

Series JBB/5

SET-3

कोड नं. 31/5/3  
Code No.

रोल नं.  
Roll No.



परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।  
Candidates must write the Code on the title page of the answer-book.

नोट	NOTE
(I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं।	(I) Please check that this question paper contains 23 printed pages.
(II) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।	(II) Code number 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) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 30 प्रश्न हैं।	(III) Please check that this question paper contains 30 questions.
(IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।	(IV) Please write down the Serial Number of the question in the answer-book before attempting it.
(V) इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।	(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 students will read the question paper only and will not write any answer on the answer-book during this period.

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विज्ञान  
SCIENCE

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

**General Instructions :**

Read the following instructions very carefully and strictly follow them :

- (i) This question paper comprises **three** Sections – A, B and C. There are **30** questions in the question paper. **All** questions are compulsory.
- (ii) **Section A** – Questions no. **1 to 14** — all questions or part thereof are of **one** mark each. These questions comprise Multiple Choice Questions (MCQ), Very Short Answer (VSA) and Assertion–Reason type questions. Answer to these questions should be given in **one word** or **one sentence**.
- (iii) **Section B** – Questions no. **15 to 24** are short answer type questions, carrying **3** marks each. Answer to these questions should not exceed **50 to 60** words.
- (iv) **Section C** – Questions no. **25 to 30** are long answer type questions, carrying **5** marks each. Answer to these questions should not exceed **80 to 90** words.
- (v) Answers should be brief and to the point. Also the above mentioned word limit be adhered to as far as possible.
- (vi) There is no overall choice in the question paper. However, an internal choice has been provided in some questions in each Section. **Only one of the choices** in such questions have to be attempted.
- (vii) In addition to this, separate instructions are given with each section and question, wherever necessary.

**SECTION A**

For question numbers **1 and 2**, two statements are given – one labelled **Assertion (A)** and the other labelled **Reason (R)**. Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below.

- (i) Both (A) and (R) are true and (R) is correct explanation of the assertion (A).
- (ii) Both (A) and (R) are true, but (R) is **not** the correct explanation of the assertion (A).
- (iii) (A) is true, but (R) is false.
- (iv) (A) is false, but (R) is true.

1. **Assertion (A)** : Carbon has a strong tendency to either lose or gain electrons to attain noble gas configuration.

(4) **Reason (R)** : Carbon has four electrons in its outermost shell and has the tendency to share electrons with carbon or other elements.

2. Assertion (A) : At high temperatures, metal wires have a greater chance of short circuiting.

2

Reason (R) : Both resistance and resistivity of a material vary with temperature.

1

3. Covalent compounds are generally poor conductors of electricity. Why ?

1

4. State the common characteristic of the following elements :

1

Boron, Silicon, Germanium and Arsenic

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State the Periodic Law on which the Modern Periodic Table is based.

1

5. Answer question numbers 5(a) – 5(d) on the basis of your understanding of the following paragraph and the related studied concepts :

Solar power in India is a fast developing industry. The country's solar installed capacity reached 30.071 GW as of 31 July, 2019. India has the lowest capital cost per MW to install solar power plants. Solar electricity generation recorded nearly 3.4% of total utility electricity generation in January 2019. The following table shows Annual Solar Power Generation of the last six years.

Year	Solar Power Generation (TWh)
2013 – 14	3.35
2014 – 15	4.60
2015 – 16	7.45
2016 – 17	12.09
2017 – 18	25.87
2018 – 19	39.27

Our country is lucky to receive solar energy for the greater part of the year. It is estimated that during a year India receives the energy equivalent to more than 5000 trillion kWh from the Sun.



- 5(a) What are solar cells ? 1
- 5(b) How much voltage can be developed and how much electricity can be produced by one typical solar cell when exposed to the Sun ? 1
- 5(c) The future of power generation by solar energy is bright in India. Give reason. 1
- 5(d) List two advantages of solar cells. 1

6. Question numbers 6(a) – 6(d) are based on the table and related information in the passage given below.

Thyroid Stimulating Hormone (TSH) stimulates thyroid gland to produce thyroxine. Study the table given below.

