ODM PUBLIC SCHOOL, BHUBANESWAR

SAMPLE QUESTION PAPER -I

MATHEMATICS (CODE 041) CLASS X – SESSION 2023-24

MARKING SCHEME

SECTION-A

1.a

2.a

3.a

4.b

5.c

6.c

7.d

8.c

9.d

10.b

11.b

12.b

13.d

14.a

15.a

16.a

17.c

18.c

19.a

20.a

SECTION-B

21. Proof. [3]

OR

6 =2×3 [1/2]

The fundamental theorem of arithmetic sates that any number that ends in '0' must have factors both 2 and 5. [1]

Therefore 6^n will not end with 0 for any natural no. [1/2]

22. l=253, d=5 [1/2]

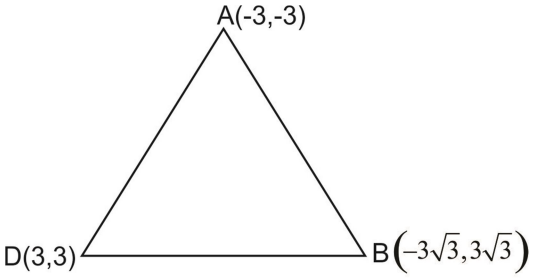
20th term from end = L-(n-1)d [1/2]

=253- 19(5) [1/2]

=253-95

=158 [1/2]

23. $AB = \sqrt{6^2 + 6^2} = \sqrt{72}$



$AC = \sqrt{\left(-3+3\sqrt{3}\right)^2 + \left(-3-3\sqrt{3}\right)^2}$ [1/2]

$= \sqrt{\left(9+27\right)^2} = \sqrt{72}$ [1/2]

BC= $\sqrt{72}$ [1/2]

AB=AC=BC [1/2]

Therefore ABC is an equilateral triangle.

OR

$AB = \sqrt{2^2 + 1^2} = \sqrt{5}$ [1/2]

$BC = \sqrt{1+4} = \sqrt{5}$ [1/2]

$CD = \sqrt{4+1} = \sqrt{5}$ [1/2]

$DA = \sqrt{1+4} = \sqrt{5}$ [1/2]

$AC = \sqrt{1+9} = \sqrt{10}$, $BD = \sqrt{9+1} = \sqrt{10}$

$\therefore$ ABCD is a square.

24. Given, To prove, Figure [1/2]

A Q = AR

BP=BQ

CP=CR [1/2]

Perimeter of $\Delta ABC =$

AB+BC+CA

=AB+BP+CP+CA

=AB+BQ+CR+CA [1/2]

=AQ+AR [1/2]

=2AQ

$\Rightarrow AQ = \frac{1}{2}$ (Perimeter of ABC) [1/2]

25. $4 = \frac{6K+2}{K+1}$ [1/2]

$\Rightarrow 4K + 4 = 6K + 2$ [1/2]

$\Rightarrow 2K = 2$ [1/2]

$\Rightarrow K = 1$ [1/2]

Ratio is 1 : 1

$\frac{1\times 3 + 1(-3)}{2}$

=0

SECTION-C

26. Let the speed of train be x and time taken be y hrs.

So D=xy

Increased speed = x+6

and time taken = y-4

xy=(x+6)(y-4) [1]

$\Rightarrow$ xy=xy+6y-4x-24

$\Rightarrow$ 4x-6y-24=0

$\Rightarrow$ 2x-3y-12=0.....(1)

Decreased speed = x-6

and time taken = y-6

(x-6)(y-6)=xy [1]

$\Rightarrow$ xy-6y+6x-36=xy

$\Rightarrow$ x-y-6=0.....(2)

Solving for x and y. [1]

x=30 and y=24

Distance =30×24=720 km

27. D=0

$\Rightarrow \left[-2(ac+bd)\right]^2 - 4(a^2+b^2)(c^2+d^2) = 0$ [1]

$\Rightarrow 4a^2c^2 + 4b^2d^2 + 8abcd - 4a^2c^2 - 4a^2d^2 - 4b^2c^2 - 4b^2d^2 = 0$

$\Rightarrow -4(a^2d^2 + b^2c^2 - 2abcd) = 0$

$\Rightarrow (ad - bc)^2 = 0$ [1]

$\Rightarrow ad - bc = 0$

$\Rightarrow ad = bc$

$\Rightarrow \frac{a}{b} = \frac{c}{a}$. [1]

28. AP=AS ------- (1)

BP=BQ ..... (2) [1]

CR=CQ ..... (3)

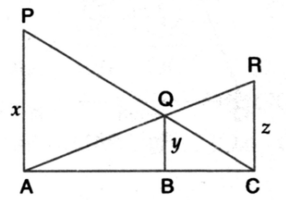
DR=DS ..... (4)

Adding equation 1,2,3 and 4.

