S.H.I.P.S.

[A Premier Institution]

SHREE HANUMAT INTERNATIONAL PUBLIC SCHOOL

(Senior Secondary)

Affiliated to the C.B.S.E., New Delhi, Vide Code No. – 1630686,

G.T. ROAD, GORAYA (Distt. Jalandhar)- 144409, Contact – 78376-36615, 01826-264069

Home Assignment 2023-24

Name: _____

Grade : XI (Science) Roll. No. _____

Note:

1. **Assignment Marks will be added in the Terminal Assessment.**
2. **Parents are required to let their child do his/her assignments on his/her own.**
3. **Use loose sheets if required to perform the task.**
4. **Best Assignment of the year will be recognised.**

ENGLISH

1. **ENGLISH PROJECT** **Poet Ted Huges and on Khushwant Singh.**
2.

Question 1.

You were travelling in a long-distance bus in the hills and your bus broke down at night. As it could not be repaired immediately, you were forced to spend the night at a nearby mountain village. Narrate the experience in 150-200 words.

Question 2.

Imagine that you are a waiter in the restaurant of a five-star hotel. Narrate in 150-200 words the life-enriching experience of working under a restaurant manager who was a born leader.

PUNJABI

ਸੁਝਾਏ ਗਏ ਪ੍ਰੋਜੈਕਟ (SUGGESTED PROJECTS)

1. ਸੱਭਿਆਚਾਰਕ ਗਤੀਵਿਧੀਆਂ (ਲੋਕ-ਨਾਚ, ਲੋਕ-ਗੀਤ, ਲੋਕ-ਬੋਲੀਆਂ)
2. ਪੁਸਤਕ ਸਮੀਖਿਆ
3. ਸਲੋਗਨ ਲੇਖਣ
4. ਪੇਂਡੂ ਅਤੇ ਸ਼ਹਿਰੀ ਜੀਵਨ
5. ਸਮਾਜਿਕ ਕੁਰੀਤੀਆਂ (ਦਾਜ, ਭਰੂਣ-ਹੱਤਿਆ, ਨਸ਼ੇ)
6. ਮਾਂ-ਬੋਲੀ (ਮਹਤੱਤਾ ਤੇ ਪ੍ਰਚਾਰ-ਪ੍ਰਸਾਰ)
7. ਪੰਜਾਬੀ ਪਹਿਰਾਵਾ
8. ਪੰਜਾਬੀ ਰਹਿਣ-ਸਹਿਣ
9. ਪੰਜਾਬੀ ਹਾਰ-ਸ਼ਿੰਗਾਰ
10. ਵਿਰਾਸਤੀ ਖੇਡਾਂ
11. ਕਰੋਨਾ-ਕਾਲ ਸਮੇਂ ਮੇਲੇ ਤੇ ਤਿਉਹਾਰ
12. ਕਰੋਨਾ-ਕਾਲ ਸਮੇਂ ਵਿਆਹ ਤੇ ਹੋਰ ਸਮਾਗਮ

PHYSICAL EDUCATION

Explain about any four asanas in your Practical file.

Note- Procedure, benefits and limitations of asanas should be mentioned.

MATHEMATICS

Trigonometric Functions

1. Prove that $\frac{\tan A+\sec A-1}{\tan A-\sec A+1}=\frac{1+\sin A}{\cos A}$

2. If $\frac{2\sin\alpha}{1+\cos\alpha+\sin\alpha}=y$, then prove that $\frac{1-\cos\alpha+\sin\alpha}{1+\sin\alpha}$ is also equal to y.

   $\left[\text{Hint : Express } \frac{1-\cos\alpha+\sin\alpha}{1+\sin\alpha}=\frac{1-\cos\alpha+\sin\alpha}{1+\sin\alpha}\cdot\frac{1+\cos\alpha+\sin\alpha}{1+\cos\alpha+\sin\alpha}\right]$

3. If $m\sin\theta = n\sin(\theta+2\alpha)$, then prove that $\tan(\theta+\alpha)\cot\alpha=\frac{m+n}{m-n}$

   [**Hint:** Express $\frac{\sin(\theta+2\alpha)}{\sin\theta}=\frac{m}{n}$ and apply componendo and dividendo]

4. If $\cos(\alpha+\beta)=\frac{4}{5}$ and $\sin(\alpha-\beta)=\frac{5}{13}$, where α lie between 0 and $\frac{\pi}{4}$, find the value of $\tan 2\alpha$ [**Hint:** Express $\tan 2\alpha$ as $\tan(\alpha+\beta+\alpha-\beta)$]

5. If $\tan x=\frac{b}{a}$, then find the value of $\sqrt{\frac{a+b}{a-b}}+\sqrt{\frac{a-b}{a+b}}$

6. Prove that $\cos\theta\cos\frac{\theta}{2}-\cos 3\theta\cos\frac{9\theta}{2}=\sin 7\theta\sin 8\theta$.

   [Hint: Express L.H.S. $=\frac{1}{2}\left[2\cos\theta\cos\frac{\theta}{2}-2\cos 3\theta\cos\frac{9\theta}{2}\right]$]

7. If $a\cos\theta+b\sin\theta=m$ and $a\sin\theta-b\cos\theta=n$, then show that $a^2+b^2=m^2+n^2$

8. Find the value of $\tan 22°30'$.

   [Hint: Let $\theta=45°$, use $\tan\frac{\theta}{2}=\frac{\sin\frac{\theta}{2}}{\cos\frac{\theta}{2}}=\frac{2\sin\frac{\theta}{2}\cos\frac{\theta}{2}}{2\cos^2\frac{\theta}{2}}=\frac{\sin\theta}{1+\cos\theta}$]

9. Prove that $\sin 4A = 4\sin A\cos^3 A - 4\cos A\sin^3 A$.

10. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then prove that $m^2 - n^2 = 4\sin\theta\tan\theta$
[Hint: $m + n = 2\tan\theta$, $m - n = 2\sin\theta$, then use $m^2 - n^2 = (m + n)(m - n)$]

11. If $\tan(A + B) = p$, $\tan(A - B) = q$, then show that $\tan 2A = \frac{p+q}{1-pq}$
[Hint: Use $2A = (A + B) + (A - B)$]

12. If $\cos\alpha + \cos\beta = 0 = \sin\alpha + \sin\beta$, then prove that $\cos 2\alpha + \cos 2\beta = -2\cos(\alpha + \beta)$.
[Hint: $(\cos\alpha + \cos\beta)^2 - (\sin\alpha + \sin\beta)^2 = 0$]

13. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then show that $\frac{\tan x}{\tan y} = \frac{a}{b}$ [**Hint:** Use Componendo and Dividendo].

