



सामान्य निर्देश :

निम्नलिखित निर्देशों को बहुत सावधानी से पढ़िए और उनका सख्ती से पालन कीजिए :

- (i) इस प्रश्न-पत्र में कुल 39 प्रश्न हैं। सभी प्रश्न अनिवार्य हैं।
- (ii) यह प्रश्न-पत्र पाँच खण्डों में विभाजित किया गया है – क, ख, ग, घ एवं ङ।
- (iii) खण्ड क – प्रश्न संख्या 1 से 20 तक बहुविकल्पीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 1 अंक का है।
- (iv) खण्ड ख – प्रश्न संख्या 21 से 26 तक अति लघु-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 2 अंकों का है। इन प्रश्नों के उत्तर 30 से 50 शब्दों में दिए जाने चाहिए।
- (v) खण्ड ग – प्रश्न संख्या 27 से 33 तक लघु-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 3 अंकों का है। इन प्रश्नों के उत्तर 50 से 80 शब्दों में दिए जाने चाहिए।
- (vi) खण्ड घ – प्रश्न संख्या 34 से 36 तक दीर्घ-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 5 अंकों का है। इन प्रश्नों के उत्तर 80 से 120 शब्दों में दिए जाने चाहिए।
- (vii) खण्ड ङ – प्रश्न संख्या 37 से 39 तक 3 स्रोत-आधारित/प्रकरण-आधारित इकाइयों के मूल्यांकन 4 अंकों के प्रश्न (उप-प्रश्नों सहित) हैं।
- (viii) प्रश्न-पत्र में समग्र विकल्प नहीं दिया गया है। यद्यपि, कुछ खण्डों में आंतरिक विकल्प दिए गए हैं। इस प्रकार के प्रश्नों में केवल एक ही विकल्प का उत्तर दीजिए।

खण्ड क

प्रश्न संख्या 1 से 20 तक के प्रत्येक प्रश्न में दिए गए चार विकल्पों में से सबसे उचित विकल्प चुनिए और लिखिए। गलत उत्तर के लिए कोई ऋणात्मक अंकन नहीं है।

20×1=

1. निम्नलिखित रासायनिक समीकरण पर विचार कीजिए :



इस रासायनिक समीकरण को संतुलित करने के लिए, 'p', 'q', 'r' और 's' के मान क्रमशः होने चाहिए:

- | | |
|----------------|----------------|
| (A) 3, 2, 2, 1 | (B) 2, 3, 3, 1 |
| (C) 2, 3, 1, 3 | (D) 3, 1, 2, 2 |

2. निम्नलिखित में से कौन-से एक विकल्प में लवणों के परिवार का निरूपण किया गया है ?

- | | |
|---|--|
| (A) NaCl, Na ₂ SO ₄ , CaSO ₄ | (B) K ₂ SO ₄ , Na ₂ SO ₄ , CaSO ₄ |
| (C) NaNO ₃ , CaCO ₃ , Na ₂ CO ₃ | (D) MgSO ₄ , CuSO ₄ , MgCl ₂ |

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General Instructions :

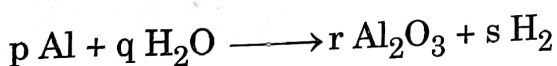
Read the following instructions very carefully and strictly follow them :

- i) This question paper comprises **39** questions. **All** questions are **compulsory**.
- ii) This question paper is divided into **five** sections – **A, B, C, D** and **E**.
- iii) **Section A** – Questions No. **1** to **20** are Multiple Choice Questions. Each question carries **1** mark.
- iv) **Section B** – Questions No. **21** to **26** are Very Short Answer type questions. Each question carries **2** marks. Answer to these questions should be in the range of **30** to **50** words.
- v) **Section C** – Questions No. **27** to **33** are Short Answer type questions. Each question carries **3** marks. Answer to these questions should be in the range of **50** to **80** words.
- vi) **Section D** – Questions No. **34** to **36** are Long Answer type questions. Each question carries **5** marks. Answer to these questions should be in the range of **80** to **120** words.
- vii) **Section E** – Questions No. **37** to **39** are of **3** source-based/case-based units of assessment carrying **4** marks each with sub-parts.
- viii) There is no overall choice. However, an internal choice has been provided in some sections. Only one of the alternatives has to be attempted in such questions.