*Table : TSH levels during pregnancy*

Stage of pregnancy	Normal (mU/L)	Low (mU/L)	High (mU/L)
First trimester	0.2 – 2.5	< 0.2	2.5 – 10
Second trimester	0.3 – 3.0	< 0.3	3.01 – 4.5
Third trimester	0.8 – 5.2	< 0.8	> 5.3

It is important to monitor TSH levels during pregnancy. High TSH levels and hypothyroidism can especially affect chances of miscarriage. Therefore, proper medication in consultation with a doctor is required to regulate/control the proper functioning of the thyroid gland.

- 6(a) Give the full form of TSH. 1
- 6(b) State the main function of TSH. 1
- 6(c) Why do TSH levels in pregnant women need to be monitored ? 1
- 6(d) A pregnant woman has TSH level of 8.95 mU/L. What care is needed for her ? 1



7. The values of mA and  $\mu$ A are

- (A)  $10^{-6}$  A and  $10^{-9}$  A respectively
- (B)  $10^{-3}$  A and  $10^{-6}$  A respectively
- (C)  $10^{-3}$  A and  $10^{-9}$  A respectively
- (D)  $10^{-6}$  A and  $10^{-3}$  A respectively

8. A cylindrical conductor of length ' $l$ ' and uniform area of cross-section ' $A$ ' has resistance ' $R$ '. Another conductor of length  $2.5 l$  and resistance  $0.5 R$  of the same material has area of cross-section

- (A)  $5 A$
- (B)  $2.5 A$
- (C)  $0.5 A$
- (D)  $\frac{1}{5} A$

9. The image distance from the eye lens in the normal eye when we increase the distance of an object from the eye

- (A) increases.
- (B) decreases.
- (C) remains unchanged.
- (D) depends on the size of the eyeball.

10. The Reni village of Garhwal is famous for

- (A) Monocultures of pine, teak and eucalyptus.
- (B) Chipko Movement.
- (C) Extensive biodiversity.
- (D) Participation of local people in efficient management of forests.



11. Consider the following criticisms that are generally addressed when a new project is launched :

- I. Displacement of peasants and local tribals without compensation.
- II. Swallowing up large amount of public money without any benefits.
- III. Deforestation and loss of biodiversity.

The criticisms about large dams in particular are

- (A) I and II
- (B) II and III
- (C) I and III
- (D) I, II and III

1

OR  
Switching off unnecessary lights and fans and repairing leaking taps correctly defines which term of 5R's ?

1

- (A) Recycle
- (B) Reuse
- (C) Repurpose
- (D) Reduce

12. Strong heating of ferrous sulphate leads to the formation of a brown solid and two gases. This reaction can be categorised as

1

- (A) displacement and redox.
- (B) decomposition and redox.
- (C) displacement and endothermic.
- (D) decomposition and exothermic.

13. If 10 mL of  $H_2SO_4$  is mixed with 10 mL of  $Mg(OH)_2$  of the same concentration, the resultant solution will give the following colour with universal indicator :

1

- (A) Red
- (B) Yellow
- (C) Green
- (D) Blue



14. An element X with atomic number 12 forms a compound with element Y with atomic number 17. The formula of the compound formed is

1

- (A) XY
- (B) XY<sub>2</sub>
- (C) X<sub>2</sub>Y
- (D) X<sub>2</sub>Y<sub>3</sub>

OR

An element X is forming acidic oxide. Its most probable position in the modern periodic table is

1

- (A) Group 1 and Period 3
- (B) Group 16 and Period 3
- (C) Group 17 and Period 3
- (D) Group 2 and Period 3

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SECTION B

15. Identify the type of each of the following reactions stating reason for your answers :

3

- (a)  $Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe + \text{heat}$
- (b)  $Pb(NO_3)_2 + 2KI \longrightarrow PbI_2 + 2KNO_3$
- (c)  $ZnCO_3 \xrightarrow{\text{heat}} ZnO + CO_2$

16. From the elements Li, K, Mg, C, Al, S identify the

- (a) elements belonging to the same group.
- (b) element which has the tendency to lose two electrons.
- (c) element which prefers sharing of electrons to complete its octet.
- (d) most metallic element.
- (e) element that forms acidic oxide.
- (f) element that belongs to group 13.