14. If $\tan\theta = \frac{\sin\alpha - \cos\alpha}{\sin\alpha + \cos\alpha}$, then show that $\sin\alpha + \cos\alpha = \sqrt{2}\cos\theta$.
[Hint: Express $\tan\theta = \tan(\alpha - \frac{\pi}{4}) \Rightarrow \theta = \alpha - \frac{\pi}{4}$]

15. If $\sin\theta + \cos\theta = 1$, then find the general value of θ.

16. Find the most general value of θ satisfying the equation $\tan\theta = -1$ and $\cos\theta = \frac{1}{\sqrt{2}}$.

17. If $\cot\theta + \tan\theta = 2\operatorname{cosec}\theta$, then find the general value of θ.

18. If $2\sin^2\theta = 3\cos\theta$, where $0 \le \theta \le 2\pi$, then find the value of θ.

19. If $\sec x \cos 5x + 1 = 0$, where $0 < x \le \frac{\pi}{2}$, then find the value of x.

20. If $\sin(\theta + \alpha) = a$ and $\sin(\theta + \beta) = b$, then prove that $\cos 2(\alpha - \beta) - 4ab\cos(\alpha - \beta) = 1 - 2a^2 - 2b^2$ [Hint: Express $\cos(\alpha - \beta) = \cos((\theta + \alpha) - (\theta + \beta))$]

21. If $\cos(\theta + \phi) = m\cos(\theta - \phi)$, then prove that $\tan\theta = \frac{1-m}{1+m}\cot\phi$.

[Hint: Express $\frac{\cos(\theta+\phi)}{\cos(\theta-\phi)}=\frac{m}{1}$ and apply Componendo and Dividendo]

22. Find the value of the expression

$3\left[\sin^4\left(\frac{3\pi}{2}-\alpha\right)+\sin^4(3\pi+\alpha)\right]-2\left\{\sin^6\left(\frac{\pi}{2}+\alpha\right)+\sin^6(5\pi-\alpha)\right]$

23. If $a\cos 2\theta + b\sin 2\theta = c$ has α and β as its roots, then prove that

$\tan\alpha + \tan\beta = \frac{2b}{a+c}$.

[Hint: Use the identities $\cos 2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$ and $\sin 2\theta = \frac{2\tan\theta}{1+\tan^2\theta}$]

24. If $x = \sec\phi - \tan\phi$ and $y = \operatorname{cosec}\phi + \cot\phi$ then show that $xy + x - y + 1 = 0$
[Hint: Find $xy + 1$ and then show that $x - y = -(xy + 1)$]

25. If θ lies in the first quadrant and $\cos\theta = \frac{8}{17}$, then find the value of

$\cos(30^\circ + \theta) + \cos(45^\circ - \theta) + \cos(120^\circ - \theta)$.

26. Find the value of the expression $\cos^4\frac{\pi}{8}+\cos^4\frac{3\pi}{8}+\cos^4\frac{5\pi}{8}+\cos^4\frac{7\pi}{8}$

[Hint: Simplify the expression to $2\left(\cos^4\frac{\pi}{8}+\cos^4\frac{3\pi}{8}\right)$

$=2\left[\left(\cos^2\frac{\pi}{8}+\cos^2\frac{3\pi}{8}\right)^2-2\cos^2\frac{\pi}{8}\cos^2\frac{3\pi}{8}\right]$

27. Find the general solution of the equation $5\cos^2\theta + 7\sin^2\theta - 6 = 0$
28. Find the general solution of the equation
$\sin x - 3\sin 2x + \sin 3x = \cos x - 3\cos 2x + \cos 3x$
29. Find the general solution of the equation $(\sqrt{3}-1)\cos\theta + (\sqrt{3}+1)\sin\theta = 2$

[Hint: Put $\sqrt{3}-1 = r\sin\alpha$, $\sqrt{3}+1 = r\cos\alpha$ which gives $\tan\alpha = \tan\left(\frac{\pi}{4}-\frac{\pi}{6}\right)$
$\Rightarrow \alpha = \frac{\pi}{12}$]

Choose the correct answer from the given four options in the Exercises 30 to 59 (M.C.Q.).

30. If $\sin\theta + \operatorname{cosec}\theta = 2$, then $\sin^2\theta + \operatorname{cosec}^2\theta$ is equal to

(A) 1 (B) 4

(C) 2 (D) None of these

31. If $f(x) = \cos^2 x + \sec^2 x$, then

(A) $f(x) < 1$ (B) $f(x) = 1$

(C) $2 < f(x) < 1$ (D) $f(x) \geq 2$

[Hint: A.M $\geq$ G.M.]

32. If $\tan\theta = \frac{1}{2}$ and $\tan\phi = \frac{1}{3}$, then the value of $\theta + \phi$ is

(A) $\frac{\pi}{6}$ (B) π (C) 0 (D) $\frac{\pi}{4}$

33. Which of the following is not correct?

(A) $\sin\theta = -\frac{1}{5}$ (B) $\cos\theta = 1$

(C) $\sec\theta = \frac{1}{2}$ (D) $\tan\theta = 20$

34. The value of $\tan 1^\circ \tan 2^\circ \tan 3^\circ \ldots \tan 89^\circ$ is

(A) 0 (B) 1

(C) $\frac{1}{2}$ (D) Not defined

35. The value of $\frac{1 - \tan^2 15^\circ}{1 + \tan^2 15^\circ}$ is

(A) 1 (B) $\sqrt{3}$ (C) $\frac{\sqrt{3}}{2}$ (D) 2

36. The value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots \cos 179^\circ$ is

(A) $\frac{1}{\sqrt{2}}$ (B) 0 (C) 1 (D) –1

37. If $\tan\theta = 3$ and θ lies in third quadrant, then the value of $\sin\theta$ is

(A) $\frac{1}{\sqrt{10}}$ (B) $-\frac{1}{\sqrt{10}}$ (C) $\frac{-3}{\sqrt{10}}$ (D) $\frac{3}{\sqrt{10}}$

38. The value of $\tan 75° - \cot 75°$ is equal to

(A) $2\sqrt{3}$ (B) $2+\sqrt{3}$ (C) $2-\sqrt{3}$ (D) 1

39. Which of the following is correct?

(A) $\sin 1° > \sin 1$ (B) $\sin 1° < \sin 1$

(C) $\sin 1° = \sin 1$ (D) $\sin 1° = \frac{\pi}{18°} \sin 1$

[Hint: 1 radian $= \frac{180°}{\pi} = 57°30'$ approx]