SECTION A

Select and write the most appropriate option out of the four options given for each of the questions no. **1** to **20**. There is no negative marking for incorrect response. 20×1=20

Consider the following chemical equation :



To balance this chemical equation, the values of 'p', 'q', 'r' and 's' must be respectively :

- | | |
|----------------|----------------|
| (A) 3, 2, 2, 1 | (B) 2, 3, 3, 1 |
| (C) 2, 3, 1, 3 | (D) 3, 1, 2, 2 |

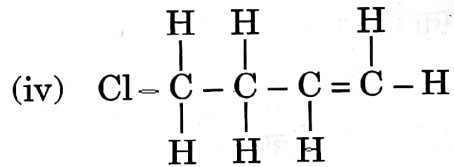
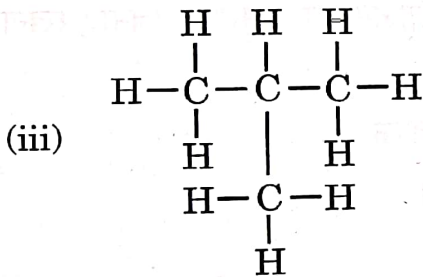
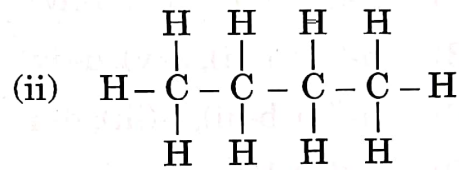
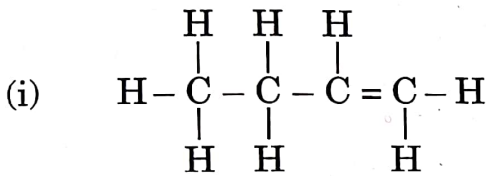
Which of the given option represents a family of salts ?

- | | |
|---|--|
| (A) NaCl, Na ₂ SO ₄ , CaSO ₄ | (B) K ₂ SO ₄ , Na ₂ SO ₄ , CaSO ₄ |
| (C) NaNO ₃ , CaCO ₃ , Na ₂ CO ₃ | (D) MgSO ₄ , CuSO ₄ , MgCl ₂ |



3. The most common method of extraction of metals from their oxide ores is :
- (A) Reduction with carbon
 - (B) Reduction with hydrogen
 - (C) Reduction with aluminium
 - (D) Electrolytic reduction

4. Given below are the structures of some hydrocarbons. Select the two structures which are related to each other from the given options :



- (A) (i) and (iv)
 - (B) (ii) and (iv)
 - (C) (ii) and (iii)
 - (D) (i) and (iii)
5. Choose the *incorrect* statement about the common reaction used in hydrogenation of vegetable oils.
- (A) It is an addition reaction.
 - (B) It takes place in the presence of nickel or palladium catalyst.
 - (C) The product contains only single bonds between carbon atoms.
 - (D) It is an addition reaction which occurs in the presence of an acid catalyst.



Match Column-I with Column-II and select the correct option from the choices provided.

Column-I	Column-II
a. Site of fertilisation of egg with the sperm	(i) Vagina
b. Site of implantation of embryo	(ii) Uterus
c. Site of entry of sperm into the female reproductive tract	(iii) Oviduct
d. Site through which the waste materials generated by the developing embryo are removed	(iv) Placenta
	(v) Cervix

(A) a-(ii), b-(i), c-(v), d-(iv)

(B) a-(iii), b-(i), c-(v), d-(iv)

(C) a-(iv), b-(ii), c-(iii), d-(i)

(D) a-(iii), b-(ii), c-(i), d-(iv)

The part of the brain which maintains the posture and balance of the body is :

(A) Pons

(B) Cerebrum

(C) Cerebellum

(D) Medulla

3. The plant hormone present in greater concentration in the areas of rapidly dividing cells is :

(A) Auxin

(B) Cytokinins

(C) Gibberellins

(D) Abscisic acid

9. Select a pair of bisexual flowers from the following :

(A) Papaya and mustard

(B) *Hibiscus* and mustard

(C) *Hibiscus* and papaya

(D) *Hibiscus* and watermelon

10. The gastric glands present in the wall of the stomach release :

(A) Mucus and Trypsin

(B) Pepsin and Trypsin

(C) Mucus and Pepsin

(D) Pepsin and Salivary amylase

[P.T.O.]