AP+BP+CR+DR=AS+BQ+CQ+DS. [1]

$\Rightarrow$ AB+CD=AD+BC. (Proved) [1]

29. In ΔPAC, we have [1]



$BQ \,||\, AP \Rightarrow \frac{BQ}{AP} = \frac{CB}{CA} \Rightarrow \frac{y}{x} = \frac{CB}{CA}$ [1]

In ΔACR, we have

$BQ \,||\, CR \Rightarrow \frac{BQ}{CR} = \frac{AB}{AC} \Rightarrow \frac{y}{z} = \frac{AB}{AC}$

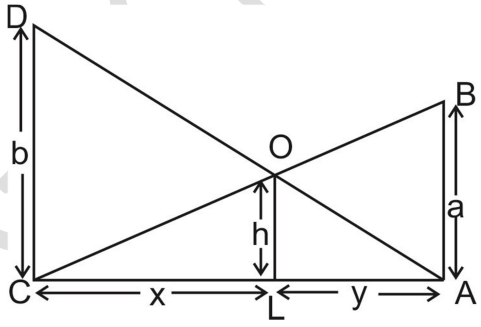
Adding (i) and (ii), we get

$\frac{y}{x} + \frac{y}{z} = \frac{CB}{AC} + \frac{AB}{AC} \Rightarrow \frac{y}{x} + \frac{y}{z} = \frac{AB + BC}{AC}$ [1]

$\Rightarrow \frac{y}{x} + \frac{y}{z} = \frac{AC}{AC} \Rightarrow \frac{y}{x} + \frac{y}{z} = 1 \Rightarrow \frac{1}{x} + \frac{1}{z} = \frac{1}{y}$

OR

Let AB and CD be two poles of heights a metres and b metres respectively such that the poles are p metres apart i.e. AC= p metres. Suppose the lines AD and BC meet at O such that OL=h metres. Let CL=x and LA=y. Then x+y=p. In ΔABC and ΔLOC, we have



$\angle CAB = \angle CLO$ and [Each equal to 90^0] [1]

$\angle C = \angle C$ [Common]

So, by using AA-criterion of similarity, we obtain

Δ CAB ~ Δ CLO

$\Rightarrow \frac{CA}{CL} = \frac{AB}{LO} \Rightarrow \frac{p}{x} = \frac{a}{h} \Rightarrow x = \frac{ph}{a}$ .....(i) [1]

In ΔALO and ΔACD, we have

$\angle ALO = \angle ACD$ [Each equal to 90^0]

and $\angle A = \angle A$ [common]

So, by using AA-criterion of similarity, we obtain. [1]

Δ ALO~Δ ACD $\Rightarrow \frac{AL}{AC} = \frac{OL}{DC} \Rightarrow \frac{y}{p} = \frac{h}{b} \Rightarrow y = \frac{ph}{b}$ [$\because$ AC=x+y=p].....(ii)

From (i) and (ii), we obtain

$$x+y=\frac{ph}{a}+\frac{ph}{b}\Rightarrow p=ph\left(\frac{1}{a}+\frac{1}{b}\right)\Rightarrow 1=h\left(\frac{a+b}{ab}\right)\ \Rightarrow h=\frac{ab}{a+b}\ \ [\because\ x+y=p]$$

Hence, the height of the intersection of the lines joining the top of each pole to the foot of the opposite pole is $\frac{ab}{a+b}$ metres.