40. If $\tan\alpha = \frac{m}{m+1}$, $\tan\beta = \frac{1}{2m+1}$, then $\alpha+\beta$ is equal to

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{4}$

41. The minimum value of $3\cos x + 4\sin x + 8$ is

(A) 5 (B) 9 (C) 7 (D) 3

42. The value of $\tan 3A - \tan 2A - \tan A$ is equal to

(A) $\tan 3A \tan 2A \tan A$

(B) $-\tan 3A \tan 2A \tan A$

(C) $\tan A \tan 2A - \tan 2A \tan 3A - \tan 3A \tan A$

(D) None of these

43. The value of $\sin(45° + \theta) - \cos(45° - \theta)$ is

(A) $2\cos\theta$ (B) $2\sin\theta$ (C) 1 (D) 0

44. The value of $\cot\left(\frac{\pi}{4}+\theta\right)\cot\left(\frac{\pi}{4}-\theta\right)$ is

(A) -1 (B) 0 (C) 1 (D) Not defined

45. $\cos 2\theta \cos 2\phi + \sin^2(\theta - \phi) - \sin^2(\theta + \phi)$ is equal to

(A) $\sin 2(\theta + \phi)$ (B) $\cos 2(\theta + \phi)$

(C) $\sin 2(\theta - \phi)$ (D) $\cos 2(\theta - \phi)$

[Hint: Use $\sin^2 A - \sin^2 B = \sin(A+B)\sin(A-B)$]

46. The value of $\cos 12° + \cos 84° + \cos 156° + \cos 132°$ is

(A) $\frac{1}{2}$ (B) 1 (C) $-\frac{1}{2}$ (D) $\frac{1}{8}$

47. If $\tan A = \frac{1}{2}$, $\tan B = \frac{1}{3}$, then $\tan (2A + B)$ is equal to

(A) 1 (B) 2 (C) 3 (D) 4

48. The value of $\sin\frac{\pi}{10}\sin\frac{13\pi}{10}$ is

(A) $\frac{1}{2}$ (B) $-\frac{1}{2}$ (C) $-\frac{1}{4}$ (D) 1

[Hint: Use $\sin 18° = \frac{\sqrt{5}-1}{4}$ and $\cos 36° = \frac{\sqrt{5}+1}{4}$]

49. The value of $\sin 50° - \sin 70° + \sin 10°$ is equal to

(A) 1 (B) 0 (C) $\frac{1}{2}$ (D) 2

50. If $\sin\theta + \cos\theta = 1$, then the value of $\sin 2\theta$ is equal to

(A) 1 (B) $\frac{1}{2}$ (C) 0 (D) –1

51. If $\alpha + \beta = \frac{\pi}{4}$, then the value of $(1 + \tan\alpha)(1 + \tan\beta)$ is

(A) 1 (B) 2
(C) -2 (D) Not defined

52. If $\sin\theta = \frac{-4}{5}$ and θ lies in third quadrant then the value of $\cos\frac{\theta}{2}$ is

(A) $\frac{1}{5}$ (B) $-\frac{1}{\sqrt{10}}$ (C) $-\frac{1}{\sqrt{5}}$ (D) $\frac{1}{\sqrt{10}}$

53. Number of solutions of the equation $\tan x + \sec x = 2\cos x$ lying in the interval $[0, 2\pi]$ is

(A) 0 (B) 1 (C) 2 (D) 3

54. The value of $\sin\frac{\pi}{18}+\sin\frac{\pi}{9}+\sin\frac{2\pi}{9}+\sin\frac{5\pi}{18}$ is given by

(A) $\sin\frac{7\pi}{18}+\sin\frac{4\pi}{9}$ (B) 1

(C) $\cos\frac{\pi}{6}+\cos\frac{3\pi}{7}$ (D) $\cos\frac{\pi}{9}+\sin\frac{\pi}{9}$

55. If A lies in the second quadrant and $3\tan A + 4 = 0$, then the value of $2\cot A - 5\cos A + \sin A$ is equal to

(A) $\frac{-53}{10}$ (B) $\frac{23}{10}$ (C) $\frac{37}{10}$ (D) $\frac{7}{10}$

56. The value of $\cos^2 48° - \sin^2 12°$ is

(A) $\frac{\sqrt{5}+1}{8}$ (B) $\frac{\sqrt{5}-1}{8}$

(C) $\frac{\sqrt{5}+1}{5}$ (D) $\frac{\sqrt{5}+1}{2\sqrt{2}}$

[Hint: Use $\cos^2 A - \sin^2 B = \cos(A+B)\cos(A-B)$]

57. If $\tan\alpha = \frac{1}{7}$, $\tan\beta = \frac{1}{3}$, then $\cos 2\alpha$ is equal to

(A) $\sin 2\beta$ (B) $\sin 4\beta$ (C) $\sin 3\beta$ (D) $\cos 2\beta$

58. If $\tan\theta = \frac{a}{b}$, then $b\cos 2\theta + a\sin 2\theta$ is equal to

(A) a (B) b (C) $\frac{a}{b}$ (D) None

59. If for real values of x, $\cos\theta = x + \frac{1}{x}$, then

(A) θ is an acute angle (B) θ is right angle

(C) θ is an obtuse angle (D) No value of θ is possible

Complex Numbers & Quadratic Equations

1. For a positive integer n, find the value of $(1-i)^n\left(1-\frac{1}{i}\right)^n$
2. Evaluate $\sum_{n=1}^{13}(i^n+i^{n+1})$, where $n\in\mathbf{N}$.
3. If $\left(\frac{1+i}{1-i}\right)^3-\left(\frac{1-i}{1+i}\right)^3=x+iy$, then find (x,y).
4. If $\frac{(1+i)^2}{2-i}=x+iy$, then find the value of $x+y$.
5. If $\left(\frac{1-i}{1+i}\right)^{100}=a+ib$, then find (a,b).
6. If $a=\cos\theta+i\sin\theta$, find the value of $\frac{1+a}{1-a}$.
7. If $(1+i)z=(1-i)\bar{z}$, then show that $z=-i\bar{z}$.
8. If $z=x+iy$, then show that $z\bar{z}+2(z+\bar{z})+b=0$, where $b\in\mathbf{R}$, represents a circle.
9. If the real part of $\frac{\bar{z}+2}{\bar{z}-1}$ is 4, then show that the locus of the point representing z in the complex plane is a circle.
10. Show that the complex number z, satisfying the condition $\arg\left(\frac{z-1}{z+1}\right)=\frac{\pi}{4}$ lies on a circle.
11. Solve the equation $|z|=z+1+2i$.

12. If $|z+1| = z + 2(1+i)$, then find z.

13. If $\arg(z-1) = \arg(z+3i)$, then find $x-1 : y$, where $z = x + iy$

14. Show that $\left|\frac{z-2}{z-3}\right| = 2$ represents a circle. Find its centre and radius.

15. If $\frac{z-1}{z+1}$ is a purely imaginary number ($z \neq -1$), then find the value of $|z|$.

16. z_1 and z_2 are two complex numbers such that $|z_1| = |z_2|$ and $\arg(z_1) + \arg(z_2) = \pi$, then show that $z_1 = -\bar{z}_2$.