11. Absolute refractive index of water and glass is $\frac{4}{3}$ and $\frac{3}{2}$ respectively. If the speed of light in glass is 2×10^8 m/s, the speed of light in water is :

- (A) $\frac{9}{4}$ m/s (B) $\frac{7}{3}$ m/s
(C) $\frac{16}{9}$ m/s (D) $\frac{9}{8}$ m/s

12. When a beam of white light passes through a region of very fine dust particles, the colour of light that scatters the most in that region is :

- (A) red (B) orange
(C) blue (D) yellow

13. A wire of length ' l ' is gradually stretched so that its length increases to $3l$. If its original resistance is R , then its new resistance will be :

- (A) $3R$ (B) $6R$
(C) $9R$ (D) $27R$

14. Which one of the following statements is **not** true about a bar magnet ?

- (A) It sets itself in north-south direction when suspended freely.
(B) It has attractive power for iron filings.
(C) It produces magnetic field lines.
(D) The direction of magnetic field lines inside a bar magnet is from its north pole to its south pole.

15. The strength of magnetic field produced inside a long straight current carrying solenoid does **not** depend upon :

- (A) number of turns in the solenoid
(B) direction of current flowing through the solenoid
(C) material of the core filled inside the solenoid
(D) radius of the coil of the solenoid

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SECTION B

Questions no. 21 to 26 are Very Short Answer Type questions.

21. (a) List the possible sources of energy required in decomposition reactions. Illustrate any one with a suitable example. 2

OR

- (b) What is observed when hydrated ferrous sulphate crystals are heated in a dry boiling tube? Give balanced chemical equation(s) of the reactions(s) that occur(s). 2

22. (a) Write the formula of the ions which (i) acids, and (ii) bases generate in water solutions. 2

- (b) Dry HCl gas does not change the colour of dry litmus paper. Why? 2

23. State the main function of veins in human circulatory system. Why do they not need thick walls? 2

24. (a) Explain how the proteins control the 'characteristics' in an organism with the help of an example of 'tallness' trait in pea plant. 2

- (b) Name the section of DNA that controls the 'characteristics' in an organism. 2

25. (a) A student has difficulty in reading his textbooks but can read the blackboard clearly while sitting in the last row. Name the defect of vision the student is suffering from. List two reasons due to which this defect arises. Write the nature of the lenses required to correct this defect. 2

OR

- (b) Draw a ray diagram to show the path of a ray of light falling obliquely on one of the refracting faces of a triangular glass prism and mark the angle of deviation on it. 2

26. An electric kettle is rated 230 V; 1000 W. Calculate the resistance of its heating element when in operation. 2

[P.T.O.]

SECTION C

Questions no. 27 to 33 are Short Answer Type questions.

27. (a) What is a reactivity series of elements ? How is it developed ? Arrange the following elements as they are arranged in the reactivity series :

Aluminum, Calcium, Copper, Lead

(b) Write balanced chemical equation to show the reaction of iron (III) oxide (Fe_2O_3) with aluminium. 3

28. (a) Common salt is an important raw material for various chemicals of daily use. State in brief the method of preparation of (i) Sodium hydroxide, and (ii) Sodium hydrogen carbonate from common salt. Write balanced chemical equations of the reactions that occur. 3

OR

(b) Design an experimental set-up to demonstrate that "Alcohol and glucose contain hydrogen but are not categorised as acids". Also give the reason to justify this fact. 3

29. On the basis of the characteristics of the processes given in the brackets in each case, differentiate between the following : 3

(a) Products of breakdown of pyruvate in aerobic and anaerobic respiration in human beings (product(s) of the processes)

(b) Respiration and photosynthesis in plants (gas released)

(c) Respiration in terrestrial animals and fishes (organs involved)

30. A pure pea plant having round (R), yellow (Y) seeds is crossed with another pure pea plant having wrinkled (r), green (y) seeds. Subsequently F_1 progeny is self-pollinated to obtain F_2 progeny.