30. $\frac{2}{p+q}=\frac{3}{2p-q}=\frac{7}{21}=\frac{1}{3}$

$\frac{2}{p+q}=\frac{1}{3}\Rightarrow p+q=6$ [1]

$\frac{3}{2p-q}=\frac{1}{3}\Rightarrow 2p-q=9$ [1]

p=5, q=1 [1]

31. (i) $l=\frac{60}{36}\times 2.\pi.21$

$=\frac{2}{6}\times\frac{22}{7}.21=22$ [1/2]

(ii) $\text{Area of sector}=\frac{1}{6}.\frac{22}{7}\times 21\times 21$=231 cm^2. [1]

or

Angle of each design = $\frac{360}{6}=60$

Area of 1 design = $\frac{60}{36}\times 22\times 28\times 28$

$=\frac{1}{6}\times 22\times 4\times 28$

$=\frac{44\times 28}{3}=410.67$ cm^2

Area of table cover = $\frac{6\times 44\times 28}{3}$

Area of Δ AOB = 332.2 cm^2

Area of design =410.67 - 332.2= 77.47

Area of design = 6×77.47 = 464.82 [1.5]

cost of making 1 cm^2 design =0.35

cost of making 464.82 design = 0.35×464.82 = Rs. 162.68

SECTION-D

32. Volume of 1 Gulab jamun = $\pi r^2h+2\times\frac{2}{3}\pi r^3$ = 0.25.05 cm^3. [2.5]

Volume of 45 Gulab jamun = 45×25.05 = 1,127.25 cm^3 [1]

Volume of sugar syrup = $\frac{30}{100}\times 1127.25$

$=338.17$ cm^3. [1.5]

~ 338 cm^3.

OR

$\ell = \sqrt{5^2 + 12^2} = 13$ [1]

SA of the toy = $2\pi rh + 2\pi r^2 + \pi r\ell$. [1]

$= \pi r(2h + 2r + \ell)$

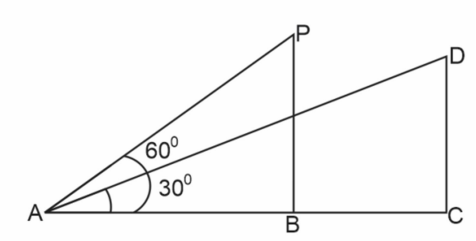
= 770 cm^2 [2]

33. $\angle PAB = 60^0$, $\angle DAB = 30^0$ [1]

PB=CD=$3600\sqrt{3}$

In ΔABP

$\tan 60^0 = \frac{PB}{AB}$ [1.5]



$\Rightarrow \sqrt{3} = \frac{3600\sqrt{3}}{AB}$

$\Rightarrow AB = 3600$

In ΔACD $\tan 30^0 = \frac{3600\sqrt{3}}{AC}$ [1.5]

$\Rightarrow AC = 10800$, BC=7200

Speed = $\frac{7200}{30}$ m/s

=240 m/s

$\frac{240 \times 60 \times 60}{1000}$ km/hr [1]

=864 km/hr

34.

CI	f_i	cf
0-100	2	2
100-200	5	7
200-300	x	7+x
300-400	12	19+x
400-500	17	36+x
500-600	20	56+x
600-700	y	56+x+y
700-800	9	65+x+y
800-900	7	72+x+y
900-1000	4	76+x+y
Total	100	

[2]

n=100, $\frac{n}{2} = 50$

$\therefore x + y = 100 - 76 = 24$ ..... (1) [1]

$$\text{median} = \ell + \left(\frac{\frac{n}{2} - cf}{t} \right) h$$

$\Rightarrow 525 = 500 + \left(\frac{50 - 36 - x}{20} \right) 100$ [1]

$\Rightarrow 25 = (14 - x) \times 5$

$\Rightarrow$ 5 = 14- x $\Rightarrow$ x= 9, y=15 [1]

35. (a) $\sin(45+30) = \sin 45.\cos 30 + \cos 45.\sin 30$ [1]

$= \frac{1}{\sqrt{2}} . \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} . \frac{1}{2}$ [1/2]

$= \frac{\sqrt{3}}{2\sqrt{2}} + \frac{1}{2\sqrt{2}} = \frac{\sqrt{3}+1}{2\sqrt{2}}$ [1]

(b) LHS $\frac{\frac{\sin\theta - \cos\theta + 1}{\cos\theta}}{\frac{\sin\theta + \cos\theta - 1}{\cos\theta}}$ [1]

$= \frac{\tan\theta - 1 + \sec\theta}{\tan\theta + 1 - \sec\theta} = \frac{(\tan\theta + \sec\theta)(1 - \sec\theta + \tan\theta)}{(1 - \sec\theta + \tan\theta)}$ [1]

$= \tan\theta + \sec\theta = \frac{\sec^2\theta - \tan^2\theta}{\sec\theta - \tan\theta}$ [1]

$= \frac{1}{\sec\theta - \tan\theta}$ = RHS.