17. If $|z_1| = 1$ ($z_1 \neq -1$) and $z_2 = \frac{z_1 - 1}{z_1 + 1}$, then show that the real part of z_2 is zero.

18. If z_1, z_2 and z_3, z_4 are two pairs of conjugate complex numbers, then find $\arg\left(\frac{z_1}{z_4}\right) + \arg\left(\frac{z_2}{z_3}\right)$.

19. If $|z_1| = |z_2| = \ldots = |z_n| = 1$, then show that $|z_1 + z_2 + z_3 + \ldots + z_n| = \left|\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} + \ldots + \frac{1}{z_n}\right|$.

20. If for complex numbers z_1 and z_2, $\arg(z_1) - \arg(z_2) = 0$, then show that $|z_1 - z_2| = |z_1| - |z_2|$

21. Solve the system of equations $\mathrm{Re}(z^2) = 0$, $|z| = 2$.

22. Find the complex number satisfying the equation $z + \sqrt{2}\,|(z+1)| + i = 0$.

23. Write the complex number $z = \frac{1-i}{\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}}$ in polar form.

24. If z and w are two complex numbers such that $|zw| = 1$ and $\arg(z) - \arg(w) = \frac{\pi}{2}$, then show that $\bar{z}\,w = -i$.

25. What is the conjugate of $\frac{2-i}{(1-2i)^2}$?

26. If $|z_1| = |z_2|$, is it necessary that $z_1 = z_2$?

27. If $\frac{(a^2+1)^2}{2a-i} = x + iy$, what is the value of $x^2 + y^2$?

28. Find z if $|z| = 4$ and arg $(z) = \frac{5\pi}{6}$.

29. Find $\left|(1+i)\frac{(2+i)}{(3+i)}\right|$

30. Find principal argument of $(1 + i\sqrt{3})^2$.

31. Where does z lie, if $\left|\frac{z-5i}{z+5i}\right| = 1$.

32. $\sin x + i\cos 2x$ and $\cos x - i\sin 2x$ are conjugate to each other for:

(A) $x = n\pi$ (B) $x = \left(n+\frac{1}{2}\right)\frac{\pi}{2}$

(C) $x = 0$ (D) No value of x

33. The real value of α for which the expression $\frac{1-i\sin\alpha}{1+2i\sin\alpha}$ is purely real is :

(A) $(n+1)\frac{\pi}{2}$ (B) $(2n+1)\frac{\pi}{2}$

(C) $n\pi$ (D) None of these, where $n \in N$

34. If $z = x + iy$ lies in the third quadrant, then $\frac{\bar{z}}{z}$ also lies in the third quadrant if

(A) $x > y > 0$ (B) $x < y < 0$

(C) $y \le x \le 0$ (D) $y \ge x \ge 0$

35. The value of $(z+3)(\bar{z}+3)$ is equivalent to

(A) $|z+3|^2$ (B) $|z-3|$

(C) z^2+3 (D) None of these

36. If $\left(\frac{1+i}{1-i}\right)^x = 1$, then

(A) $x = 2n+1$ (B) $x = 4n$

(C) $x = 2n$ (D) $x = 4n+1$, where $n \in N$

37. A real value of x satisfies the equation $\left(\frac{3-4ix}{3+4ix}\right) = \alpha - i\beta$ $(\alpha, \beta \in R)$ if $\alpha^2 + \beta^2 =$

(A) 1 (B) -1 (C) 2 (D) -2

38. Which of the following is correct for any two complex numbers z_1 and z_2?

(A) $|z_1 z_2| = |z_1||z_2|$ (B) $\arg(z_1 z_2) = \arg(z_1).\arg(z_2)$

(C) $|z_1 + z_2| = |z_1| + |z_2|$ (D) $|z_1 + z_2| \ge |z_1| - |z_2|$

39. The point represented by the complex number $2 - i$ is rotated about origin through

an angle $\frac{\pi}{2}$ in the clockwise direction, the new position of point is:

(A) $1+2i$ (B) $-1-2i$ (C) $2+i$ (D) $-1+2i$

40. Let $x, y \in \mathbf{R}$, then $x+iy$ is a non real complex number if:

(A) $x=0$ (B) $y=0$ (C) $x \neq 0$ (D) $y \neq 0$

41. If $a+ib=c+id$, then

(A) $a^2+c^2=0$ (B) $b^2+c^2=0$

(C) $b^2+d^2=0$ (D) $a^2+b^2=c^2+d^2$

42. The complex number z which satisfies the condition $\left|\frac{i+z}{i-z}\right|=1$ lies on

(A) circle $x^2+y^2=1$ (B) the x-axis

(C) the y-axis (D) the line $x+y=1$.

43. If z is a complex number, then

(A) $\left|z^2\right|>|z|^2$ (B) $\left|z^2\right|=|z|^2$

(C) $\left|z^2\right|<|z|^2$ (D) $\left|z^2\right| \geq |z|^2$

44. $|z_1+z_2|=|z_1|+|z_2|$ is possible if

(A) $z_2=\overline{z}_1$ (B) $z_2=\frac{1}{z_1}$

(C) $\arg(z_1)=\arg(z_2)$ (D) $|z_1|=|z_2|$

45. The real value of θ for which the expression $\frac{1+i\cos\theta}{1-2i\cos\theta}$ is a real number is:

(A) $n\pi+\frac{\pi}{4}$ (B) $n\pi+(-1)^n\frac{\pi}{4}$

(C) $2n\pi\pm\frac{\pi}{2}$ (D) none of these.

46. The value of arg (x) when $x<0$ is:

(A) 0 (B) $\frac{\pi}{2}$

(C) π (D) none of these

47. If $f(z) = \frac{7-z}{1-z^2}$, where $z = 1 + 2i$, then $|f(z)|$ is

(A) $\frac{|z|}{2}$ (B) $|z|$

(C) $2|z|$ (D) none of these.

Sets

1. Write the following sets in the roaster from

(i) $A = \{x : x \in R, 2x + 11 = 15\}$ (ii) $B = \{x \mid x^2 = x, x \in R\}$

(iii) $C = \{x \mid x$ is a positive factor of a prime number $p\}$

2. Write the following sets in the roaster form :

(i) $D = \{t \mid t^3 = t, t \in R\}$ (ii) $E = \{w \mid \frac{w-2}{w+3} = 3, w \in R\}$

(iii) $F = \{x \mid x^4 - 5x^2 + 6 = 0, x \in R\}$

3. If $Y = \{x \mid x$ is a positive factor of the number $2^{p-1}(2^p - 1)$, where $2^p - 1$ is a prime number$\}$. Write Y in the roaster form.