(a) What do the seeds of F_1 generation look like ?

(b) Give the possible combinations of traits in seeds of F_2 generation. Also give their ratio. 3

(c) State the reason of obtaining seeds of new combination of traits in F_2 generation.

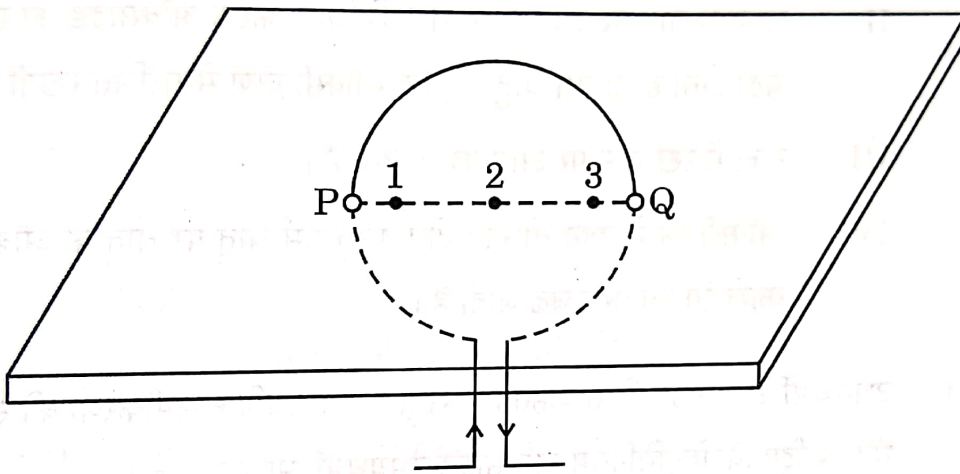
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31. What is a rainbow ? Draw a labelled diagram to show its formation. 3

32. Consider a rectangular cardboard having two holes P and Q through which a current carrying circular loop has been inserted as shown in the diagram.

- (a) Make this diagram on your answer sheet and draw three magnetic field lines, one each passing through the points 1 (near P), 2 (at the centre of the loop) and 3 (near Q).



(b) List two factors on which the intensity of the magnetic field produced at the centre of the loop depends.

(c) Name the rule you will apply to determine the direction of magnetic field produced due to a current carrying straight conductor. 3

33. (a) "In a food chain energy flow is unidirectional." Give two reasons for the given statement.

(b) If 10,000 J energy is available at the producer level, how much energy will be available to the secondary consumers ? Give reason to justify your answer. 3

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SECTION D

Questions no. 34 to 36 are Long Answer Type questions.

34. (a) (i) Consider the following metals :

K, Ca, Al, Cu, Ag, Fe

Select from the above metals, a metal which

- I. does not react with oxygen even at high temperature.
 - II. reacts with oxygen at ordinary temperature and forms a protective oxide layer which prevents the metal from further oxidation.
 - III. catches fire when kept in the open.
 - IV. does not burn in oxygen but the hot metal is coated with a black coloured oxide layer.
- (ii) What are amphoteric oxides ? With the help of balanced chemical equations show that aluminium oxide is an amphoteric oxide.
- (iii) What are alkalis ? Give one example. 5

OR

(b) (i) With the help of balanced chemical equations state the process of extracting (I) mercury from its ore called cinnabar, and (II) copper from its sulphide ore.

