constant. *1*

33. Attempt either (a) or (b) :

(a) Calculate the total resistance of the given circuit and find the total current flowing in it. *2*



OR

(b) How would you join three resistors each of resistance 6 Ω, so that the equivalent resistance of the combination is (i) 9 Ω, and (ii) 4 Ω ? *2*

34. Draw the pattern of magnetic field lines produced by a straight current-carrying conductor and name the factors on which the magnitude of magnetic field, due to it, depends. *2*

35. (a) State the causes of hypermetropia.

(b) With the help of ray diagram, show the :

(i) Image formation by hypermetropic eye, and

(ii) Correction of hypermetropia by using an appropriate lens. *3*

36. What is the use of fuse in domestic electric circuits ? How is its role different from the role of a green coloured wire given in domestic electric circuits ? What will happen if an electrician installs a fuse with higher-rated value than prescribed for a given electric circuit ? *3*

37. What is meant by atmospheric refraction of light ? Explain the following natural phenomenon by using the concept of atmospheric refraction : *3*

(a) Twinkling of stars

(b) Flickering of objects seen through a turbulent stream of hot air

38. Read the following passage and answer the questions that follow :

Two students, A and B were performing an activity on refraction through glass slab and refraction through prism respectively. Student 'A' observed that the emergent light ray is parallel to the direction of incident ray, while student 'B' observed that the emergent ray is making a certain angle with respect to the direction of the incident ray in the prism, called angle of deviation. He also noted that the angle of deviation is different for different colours of light.

(a) When white light passes through a glass slab, it does not show dispersion, while it shows dispersion when it passes through a glass prism. Why ? *1*

(b) Why do we get spectrum when white light passes through tiny water droplets present in air ? *1*

(c) (i) For a given pair of mediums, if we change the angle of incidence gradually, will it change the speed of light in that medium ? Explain. *2*

OR

(c) (ii) Calculate the speed of light in a given medium if angle of incidence in air is 60° and angle of refraction in the medium is 30°. *2*

Given that speed of light in air is 3×10^8 m/s.

39. Attempt either (a) or (b) :

(a) (i) Write the definition of the SI unit of power.

(ii) Two resistors R_1 = 1 Ω and R_2 = 2 Ω are connected in an electric circuit with a battery of 12 V. Calculate the power consumed, when R_1 and R_2 are connected in

(I) Parallel combination, and

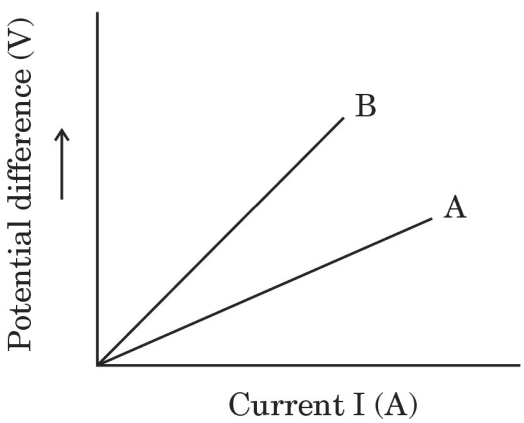
(II) Series combination.

(iii) Calculate the minimum number of identical electric bulbs of rating 4 V, 6 W; that can work safely with their optimum brightness, when connected in series with a 240 V mains supply. *5*

OR

(b) (i) State Ohm's law. V-I graph for Ohm's law is always a straight line. Justify.

(ii)



V-I graphs for two wires of identical dimensions but made of different materials A and B are shown in the figure. Out of A and B, which one is a better choice for making a heating element ? Justify your answer. *5*

Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2026 (2nd Board Examination)
SUBJECT NAME : Science 086
(Q.P. CODE / Set No. 31/7/2)