4. State which of the following statements are true and which are false. Justify your answer.

(i) $35 \in \{x \mid x$ has exactly four positive factors$\}$.

(ii) $128 \in \{y \mid$ the sum of all the positive factors of y is $2y\}$

(iii) $3 \notin \{x \mid x^4 - 5x^3 + 2x^2 - 112x + 6 = 0\}$

(iv) $496 \notin \{y \mid$ the sum of all the positive factors of y is $2y\}$.

5. Given $L = \{1, 2, 3, 4\}$, $M = \{3, 4, 5, 6\}$ and $N = \{1, 3, 5\}$

Verify that $L - (M \cup N) = (L - M) \cap (L - N)$

6. If A and B are subsets of the universal set U, then show that

(i) $A \subset A \cup B$ (ii) $A \subset B \Leftrightarrow A \cup B = B$

(iii) $(A \cap B) \subset A$

7. Given that $N = \{1, 2, 3, \ldots, 100\}$. Then write

(i) the subset of N whose elements are even numbers.

(ii) the subset of N whose element are perfect square numbers.

8. If $X = \{1, 2, 3\}$, if n represents any member of X, write the following sets containing all numbers represented by

(i) $4n$ (ii) $n + 6$ (iii) $\frac{n}{2}$ (iv) $n - 1$

9. If Y = {1, 2, 3, ... 10}, and a represents any element of Y, write the following sets, containing all the elements satisfying the given conditions.

   (i) $a \in Y$ but $a^2 \notin Y$ (ii) $a + 1 = 6, a \in Y$

   (iii) a is less than 6 and $a \in Y$

10. A, B and C are subsets of Universal Set U. If A = {2, 4, 6, 8, 12, 20} B = {3, 6, 9, 12, 15}, C = {5, 10, 15, 20} and U is the set of all whole numbers, draw a Venn diagram showing the relation of U, A, B and C.

11. Let U be the set of all boys and girls in a school, G be the set of all girls in the school, B be the set of all boys in the school, and S be the set of all students in the school who take swimming. Some, but not all, students in the school take swimming. Draw a Venn diagram showing one of the possible interrelationship among sets U, G, B and S.

12. For all sets A, B and C, show that $(A - B) \cap (C - B) = A - (B \cup C)$

Determine whether each of the statement in Exercises 13 – 17 is true or false. Justify your answer.

13. For all sets A and B, $(A - B) \cup (A \cap B) = A$

14. For all sets A, B and C, $A - (B - C) = (A - B) - C$

15. For all sets A, B and C, if $A \subset B$, then $A \cap C \subset B \cap C$

16. For all sets A, B and C, if $A \subset B$, then $A \cup C \subset B \cup C$

17. For all sets A, B and C, if $A \subset C$ and $B \subset C$, then $A \cup B \subset C$.

Using properties of sets prove the statements given in Exercises 18 to 22

18. For all sets A and B, $A \cup (B - A) = A \cup B$

19. For all sets A and B, $A - (A - B) = A \cap B$

20. For all sets A and B, $A - (A \cap B) = A - B$

21. For all sets A and B, $(A \cup B) - B = A - B$

22. Let $T = \left\{x \mid \frac{x+5}{x-7} - 5 = \frac{4x-40}{13-x}\right\}$. Is T an empty set? Justify your answer.

23. Let A, B and C be sets. Then show that

$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

24. Out of 100 students; 15 passed in English, 12 passed in Mathematics, 8 in Science, 6 in English and Mathematics, 7 in Mathematics and Science; 4 in English and Science; 4 in all the three. Find how many passed

(i) in English and Mathematics but not in Science

(ii) in Mathematics and Science but not in English

(iii) in Mathematics only

(iv) in more than one subject only

25. In a class of 60 students, 25 students play cricket and 20 students play tennis, and 10 students play both the games. Find the number of students who play neither?

26. In a survey of 200 students of a school, it was found that 120 study Mathematics, 90 study Physics and 70 study Chemistry, 40 study Mathematics and Physics, 30 study Physics and Chemistry, 50 study Chemistry and Mathematics and 20 none of these subjects. Find the number of students who study all the three subjects.

27. In a town of 10,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B, 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers. Find

(a) The number of families which buy newspaper A only.

(b) The number of families which buy none of A, B and C

28. In a group of 50 students, the number of students studying French, English, Sanskrit were found to be as follows:
French = 17, English = 13, Sanskrit = 15
French and English = 09, English and Sanskrit = 4

French and Sanskrit = 5, English, French and Sanskrit = 3. Find the number of students who study

(i) French only

(ii) English only

(iii) Sanskrit only

(iv) English and Sanskrit but not French

(v) French and Sanskrit but not English

(vi) French and English but not Sanskrit

(vii) at least one of the three languages

(viii) none of the three languages

Choose the correct answers from the given four options in each Exercises 29 to 43 (M.C.Q.).

29. Suppose $A_1, A_2, \ldots, A_{30}$ are thirty sets each having 5 elements and $B_1, B_2, \ldots, B_n$ are n sets each with 3 elements, let $\bigcup_{i=1}^{30} A_i = \bigcup_{j=1}^{n} B_j = S$ and each element of S belongs to exactly 10 of the A_i's and exactly 9 of the B_j'S. then n is equal to
(A) 15 (B) 3 (C) 45 (D) 35

30. Two finite sets have m and n elements. The number of subsets of the first set is 112 more than that of the second set. The values of m and n are, respectively,
(A) 4, 7 (B) 7, 4 (C) 4, 4 (D) 7, 7

31. The set $(A \cap B')' \cup (B \cap C)$ is equal to
(A) $A' \cup B \cup C$ (B) $A' \cup B$ (C) $A' \cup C'$ (D) $A' \cap B$

32. Let F_1 be the set of parallelograms, F_2 the set of rectangles, F_3 the set of rhombuses, F_4 the set of squares and F_5 the set of trapeziums in a plane. Then F_1 may be equal to
(A) $F_2 \cap F_3$ (B) $F_3 \cap F_4$
(C) $F_2 \cup F_5$ (D) $F_2 \cup F_3 \cup F_4 \cup F_1$

33. Let S = set of points inside the square, T = the set of points inside the triangle and C = the set of points inside the circle. If the triangle and circle intersect each other and are contained in a square. Then
(A) $S \cap T \cap C = \phi$ (B) $S \cup T \cup C = C$
(C) $S \cup T \cup C = S$ (D) $S \cup T = S \cap C$