(ii) Silver and copper articles slowly lose their shiny surfaces when exposed to air. Name the compounds formed on (I) silver articles, and (II) copper articles in the form of coating. 5

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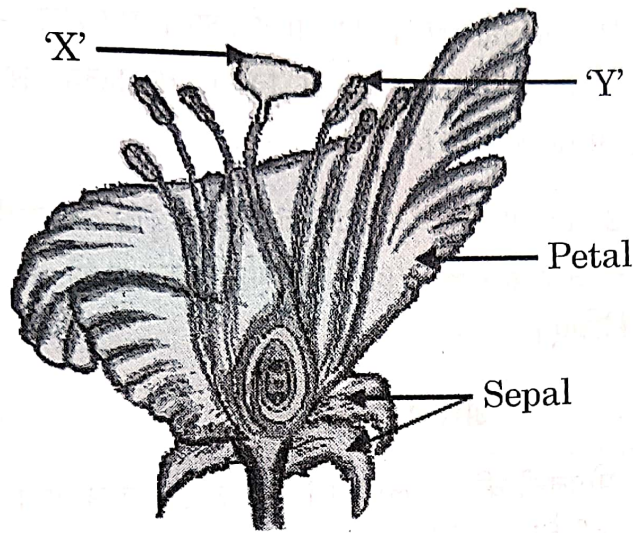
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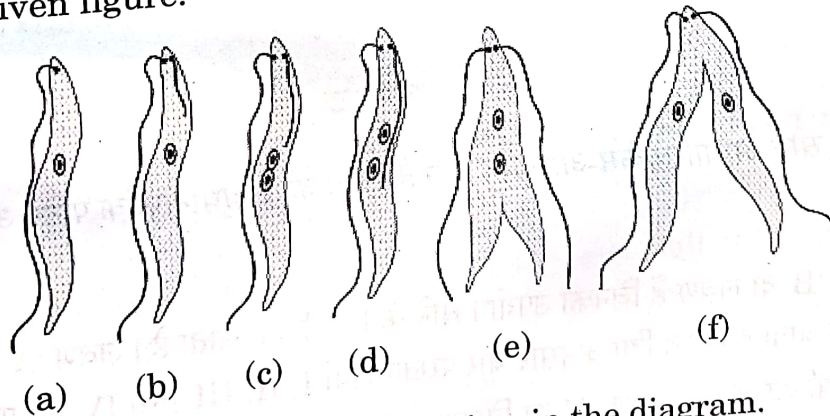
(a) (i) Identify the parts 'X' and 'Y' in the figure given below :



- (ii) Name the yellowish coloured structures produced by the part labelled as 'Y'.
- (iii) Write the name of the process by which these are transferred to the part labelled as 'X'.
- (iv) Explain the process of seed formation in a flowering plant. 5

OR

(b) (i) Name the type of asexual mode of reproduction shown in the given figure.



- (ii) Identify the unicellular organism in the diagram.
- (iii) List any two advantages of asexual reproduction over sexual reproduction.
- (iv) Name and explain any one mode of asexual reproduction observed in *Hydra*. 5

[P.T.O.]

36. (a) (i) "In refraction of light through a rectangular glass slab, the emergent ray is always parallel to the direction of the incident ray." Why? Explain with the help of a ray diagram. What happens when a ray of light falls normally on one of the faces of a rectangular glass prism? Draw diagram.
- (ii) An object is placed at a distance of 30 cm from the optical centre of a concave lens of focal length 20 cm. Use Lens formula to determine the position of the image formed in this case.

5

OR

- (b) (i) A student wishes to study the image formation by a concave mirror using candle flame as object. State the type of the image formed by the mirror and mention the change in the image formed, if any, that he observes when the candle flame is gradually moved away from the pole of the mirror. Draw a ray diagram to show the image formation when the object distance is nearly equal to the radius of curvature of the mirror.
- (ii) A convex mirror used for rear-view on an automobile has a focal length of 3.0 m. If a bus is located at 6.0 m from this mirror, use mirror formula to find the position of the image of the bus as seen in the mirror.

5

SECTION E

The following questions are Source-based/Case-based questions. Read the case carefully and answer the questions that follow.

37. 'A' and 'B' are two salts used for washing purposes. Salt 'A' is used for bathing also. Four test tubes I, II, III and IV as mentioned below are taken.
- I. Rain water + solution of salt 'A'
 - II. Rain water + solution of salt 'B'
 - III. Tubewell water + solution of salt 'A'
 - IV. Tubewell water + solution of salt 'B'

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The test tubes are shaken one by one almost identically for the same time and the lengths of foam formed in each test tube is noted.