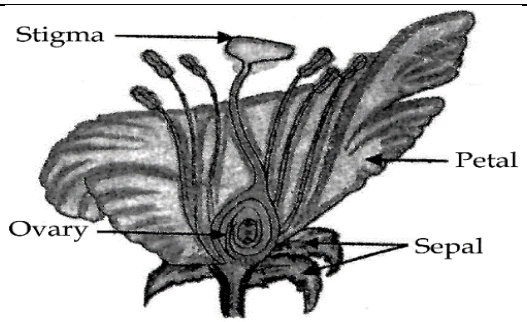
General Instructions: -

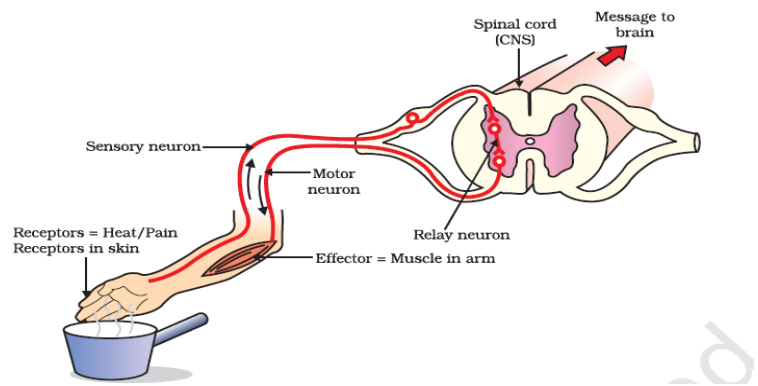
1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	**"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, evaluation done and several other aspects. Its leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in Newspaper/Website, etc. may invite action under various rules of the Board and IPC."**
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In Class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.**
4	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X' be marked. Evaluators will not put right **(✓)** while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note **"Extra Question"**.
10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.

11	A full scale of marks 80 (example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).This is in view of the reduced syllabus and number of questions in question paper.
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past :- ● Leaving answer or part thereof unassessed in an answer book. ● Giving more marks for an answer than assigned to it. ● Wrong totaling of marks awarded on an answer. ● Wrong transfer of marks from the inside pages of the answer book to the title page. ● Wrong question wise totaling on the title page. ● Wrong totaling of marks of the two columns on the title page. ● Wrong grand total. ● Marks in words and figures not tallying/not same. ● Wrong transfer of marks from the answer book to online award list. ● Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.) ● Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
14	While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.
15	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16	The Examiners should acquaint themselves with the guidelines given in the "**Guidelines for Spot Evaluation**" before starting the actual evaluation.
17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.
19	**If a candidate attempts both alternatives/options in a question where only one option/alternative is required to be attempted, the Evaluator shall award marks in both the options. The system will take the higher of two scores and disregard the other response.**
20	**In a question having two options/alternatives, if a candidate has attempted only one, then the evaluator shall mark "NA" (Not attempted) against the option that has not been attempted by the candidate.**

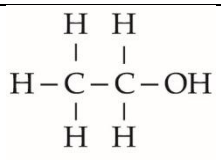
MARKING SCHEME
Science (Subject Code - 086)
(PAPER CODE : 31/7/2)

Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks	Total Marks
	Section (A) **Biology**		
1.	(C) Rapid growth of part of the tendril away from the point of contact with the support.	1	1
2.	(D) Storage of food in roots and stems.	1	1
3.	(A) Pituitary	1	1
4.	(C) It transports food to different parts of the plant body.	1	1
5.	(C) 3 yellow : 1 green	1	1
6.	(D) (ii) and (iv)	1	1
7.	(D) Peristalsis	1	1
8.	(B) Both A and R are true but R is not the correct explanation of A	1	1
9.	(B) Both A and R are true but R is not the correct explanation of A	1	1
10.	(a) • No of chromosomes in Zygote: 48 • When the two gametes combine during sexual reproduction, it results in re-establishment of number of chromosomes. / • By fertilisation to form zygote	**1** **1**	2
11.	(i) (a) *Hydra* (b) *Bryophyllum* (ii) Asexual reproduction. (iii) New generation or new individuals can be created from a single parent / produces many off springs in lesser time. **(any other)** **OR** (b)	½ ½ ½ ½	

		½x4	2
12.	Trypsin is secreted by Pancreas (gland) and it digests proteins. Bile juice is secreted by liver (gland) and it emulsifies fats.	½ + ½ ½ + ½	2
13.	(a) When waste is not segregated at source, it gets accumulated and materials like plastic will not be biodegraded. It may clog drains, pollute rivers and oceans and cause harm to cattle, fishes etc. (Or any other) (b) Because crop fields are manmade ecosystem and in this living organisms interact with each other and also with the abiotic components of the ecosystem. (c) These chemicals are non-biodegradable, hence keep getting accumulated at each trophic level, increasing progressively. As human beings occupy the top level in a food chain, the maximum concentration of these chemicals get accumulated in them. Phenomenon is Biological magnification.	1 1 ½ ½	3
14.	(a) Grafting for grapes and rose. (b) Many parts of the plants like – stem, root and leaves can develop into new plant. (c) Pollen grains produce / carry male gametes for fertilization in plants.	1 1 1	3
15.	(a) Deoxyribo nucleic acid (b) Meiosis / Reductional division	1 1	