3

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13

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17. In the electrolysis of water
- Name the gases liberated at anode and cathode.
  - Why is it that the volume of gas collected on one electrode is two times that on the other electrode?
  - What would happen if dil.  $H_2SO_4$  is not added to water?

OR

A chemical compound 'X' is used in the soap and glass industry. It is prepared from brine.

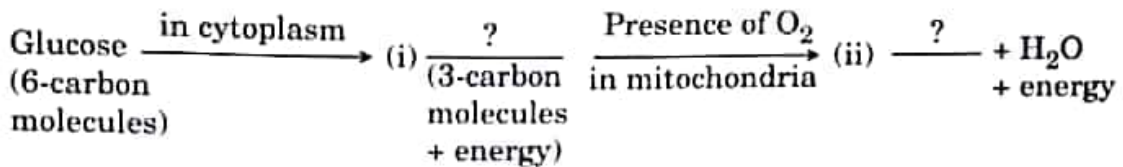
- Write the chemical name, common name and chemical formula of 'X'.
  - Write the equation involved in its preparation.
  - What happens when it is treated with water containing Ca or Mg salts?
18. (a) Create a food chain of the following organisms :  
Insect, Hawk, Grass, Snake, Frog
- Name the organism at the third trophic level of the created food chain.
  - Which organism of this food chain will have the highest concentration of non-biodegradable chemicals?
  - Name the phenomenon associated with it.
  - If 10,000 joules of energy is available to frogs, how much energy will be available to snakes in this food chain?

OR

- What is an ecosystem?
  - List any two natural ecosystems.
  - We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly. Why?
19. (a) What provides nutrition to human sperms? State the genetic constitution of a sperm.
- (b) Mention the chromosome pair present in zygote which determines the sex of (i) a female child, and (ii) a male child.



20. (a) In the process of respiration, state the function of alveoli.  
(b) Rate of breathing in aquatic organisms is much faster than that in terrestrial organisms. Give reasons.  
(c) Complete the following pathway showing the breakdown of glucose : 3



21. (a) Why is the F1 progeny always of tall plants when a tall pea plant is crossed with a short pea plant ?  
(b) How is F2 progeny obtained by self-pollination of F1 progeny different from F1 progeny ? Give reason for this observation.  
(c) State a conclusion that can be drawn on the basis of this observation. 3

22. Draw ray diagram in each of the following cases to show what happens after reflection to the incident ray when  
(a) it is parallel to the principal axis and falling on a convex mirror.  
(b) it is falling on a concave mirror while passing through its principal focus.  
(c) it is coming oblique to the principal axis and falling on the pole of a convex mirror. 3

23. A student uses spectacles of focal length – 2.5 m.  
(a) Name the defect of vision he is suffering from.  
(b) Which lens is used for the correction of this defect ?  
(c) List two main causes of developing this defect.  
(d) Compute the power of this lens. 3

OR

Give reasons :

- (a) Red colour is selected for danger signals.  
(b) The sky appears dark in space.  
(c) The time difference between actual sunset and apparent sunset is about 2 minutes. 3
24. (a) Draw the pattern of magnetic field lines due to a magnetic field through and around a current carrying circular loop.  
(b) Name and state the rule to find out the direction of magnetic field inside and around the loop. 3



### SECTION C

25. (a) Define isomerism. Draw all possible isomers of butane.  
(b) "A compound 'X' on combustion gives a yellow flame with lots of smoke." What inference would you draw from this statement?  
(c) State the role of alkaline  $\text{KMnO}_4$  in the reaction involving conversion of an alcohol to corresponding carboxylic acid.