OR

$\cos ec\theta - \sin\theta = m$ and $\sec\theta - \cos\theta = n$

$\Rightarrow \frac{1 - \sin^2\theta}{\sin\theta} = m$ and $\frac{1 - \cos^2\theta}{\cos\theta} = n$ [2]

$\Rightarrow \frac{\cos^2\theta}{\sin\theta} = m$ and $\frac{\sin^2\theta}{\cos\theta} = n$ [1]

$\left(m^2 n\right)^{2/3} + \left(mn^2\right)^{2/3} = \left(\cos^3\right)^{2/3} + \left(\sin^3\right)^{2/3}$ [1]

$= \cos^2\theta + \sin^2\theta = 1$ (proved). [1]

36. (a) 2

(b) (-7,0), (7,0)

(c) 4+(a+1)2+b=0

$\Rightarrow$ 4+2a+2+b=0

$\Rightarrow$ 2a+b=-6.....(1)

9+(a+1)(-3)+b=0

9-3a-3+b=0

$\Rightarrow$ 9-3+b-3a=0 [1]

$\Rightarrow$ b-3a=-6

b+2a=-6

-5a=0

$\therefore$ a = 0 [1]

b = -6

OR

$(\alpha-\beta)^2=144$

$\Rightarrow \alpha-\beta=12$

$\alpha+\beta=-P, \alpha.\beta=45$ [1]

$(\alpha+\beta)^2=(\alpha-\beta)^2+4\alpha\beta$

=144+180=324

$\Rightarrow \alpha+\beta=\pm\sqrt{324}=18$

$P=\pm 18$ [1]

37. (a) {RR, RB, RG, GR, GB, GG, YR, YB, YG}

(b) $\frac{1}{9}$

(c) Number of winners = $\frac{1}{9}\times 99=11$ [1]

Number of looser = 88

Fund collected= 88×5-11×10 [1]

=440 - 110 = 330. [1]

OR

Fund collected = 88×5-11×5 [1]

=440 - 55=385 [1]

38. (a) HCF of 96, 240, 336=48 [1]

(b) $\frac{336}{48}=7$

(c) $\frac{96+240+336}{48}=14$ [1+1]

OR

History = 1.8×48=86.4

Science = 2.2×48=105.6

Maths. = 2.5×48=120

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ODM PUBLIC SCHOOL, BHUBANESWAR
SAMPLE QUESTION PAPER -I
GENERAL SCIENCE (CODE 086) CLASS X – SESSION 2023-24

General Instructions:

i. This question paper consists of 39 questions in 5 sections.
ii. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
iii. Section A consists of 20 objective type questions carrying 1 mark each.
iv. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to50 words.
v. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be In the range of 50 to80 words.
vi. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80to 120 words.
vii. Section E consists of 3 source-based / case-based units of assessment of 04 marks each with sub-parts.

Time Allowed: 3 Hrs. **Maximum Marks: 80**

MARKING SCHEME

SECTION-A

1. d [1]
2. c [1]
3. c [1]
4. c [1]
5. b [1]
6. b [1]
7. d [1]
8. a [1]
9. b [1]
10. b [1]
11. d [1]
12. a [1]
13. d. Convex Lens [1]
14. (b) very near to the focus of the reflector [1]
15. (c) 2A [1]
16. (a) concentric circles [1]
17. d [1]
18. c [1]
19. a [1]
20. d [1]

SECTION-B

21. X- Zn, ZnCO3 [1/2 + 1/2

Process-calcination (heating in absence of air) [1

$ZnCO_3 \rightarrow ZnO + CO_2$

OR

$ZnS + O_2 \rightarrow Zn + SO_2$ [1

$MnO_2 + Al \rightarrow Mn + Al_2O_3$ [1

22. Brain is protected a bony box contained in ' a fluid-filled balloon which protects from shocks. (1)
Vertebral column protects the spinal cord (1)

23. (a) An aquarium is an artificial ecosystem which do not contain decomposers in contrast to a pond or a lake which is natural, self-sustaining and complete ecosystems. (1)
(b) 10% (1/2) , small carnivores (1/2)

24. (a) Reflex action is a sudden, involuntary, spontaneous response to the stimulus that is usually helpful to protect ourselves from any kind of harm. (1)
(b) Tongue(.5) Nose. (.5)

25. Into the plane of paper at P
and out of it at Q.
The strength of the magnetic field is larger at the point located closer i.e. at Q.