34. Let R be set of points inside a rectangle of sides a and b $(a, b > 1)$ with two sides along the positive direction of x-axis and y-axis. Then
(A) $R = \{(x, y) : 0 \le x \le a, 0 \le y \le b\}$
(B) $R = \{(x, y) : 0 \le x < a, 0 \le y \le b\}$
(C) $R = \{(x, y) : 0 \le x \le a, 0 < y < b\}$
(D) $R = \{(x, y) : 0 < x < a, 0 < y < b\}$

35. In a class of 60 students, 25 students play cricket and 20 students play tennis, and 10 students play both the games. Then, the number of students who play neither is

(A) 0 (B) 25 (C) 35 (D) 45

36. In a town of 840 persons, 450 persons read Hindi, 300 read English and 200 read both. Then the number of persons who read neither is

(A) 210 (B) 290 (C) 180 (D) 260

37. If $X = \{8^n - 7n - 1 \mid n \in N\}$ and $Y = \{49n - 49 \mid n \in N\}$. Then

(A) $X \subset Y$ (B) $Y \subset X$ (C) $X = Y$ (D) $X \cap Y = \phi$

38. A survey shows that 63% of the people watch a News Channel whereas 76% watch another channel. If x% of the people watch both channel, then

(A) $x = 35$ (B) $x = 63$ (C) $39 \leq x \leq 63$ (D) $x = 39$

39. If sets A and B are defined as

$A = \{(x, y) \mid y = \frac{1}{x}, 0 \neq x \in R\}$ $B = \{(x, y) \mid y = -x, x \in R\}$, then

(A) $A \cap B = A$ (B) $A \cap B = B$ (C) $A \cap B = \phi$ (D) $A \cup B = A$

40. If A and B are two sets, then $A \cap (A \cup B)$ equals

(A) A (B) B (C) ϕ (D) $A \cap B$

41. If $A = \{1, 3, 5, 7, 9, 11, 13, 15, 17\}$ $B = \{2, 4, \ldots, 18\}$ and N the set of natural numbers is the universal set, then $A' \cup (A \cup B) \cap B')$ is

(A) ϕ (B) N (C) A (D) B

42. Let $S = \{x \mid x$ is a positive multiple of 3 less than 100$\}$

$P = \{x \mid x$ is a prime number less than 20$\}$. Then $n(S) + n(P)$ is

(A) 34 (B) 31 (C) 33 (D) 30

43. If X and Y are two sets and X′ denotes the complement of X, then $X \cap (X \cup Y)'$ is equal to

(A) X (B) Y (C) ϕ (D) $X \cap Y$

Relations & Functions

1. Let A = {–1, 2, 3} and B = {1, 3}. Determine
   (i) A × B (ii) B × A
   (iii) B × B (iv) A × A
2. If P = {x : x < 3, x ∈ N}, Q = {x : x ≤ 2, x ∈ W}. Find (P ∪ Q) × (P ∩ Q), where W is the set of whole numbers.
3. If A = {x : x ∈ W, x < 2} B = {x : x ∈ N, 1 < x < 5} C = {3, 5} find
   (i) A × (B ∩ C) (ii) A × (B ∪ C)
4. In each of the following cases, find a and b.
   (i) $(2a + b, a - b) = (8, 3)$ (ii) $\left(\frac{a}{4}, a-2b\right) = (0, 6 + b)$
5. Given A = {1, 2, 3, 4, 5}, S = {(x, y) : x ∈ A, y ∈ A}. Find the ordered pairs which satisfy the conditions given below:
   (i) $x + y = 5$ (ii) $x + y < 5$ (iii) $x + y > 8$
6. Given R = {(x, y) : x, y ∈ W, $x^2 + y^2 = 25$}. Find the domain and Range of R.
7. If $R_1 = \{(x, y) \mid y = 2x + 7$, where $x \in R$ and $-5 \le x \le 5\}$ is a relation. Then find the domain and Range of R_1.
8. If $R_2 = \{(x, y) \mid x$ and y are integers and $x^2 + y^2 = 64\}$ is a relation. Then find R_2.
9. If $R_3 = \{(x, |x|) \mid x$ is a real number$\}$ is a relation. Then find domain and range of R_3.
10. Is the given relation a function? Give reasons for your answer.
    (i) $h = \{(4, 6), (3, 9), (-11, 6), (3, 11)\}$
    (ii) $f = \{(x, x) \mid x$ is a real number$\}$
    (iii) $g = \left\{\left(n, \frac{1}{n}\right) \mid n$ is a positive integer$\right\}$
    (iv) $s = \{(n, n^2) \mid n$ is a positive integer$\}$
    (v) $t = \{(x, 3) \mid x$ is a real number.
11. If f and g are real functions defined by $f(x) = x^2 + 7$ and $g(x) = 3x + 5$, find each of the following
    (a) $f(3) + g(-5)$ (b) $f\left(\frac{1}{2}\right) \times g(14)$

(c) $f(-2)+g(-1)$ (d) $f(t)-f(-2)$

(e) $\frac{f(t)-f(5)}{t-5}$, if $t \neq 5$

12. Let f and g be real functions defined by $f(x) = 2x + 1$ and $g(x) = 4x - 7$.
    (a) For what real numbers x, $f(x) = g(x)$?
    (b) For what real numbers x, $f(x) < g(x)$?
13. If f and g are two real valued functions defined as $f(x) = 2x + 1$, $g(x) = x^2 + 1$, then find.

    (i) $f + g$ (ii) $f - g$ (iii) fg (iv) $\frac{f}{g}$

14. Express the following functions as set of ordered pairs and determine their range.
    $f: X \to R$, $f(x) = x^3 + 1$, where $X = \{-1, 0, 3, 9, 7\}$
15. Find the values of x for which the functions
    $f(x) = 3x^2 - 1$ and $g(x) = 3 + x$ are equal
16. Is $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ a function? Justify. If this is described by the relation, $g(x) = \alpha x + \beta$, then what values should be assigned to α and β?
17. Find the domain of each of the following functions given by

    (i) $f(x) = \frac{1}{\sqrt{1-\cos x}}$ (ii) $f(x) = \frac{1}{\sqrt{x+|x|}}$

    (iii) $f(x) = x\,|x|$ (iv) $f(x) = \frac{x^3 - x + 3}{x^2 - 1}$

    (v) $f(x) = \frac{3x}{2x-8}$

18. Find the range of the following functions given by

(i) $f(x) = \frac{3}{2-x^2}$ (ii) $f(x) = 1 - |x-2|$

(iii) $f(x) = |x-3|$ (iv) $f(x) = 1 + 3\cos 2x$

(Hint : $-1 \leq \cos 2x \leq 1 \Rightarrow -3 \leq 3\cos 2x \leq 3 \Rightarrow -2 \leq 1 + 3\cos 2x \leq 4$)

19. Redefine the function $f(x) = |x-2| + |2+x|$, $-3 \leq x \leq 3$

20. If $f(x) = \frac{x-1}{x+1}$, then show that

(i) $f\left(\frac{1}{x}\right) = -f(x)$ (ii) $f\left(-\frac{1}{x}\right) = \frac{-1}{f(x)}$

21. Let $f(x) = \sqrt{x}$ and $g(x) = x$ be two functions defined in the domain $R^+ \cup \{0\}$. Find

(i) $(f+g)(x)$ (ii) $(f-g)(x)$

(iii) $(fg)(x)$ (iv) $\left(\frac{f}{g}\right)(x)$

22. Find the domain and Range of the function $f(x) = \frac{1}{\sqrt{x-5}}$.

23. If $f(x) = y = \frac{ax-b}{cx-a}$, then prove that $f(y) = x$.

Choose the correct answers in Exercises from 24 to 35 (M.C.Q.)