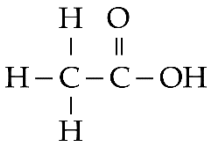
	(c) (i) India has variety of climatic conditions variations in wheat varieties will enable farmers to grow crop according to best suited variety in a particular climate. It will give benefit of survival and better grain quality. **OR** (c)(ii) A section of DNA provides information for one protein, is called gene for that protein. For example, plant height depends on hormones that trigger growth. Its quantity will be determined by efficiency of enzyme that is needed for the synthesis of this hormone. If the gene has any variation, making it less efficient, it will make enzyme less efficient less hormone and hence short plant.	2 2	4
16.	(a) (i) Receptor → Sensory neuron → (CNS) Spinal cord ↓ Effector ← Motor neuron ← Relay neuron Alternate answer  (ii) (I) Cerebrum / Fore brain (II) Cerebellum (III) Medulla in hindbrain **OR** (b) (i) • Electrical impulses reach only those cells which are connected by nervous tissue not each and every cell in the body. • Once an electrical impulse is generated in a cell and transmitted, the cell will take some time to reset its mechanism before it can generate and transmit a new impulse. (ii)	2 1 1 1 1+1	

	(I) **Movement in 'Touch – me – not' plant**: 1. It uses electro – chemical means to convey the information of touch from cell to cell and there is no specialised tissue for this 2.Plant cells change shape due changing amount of water resulting in swelling or shrinking **Movement in animals**: 1. In animals there is specialised tissue (muscles) for movements which change shape due to special proteins. 2. In animals muscles contract & relax to bring movements (II) Chemotropism.	2 1	5
	Section B (Chemistry)		
17.	(B) Pb	1	1
18.	(D) Brown fumes	1	1
19.	(C) Ketone	1	1
20.	(A) Hydrophilic head and a hydrophobic tail.	1	1
21.	(A) I and II	1	1
22.	(D) C_3H_4	1	1
23.	(A) Natural indicator	1	1
24.	(D) A is false but R is true.	1	1
25.	(a)Acids do not produce H^+ ions in absence of water. / The separation of H^+ ion from acid molecule cannot occur in absence of water. (b) Acids present in curd form toxic salts with copper.	1 1	2
26.	(a) Combination reaction The beaker becomes hot because a large amount of heat is released during the reaction/ it is a highly exothermic reaction. (b) $CaO + H_2O \rightarrow Ca(OH)_2 + Heat$ Quick lime — slaked lime	**1** **1** **1**	3
27.	A - C_2H_5OH/ Ethanol	½	



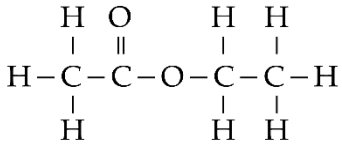
½

B - CH_3COOH /Ethanoic acid/ acetic acid ½



½

C- $CH_3COOC_2H_5$ /Ethyl ethanoate/ ethyl acetate/ester ½



½

Alternate answer

$$C_2H_5OH \xrightarrow[K_2Cr_2O_7]{\text{Acidified}} CH_3COOH$$

Ehanol (A) **Ethanoic acid (B)** 1+1

$$A + B \xrightarrow[H_2SO_4]{\text{conc}} \underset{\text{Ester}}{C\ (CH_3COOC_2H_5)}$$

Ethyl ethanoate/ethyl acetate 1

OR

(b)

(i) Unsaturated hydrocarbons having double or triple bonds have a strong tendency to become saturated.