Or

Resistance of each part is R/3 Ω
(as resistance is proportional to the length of the wire.) –

$$\frac{1}{R_1} = \frac{3}{R} + \frac{3}{R} + \frac{3}{R} = \frac{9}{R}$$

$$\therefore R_1 = \frac{R}{9} \quad \therefore \frac{R_1}{R} = \frac{1}{9}$$

26. Stain Preferred is Safranin. (1) Removal of Extra Stain- By blotting /filter paper. (1)

SECTION-C

27. a) 1-Chloro-propane
b) 2,3-Dichloro-butane
c) Propanone

OR

A- C_2H_5OH B- CH_3COOH

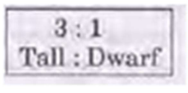
$C_2H_5OH + 4[O] \rightarrow$ alkaline $KMnO_4 \rightarrow CH_3COOH + H_2O$

28. a) X- $CaCO_3$ Z- $Ca(OH)_2$ [1/2 + 1/2

b) $CaCO_3 + HCl \rightarrow CaCl_2 + CO_2 + H_2O$ [1

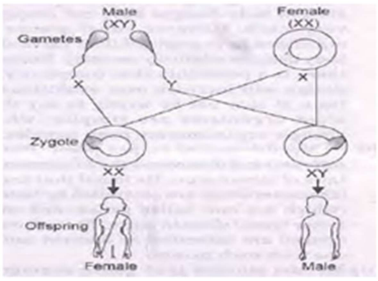
$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$ [1

29. a.Tall, because genes responsible for tallness are dominant over dwarf trait. (1)

b. 

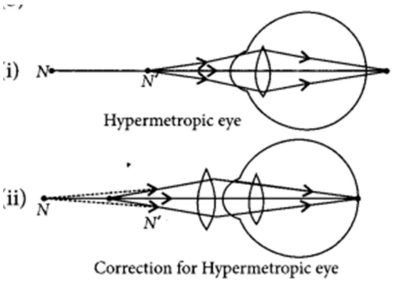
OR

c. Women produce only one type of ovum (carrying X chromosome) and males produce two types of sperms (carrying either X or Y chromosome) in equal proportions. So, the sex of a child is a matter of chance depending upon the type of sperm fertilizing the ovum.

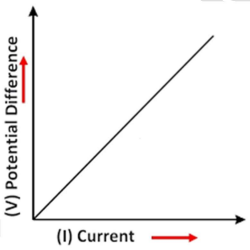


30. Definition (1)
Ozone formation (1)
Cause skin cancer (.5), damage eye(.5) or any other relevant answer.

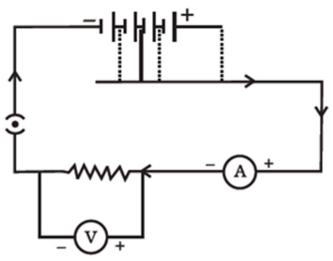
31. (a) Hypermetropia is caused due to following reasons:
(i) Shortening of the eyeball
(ii) Focal length of crystalline lens is too long.



32. Joules law of heating states that the heat dissipated across a resistor is directly proportional to
(a) the square of the current flowing through it
(b) The resistance of the conductor
(c) duration of flow of current.
$H = I^2RT$
ii. $R \alpha l$
$R \alpha 1/A$



Or



33. i. Pin P.

ii. To the metallic body of the clothes iron.

iii. It prevents severe shocks by providing a low resistance path for any leakage current to the metallic body of the iron

34. a) Calcium oxychloride, CaOCl2 [1/2 + 1/2]

b) When Cl2 gas is allowed to pass through dry slaked lime it produces white powdery mass of bleaching powder. [1+1]

$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

c) It is stored in air tight container unless it would react with CO2 gas present in air to form CaCO3 and release all Cl2 availed in it.