24. Let $n(A) = m$, and $n(B) = n$. Then the total number of non-empty relations that can be defined from A to B is

(A) m^n (B) $n^m - 1$

(C) $mn - 1$ (D) $2^{mn} - 1$

25. If $[x]^2 - 5[x] + 6 = 0$, where $[\ .\ ]$ denote the greatest integer function, then

(A) $x \in [3, 4]$ (B) $x \in (2, 3]$

(C) $x \in [2, 3]$ (D) $x \in [2, 4)$

26. Range of $f(x) = \dfrac{1}{1-2\cos x}$ is

(A) $\left[\frac{1}{3}, 1\right]$ (B) $\left[-1, \frac{1}{3}\right]$

(C) $(-\infty, -1] \cup \left[\frac{1}{3}, \infty\right)$ (D) $\left[-\frac{1}{3}, 1\right]$

27. Let $f(x) = \sqrt{1+x^2}$, then

(A) $f(xy) = f(x) \cdot f(y)$ (B) $f(xy) \geq f(x) \cdot f(y)$

(C) $f(xy) \leq f(x) \cdot f(y)$ (D) None of these

[Hint : find $f(xy) = \sqrt{1+x^2y^2}$, $f(x) \cdot f(y) = \sqrt{1+x^2y^2+x^2+y^2}$]

28. Domain of $\sqrt{a^2-x^2}$ $(a > 0)$ is

(A) $(-a, a)$ (B) $[-a, a]$

(C) $[0, a]$ (D) $(-a, 0]$

29. If $f(x) = ax + b$, where a and b are integers, $f(-1) = -5$ and $f(3) = 3$, then a and b are equal to

(A) $a = -3, b = -1$ (B) $a = 2, b = -3$

(C) $a = 0, b = 2$ (D) $a = 2, b = 3$

30. The domain of the function f defined by $f(x) = \sqrt{4-x} + \dfrac{1}{\sqrt{x^2-1}}$ is equal to

(A) $(-\infty, -1) \cup (1, 4]$ (B) $(-\infty, -1] \cup (1, 4]$

(C) $(-\infty, -1) \cup [1, 4]$ (D) $(-\infty, -1) \cup [1, 4)$

31. The domain and range of the real function f defined by $f(x) = \dfrac{4-x}{x-4}$ is given by

(A) Domain = **R**, Range = $\{-1, 1\}$

(B) Domain = $\mathbf{R} - \{1\}$, Range = $\mathbf{R}$

(C) Domain = $\mathbf{R} - \{4\}$, Range = $\{-1\}$

(D) Domain = $\mathbf{R} - \{-4\}$, Range = $\{-1, 1\}$

32. The domain and range of real function f defined by $f(x) = \sqrt{x-1}$ is given by

(A) Domain = $(1, \infty)$, Range = $(0, \infty)$

(B) Domain = $[1, \infty)$, Range = $(0, \infty)$

(C) Domain = $[1, \infty)$, Range = $[0, \infty)$

(D) Domain = $[1, \infty)$, Range = $[0, \infty)$

33. The domain of the function f given by $f(x) = \frac{x^2+2x+1}{x^2-x-6}$

(A) $\mathbf{R} - \{3, -2\}$ (B) $\mathbf{R} - \{-3, 2\}$

(C) $\mathbf{R} - [3, -2]$ (D) $\mathbf{R} - (3, -2)$

34. The domain and range of the function f given by $f(x) = 2 - |x-5|$ is

(A) Domain = $\mathbf{R}^+$, Range = $(-\infty, 1]$

(B) Domain = $\mathbf{R}$, Range = $(-\infty, 2]$

(C) Domain = $\mathbf{R}$, Range = $(-\infty, 2)$

(D) Domain = $\mathbf{R}^+$, Range = $(-\infty, 2]$

35. The domain for which the functions defined by $f(x) = 3x^2 - 1$ and $g(x) = 3 + x$ are equal is

(A) $\left\{-1, \frac{4}{3}\right\}$ (B) $\left[-1, \frac{4}{3}\right]$

(C) $\left(-1, \frac{4}{3}\right)$ (D) $\left[-1, \frac{4}{3}\right)$

BIOLOGY

MULTIPLE CHOICE QUESTIONS:-

1. Largest herbarium of India is at

(a) Lloyd Botanical Garden, (b) National Botanical Garden,

(c) Indian Botanical Garden, Sibpur (d) Forest Research Institute, Dehradun

2. A condition in which internal environment of the body remains constant is

(a) Hematoma (b) Haemopoiesis

(c) Homeostasis (d) Hemostasis

3. Which one is taxonomic aid for identification of plants and animals based on similarities and dissimilarities

(a) Flora (b) Keys (c) Monographs (d) Catalogues

4. nigrum is one species of genus

(a) Mangifera (b) Solanum (c) Triticum (d) Pisum

5. Black rot of crucifers is caused by a:

(a) Fungus (b) Bacterium (c) virus (d) None of these.

6. Pusa Komal variety of cow pea is resistant to disease:

(a) Hill bunt (b) White rust (c) Leaf curl (d) Bacterial blight

7. Due to which of the following organisms, yield of rice is increased?

(a) Sesbania (b) Bacillus popilliae (c) Anabaena (d) Bacillus subtilis

8. Which of the following kingdoms includes unicellular eukaryotes?

(a) Monera (b) Fungi (c) Protista (d) Plantae

9. How many organisms in the list given below are autotrophs?

Lactobacillus, Nostoc, Chara, Nitrosomonas, Nitrobacter, Streptomyces, Saccharomyces, Trypanosoma, Porphyra, Wolffia.