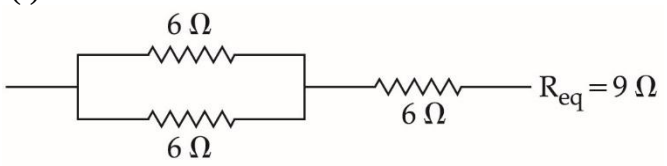
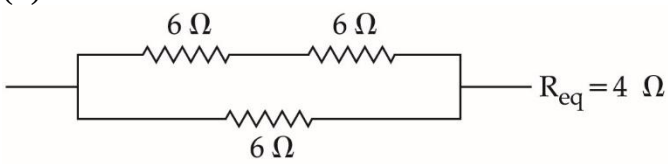
/

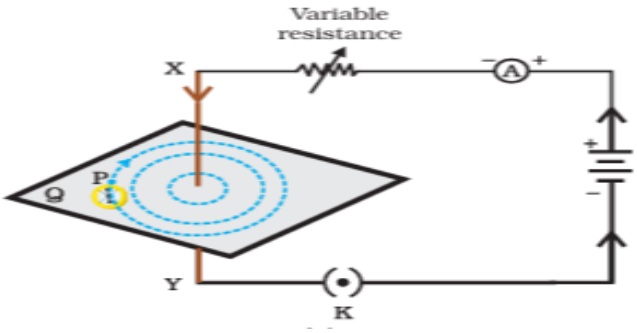
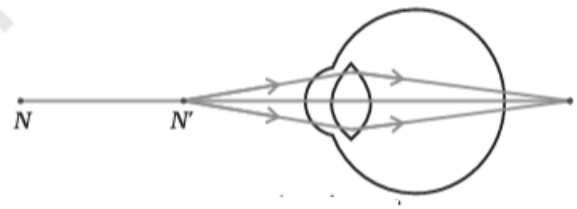
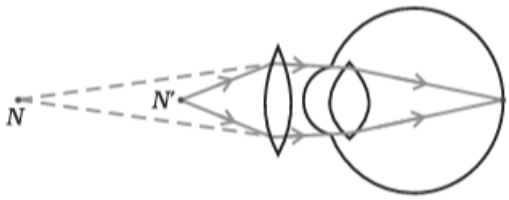
Unsaturated hydrocarbons are reactive and undergo addition reactions. 1

(ii) Long chain of hydrocarbon in detergents does not form insoluble precipitate with Calcium or Magnesium ions of hard water and hence they remain effective even in hard water. 1

(iii) Carbon is tetravalent. It can neither form C^{4+} cation nor C^{4-} anion. It completes its octet by sharing its valence electrons with other atoms of carbon or other elements forming covalent bonds. 1 3

28.	(a) • $CaSO_4.½H_2O$ / $(CaSO_4)_2.H_2O$ • Calcium sulphate hemihydrate (b) • Washing soda / Sodium carbonate • $Na_2CO_3.10H_2O$ (c) (i) (I) Fixed number of water molecules present in one formula unit of salt. (II) $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$ **OR** (c) (ii) (I) Vanilla / Onion / Clove / Olfactory indicator (any other suitable example) (II) - In textile industry / paper industry as a bleaching agent. - as an oxidising agent in chemical industries - as a disinfectant **(any one and any other)**	½ ½ ½ ½ **1** **1** **1** **1**	4
29.	(a) (i) (I) $2HgS(s) + 3O_2(g) \xrightarrow{Heat} 2HgO(s) + 2SO_2(g)$ $2HgO(s) \xrightarrow{Heat} 2Hg(l) + O_2(g)$ (II) $ZnCO_3(s) \xrightarrow{Heat} ZnO(s) + CO_2(g)$ $ZnO(s) + C(s) \rightarrow Zn(s) + CO(g)$ (III) At cathode $Na^+ + e^- \rightarrow Na$ At anode $2Cl^- \rightarrow Cl_2 + 2e^-$ (ii) (I) Because movement of ions in solid state is not possible due to its rigid structure. (II) A large amount of heat energy is required to overcome strong electrostatic forces of attraction between oppositely charged ions in ionic compounds. **OR** b) (i)	**1** **1** 1 1 1	

	• Cathode – Thin strip of pure zinc metal • Anode – Impure zinc metal (ii) • A solution of Zinc salt like $ZnSO_4$. • On the cathode. (iii) • Zinc forms a protective layer on iron preventing reaction of air and water with iron surface. • Galvanisation.	½ ½ 1 1 1 1	5
	Section – C (Physics)		
30.	D (i), (ii) and (iii)	1	1
31.	B (i) and (iii)	1	1
32.	(D) Assertion (A) is false but Reason (R) is true	1	1
33.	(a) $R_S=R_3+R_4$ $R_S=6+4=10\Omega$ R_S and R_2 are in parallel $\frac{1}{Rp}=\frac{1}{10}+\frac{1}{10}=\frac{2}{10}=\frac{1}{5}$ $Rp=5\Omega$ R_1 and Rp are in series Total Resistance=5+1=6 Ω Total Current I=$\frac{V}{R}=\frac{12}{6}=2A$ **OR** (b) (i)  (ii)  	1 1 1 1	2
34.	• Diagram of pattern of magnetic field:		