Two uses of it : As a sterilizing agent

Or

a) X- Cl2 Y- Ca(OH)2 [2

b) $Ca(OH)_2 + Cl_2 \rightarrow CaCl_2 + H_2O$ $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$ [2

c) Cl2 (g) [1

35. Dig. (1.5)

(i) Ovary (.5)

(ii) Oviduct or fallopian tube (.5)

(iii) Uterus or uterus wall (.5)

b. (i) It becomes thicker due to development of blood vessels and glands in it. (1)

(ii) It gets peeled and shed off along with mucus, blood, dead ovum during menstruation (1)

OR

(a) Errors in DNA copying (variations). (1)

(b)(i) Each piece grows into a complete organism. (1)

(ii)Develops into new plants.(1)

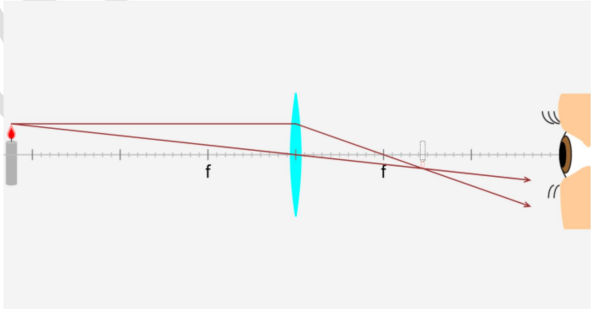
(c) Regeneration is carried out by specialized cells. It is not reproduction since most organisms would not be able to grow through pieces. (2)

36. Convex lens

(i) $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$\frac{1}{5} = \frac{1}{7} - \frac{1}{u}$$

U = - 17.5 m



Or

(i) Power of lens (P) = 1/f

P = 1.5D

f = 1/1.5 = 10/15 = 0.66 m

A convex lens has a positive focal length. Therefore, it is a convex lens or a converging lens.

(ii) Focal length of concave lens (OF_1), f = – 15 cm

Image distance, v= – 10 cm

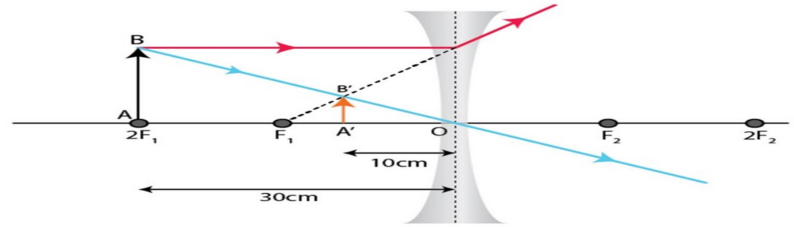
According to the lens formula,

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

$$\frac{1}{u}=\frac{1}{v}-\frac{1}{f}=-\frac{1}{10}-\frac{1}{-15}=-\frac{1}{10}+\frac{1}{15}$$

$$v=-\frac{5}{150}=-30cm$$

The negative value of u indicates that the object is placed 30 cm in front of the lens. This is shown in the following ray diagram.



37 . a) Write the MRS first then compare. Fe2O3 / Fe3O4 (haematite or magnetite) [1+1+1+1

b) Roasing : Heating any metallic ore in presence of air.
Usually ores like metal sulphides are done in this process. (ZnS)
Calcination : Heating in metallic ores in absence of air.
Usually ores like carbonates are preferred. (ZnCO3)

c) It is homogeneous moleten mixture of two or more metals or metals and nonmetals.

d) Brass composition : Cu70% + Zn 30%

38. (i) c
(ii) a
(iii) c
(iv) c
(iv) c

39. In case of parallel combination of resistors the equivalent resistance is less than the individual resistance connected in parallel.
Since, 1/R = 1/R1 + 1/R2 + 1/R3 +….

2) At our home, we are connecting electrical devices in parallel combination because in parallel combination equivalent resistance is less and also we can draw an electric current according to the need of electric devices.

3) If n resistors of resistance R are connected in parallel then equivalent resistance is given by,
1/Re = 1/R + 1/R + 1/R +….n times 1/R
Thus, 1/Re = n/R
Hence, Re= R/n is the required equivalent resistance of the given combination.

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