5

26. (a) What is an amalgam?  
(b) Why is solder used for making electrical fuse?  
(c) What is galvanisation? State its significance.  
(d) In the electrolytic refining of copper, name the anode and cathode used and the electrolyte taken in the cell.

5

OR

- (a) Explain the formation of ionic compound,  $\text{Al}_2\text{O}_3$  with electron-dot structure :  
(Given : Atomic no. of Al and O are 13 and 8 respectively)  
(b) What happens when (Report only observations)  
(i) a reactive metal reacts with a dilute mineral acid?  
(ii) an amphoteric oxide reacts with sodium hydroxide solution?  
(iii) a metal of low reactivity is dropped in the salt solution of a metal of high reactivity?  
(iv) a metal carbonate is treated with acid?
27. (a) List two reasons of using contraceptive methods by married couples.  
(b) Write in proper sequence the processes going on in the different organs of the reproductive system of a human female starting from the time of egg production to childbirth.

5

5

OR



- (a) Identify the modes of asexual reproduction in each of the following organisms :
- (i) Hydra
  - (ii) Planaria
  - (iii) Amoeba
  - (iv) Spirogyra
  - (v) Rhizopus
- (b) List three advantages of vegetative propagation.
- (c) Why can fertilisation not take place in flowers if pollination does not occur ?

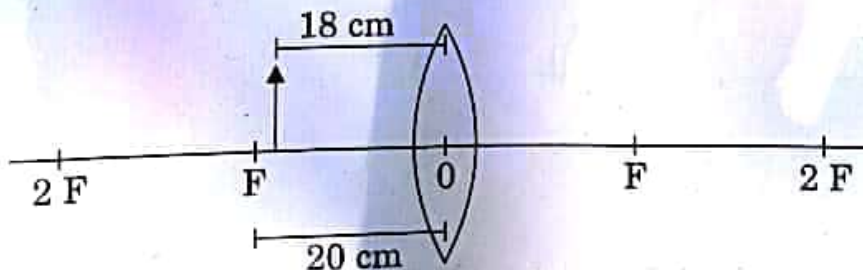
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28. Give reasons :

- (a) Ventricles have thicker muscular walls than atria.
- (b) Transport system in plants is slow.
- (c) Circulation of blood in aquatic vertebrates differs from that in terrestrial vertebrates.
- (d) During the daytime, water and minerals travel faster through xylem as compared to the night.
- (e) Veins have valves whereas arteries do not.

5

29. (a) Complete the following ray diagram :



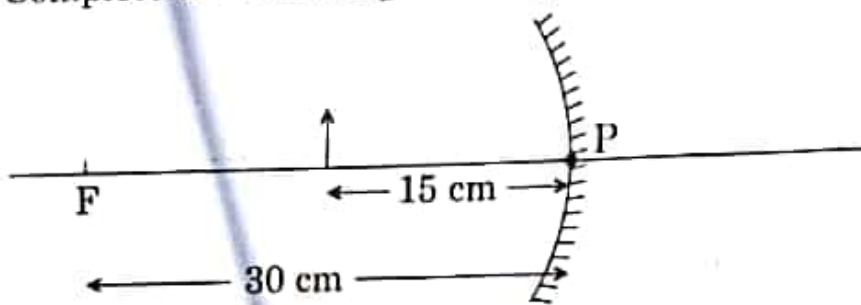
- (b) Find the nature, position and size of the image formed.
- (c) Use lens formula to determine the magnification in this case.

5

OR



- (a) Complete the following ray diagram :



- (b) Find the nature, position and size of the image formed.  
(c) Use mirror formula to determine the magnification in this case.

5

30. (a) Two lamps rated 100 W, 220 V and 10 W, 220 V are connected in parallel to 220 V supply. Calculate the total current through the circuit.
- (b) Two resistors X and Y of resistances  $2 \Omega$  and  $3 \Omega$  respectively are first joined in parallel and then in series. In each case the voltage supplied is 5 V.
- (i) Draw circuit diagrams to show the combination of resistors in each case.
- (ii) Calculate the voltage across the  $3 \Omega$  resistor in the series combination of resistors.

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