	 • Factors : (i) Amount of current flowing in the circuit (ii) Distance from current carrying conductor	1 ½+ ½	2
35.	(a) Reasons: (i) the focal length of the eye lens is too long (ii) the eyeball has become too small. (b) (i) Hypermetropic eye  (ii) Correction 	½+ ½ 1 1	3
36.	• Fuse – It is used to protect the appliances from overloading (Short circuiting). • Green colour wire – Earth wire – Provides a low resistance conducting path for current to flow to the earth, if there is any leakage of current to metallic body of appliance, hence prevents from electric shock. • Fuse will not be able to protect the circuit during overloading	1 1 1	3

37.	• Refraction of light by the earth's atmosphere due to variation in optical density of different layers of air is called as atmospheric refraction. (a) The starlight, on entering the earth's atmosphere undergoes refraction continuously in a medium of gradually increasing refractive index and we see the apparent position of the star. Since the physical conditions of atmosphere are not stationary, the apparent position of the star fluctuates and gives twinkling effect. (b) The air just above the fire becomes hotter than the air further up. The hotter air is lighter (less dens) than cooler air above it and has a refractive index slightly less than that of cooler air. Since the physical conditions of refracting medium are not stationary, the apparent position of objects, as seen through hot air fluctuates. And we see flickering objects.	1 1 1	3
38.	(a) Glass slab shows no dispersion because the colours dispersed by first refracting surface recombine and emerge out as white light at the second surface. In a glass prism different colours bend at different angles hence shows dispersion (b) Tiny water droplets act like prism. They refract and disperse the sunlight to show spectrum. (c) (i) With change in i, r will also change. Hence refractive index remains constant. Refractive index = $\frac{speed\ of\ light\ in\ air}{speed\ of\ light\ in\ given\ medium}$ Hence speed of light in that medium will also remain constant. **OR** (c) (ii) $n = \frac{sin\ i}{sin\ r}$ $n = \frac{\sin 60^o}{sin 30^o} = \frac{\sqrt{3}/2}{1/2} = \sqrt{3}$ $n = \frac{speed\ of\ light\ in\ air}{speed\ of\ light\ in\ medium}$ $\sqrt{3} = \frac{3\times10^8}{v}$ $v = \frac{3\times10^8}{\sqrt{3}}$ $v = \sqrt{3} \times 10^8$ m/s	1 1 1 1 ½ ½ ½ ½	4

39.	(a) (i) 1 W is the power consumed by a device that carries 1A current when operated at a potential difference of 1V. / When 1J electrical energy is consumed in 1 s the power consumed is 1W. (ii) (I) Parallel combinatioin $\frac{1}{R} = \frac{1}{1} + \frac{1}{2} = \frac{3}{2}$ $R = \frac{2}{3}\Omega$ $P = \frac{V^2}{R}$ $P = \frac{(12)^2}{2/3} = 216W$	1 1	
	(II) Series: R=1+2=3 Ω $P = \frac{V^2}{R} = \frac{(12)^2}{3} = 48\ W$	1	
	(iii) $R = \frac{V^2}{P}$ $R = \frac{(4)^2}{6} = \frac{8}{3}\ \Omega$ $P = VI$ $I = \frac{6}{4} = \frac{3}{2}A$	½ ½	
	Since same current will flow in all resistors, hence $R_s = \frac{240}{3/2} = 160\ \Omega$ $n = \frac{R_s}{R} = \frac{160}{8/3} = 60$ **OR**	½ ½	
	(b) (i) • Ohm's law: The potential difference, V, across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature remains the same. • According to Ohm's law Vα I	1	

	It means that as the current through a wire increases, the potential difference across the wire increases linearly, hence the graph is a straight line. (ii) • Wire B • Slope of wire B is more $R = \frac{V}{I}$ Hence resistance of wire B is more. Since the dimensions of both wires are same therefore $R=\rho\frac{l}{A}$ Resistivity of wire B is more which is the characteristic of a heating element.	1 1 1 1	5

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