- (a) In which one of the four test tubes is the foam formed the minimum? 1
- (b) Differentiate between salt A and salt B. 1
- (c) (i) What are esters? What happens when an ester reacts with an alkali (say sodium hydroxide)? Give chemical equation for the reaction. 2

OR

- (c) (ii) What is the cause of hardness of water? Sometimes it is observed that while bathing foam is formed with difficulty and an insoluble substance is formed. Name this substance and write the cause of its formation. 2

38. A person while climbing up a rocky hill comes into a panic state and fear. His body starts reacting in a "flight-or-flight" condition to adjust to the dangerous and stressful situation.

Based on the above facts, answer the questions that follow.

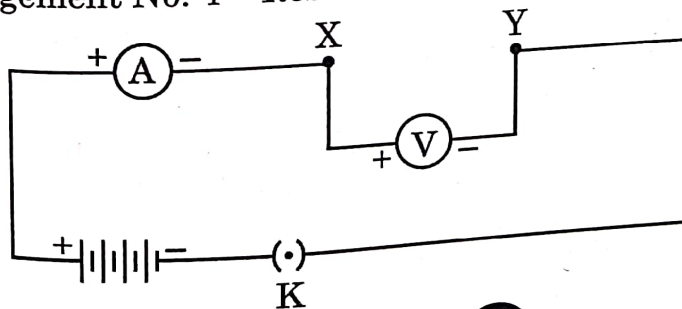
- (a) (i) Name the hormone secreted in the blood of the person in this situation. 2

OR

- (a) (ii) Name the source gland of the hormone secreted in this condition. 2
- (b) State any two responses in the body of the person as a result of the secretion of this hormone. 1
- (c) How does the action of the chemical signal in terms of hormones differ from the electrical impulses via nerve cells? 1

39. As shown in the diagram, an electric circuit consisting of an ammeter, a voltmeter, 4 cells of 1.5 V each, a plug key with a gap XY was set up. Voltmeter and ammeter readings were recorded in the observation table for four arrangements as given below:

- Arrangement No. 1 – only resistor R_1 in gap XY
- Arrangement No. 2 – only resistor R_2 in gap XY
- Arrangement No. 3 – Resistors R_1 and R_2 in series in gap XY
- Arrangement No. 4 – Resistors R_1 and R_2 in parallel in gap XY



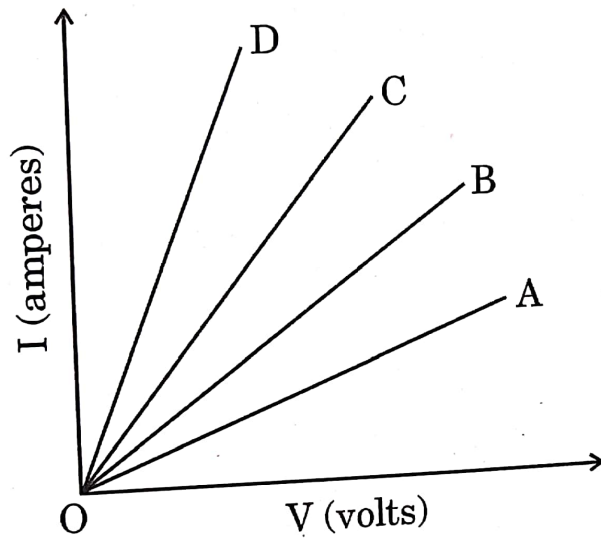
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Based on the observations, four V – I graphs A, B, C and D as shown in figure were drawn. Study these graphs.



- (a) Which one of the graphs represents the series combination of R_1 and R_2 ? 1
- (b) Which one of these graphs represents the parallel combination of R_1 and R_2 ? 1
- (c) (i) Show an arrangement of three resistors, each of resistance 10Ω , so that the combination has a resistance of 15Ω . Give justification for your answer. 2

OR

- (c) (ii) A battery of 6 V is connected with a series combination of five resistors of 0.1Ω , 0.2Ω , 0.3Ω , 0.4Ω and 0.5Ω . How much current would flow through the 0.3Ω resistor? Justify your answer. 2