(a) Four (b) Five (c) Six (d) Three

10.Yellow-green pigment is found in

(a) Xanthophyta (b) Chlorophyta (c) Phaeophyta (d) Rhodophyta

11. Mannitol is the stored food in :

(a) Chara (b)Porphyra (c)Fucus (d)Gracillaria

12. Which one of the following has haplontic life cycle ?

(a) Funaria (b) Polytrichum (c) Ustilago (d) Wheat

13. Which one of the following plants is monoecious ?

(a) Marchantia (b) Pinus (c) Cycas (d) Papaya

14. Which one is the wrong pairing for the disease and its causal organism?

(a) Late blight of potato-Alternaria solani

(b) Black rust of wheat-Puccinia graminis

(c) Loose smut of wheat-Ustilago nuda

(d) Root-knot of vegetables-Meloidogyne sp

15 . Which one of the following is a vascular cryptogam?

(a) Ginkgo (b) Equisetum (c) Marchantia (c) Cedrus

16. Replum is present in the ovary of flower of :

(a) Sunflower (b) Pea (c) Lemon (d) Mustard

17. Thorn of Bougainvillea and tendril of Cucurbita are examples of

(a) Vestigial organs (b) Retrogressive evolution

(c) Analogous organs (d) Homologous organs

18. Dry indehiscent single-seeded

fruit formed from bicarpellary syncarpous inferior ovary is :

(a) Berry (b) Cremocarp (c) Caryopsis (d) Cypsella

19. The fleshy receptacle of syconous of fig encloses a number of:

(a) Berries (b) Mericarps (c) Achenes (d) Samaras

20. Pneumatophores are present in

(a) Xerophytes (b) Hygrophytes (c) Mesophytes (d) Halophytes

ASSERTION/ REASON

A. Both assertion and reason are true, and reason is the correct explanation of assertion.

B.Both assertion and reason are true, but reason is not the correct explanation of assertion.

c.Assertion is true but reason is false.

D. Both assertion and reason are false.

ASSERTION:-Leaves are pinnately arrange in poppy plant

REASON:-incisions are less than half way from margin to Madrib.

ASSERTION:- Parthenocarpy involves formation of seedless fruits

REASON:-apomixis occurs without fertilisation

ASSERTION:-Red algae contribute in producing coral reefs

REASON:-some red algae secret and deposit calcium carbonate over their cell wall.

ASSERTION:-cyanobacteria is the new name for myxophyceae or blue green algae.

REASON:-Brown algae is the new name for chlorophyceae.

ASSERTION:-Plant manufactures food only during the daytime.

REASON:- During day time metabolism is high.

ANSWER THE FOLLOWING QUESTIONS:-

1. Algae are known to reproduce asexually by a variety of spores under different environmental conditions. Name these spores and the conditions under which they are produced

2. Biological classification is a dynamic and ever evolving phenomena which keeps changing with our understanding of life forms.

justify the statement taking any two examples.

3. 'Zoological parks are centre for recreation and education'. comments.

4. Explain the structure of bacteriophage.

5. Gametophyte is a dominant phase in the life cycle of bryophyte. Explain.

6. Draw well labelled diagram of i)female and male Thallus of liverwort

ii) Gametophyte and sporophyte of in Funaria

7. Justify the following statement on the basis of external features:
a)Underground parts of a plant are not always roots.
b) Flower is a modified shoot.

8. Seeds of some plants germinate immediately after shedding from the plants while in other plants they require a period of rest before germination. The lateral phenomena is called dormancy. Give the reasons for seed dormancy and some methods to break it.

9. 'Sunflower is not a flower'. explain.

10. Distinguish between the families for Fabaceae, solanaceae,liliaceae on the basis of gynoecium characteristics. Also write the economic importance of any one of the above family.

PROJECT

1. To prepare project of 35-40 pages on the topic already discussed It should include:

- Cover page
- Index
- Acknowledgement
- Introduction
- Details about the project
- Bibliography

PRESENTATION

- Short presentation on biological classification (At least with one kingdom)
- Instructions:

1. Topic must have introduction, needs of classification.

- 2. Information about all the type of classification.
- 3. Complete information about any one kingdom.
- 4. Relevant diagram must be attached with your presentation
- 5. Cover page must be attached
- Mode: PPT/Video

PRACTICAL FILE

NOTE :-

Complete your notes.

Complete your practical

File.

Learn full syllabus

PHYSICS

CASE BASED STUDY

nature of a physical quantity is described by its dimensions. All the physical quantities represented by derived units can be expressed in terms of some combination of seven fundamental or base quantities. We shall call these base quantities as the seven dimensions of the physical world, which are denoted with square brackets [ ]. Thus, length has the dimension [L], mass [M], time [T], electric current [A], thermodynamic temperature [K], luminous intensity [cd], and amount of substance [mol]. The dimensions of a physical quantity are the powers (or exponents) to which the base quantities are raised to represent that quantity. Note that using the square brackets [ ] round a quantity means that we are dealing with 'the dimensions of' the quantity. In mechanics, all the physical quantities can be written in terms of the dimensions [L], [M] and [T]. For example, the volume occupied by an object is expressed as the product of length, breadth and height, or three lengths. Hence the dimensions of volume are [L] × [L] × [L] = [L3].

(1) **Dimensions of area is**

(a) [L2] (b) [L3] (c) [M2] (d) None of these

(2) **dimensions of volume are**

(a) [L2] (b) [L] (c) [L3] (d) None of these

(3) **What is uncertainty in physics? Explain with one example**

(4) **define dimensions of a physical quantity**

(5) **Give list for 7 base quantities with dimensions**

Multiple Choice Questions (MCQ II)

6. **If P, Q, R are physical quantities, having different dimensions, which of the following combinations can never be a meaningful quantity?**

(a) (P – Q)/R (b) PQ – R c) PQ/R (d) (PR – Q2)/R

(e) (R + Q)/P

7. **Photon is quantum of radiation with energy E = hv where v is frequency h is Planck's constant. The dimensions of h are the same as that of**

(a) Linear impulse (b) Angular impulse

(c) Linear momentum (d) Angular momentum

8. If **Planck's constant (h) and speed of light in vacuum (c) are taken as two fundamental quantities, which one of the following can, in addition, be taken to express length, mass and time in terms of the three chosen fundamental quantities?**

(a) Mass of electron (me) (b) Universal gravitational constant (G)

(c) Charge of electron (e) (d) Mass of proton (mp)

9.Which of the following ratios express pressure?

(a) Force/ Area (b) Energy/ Volume

(c) Energy/ Area (d) Force/ Volume

SHORT QUESTIONS ANSWERS

10. If the unit of force is 100 N, unit of length is 10 m and unit of time is 100 s, what is the unit of mass in this system of units?

11.Give an example of

(a) a physical quantity which has a unit but no dimensions.

(b) a physical quantity which has neither unit nor dimensions. (c) a constant which has a unit.

(d) a constant which has no unit.

12 The displacement of a progressive wave is represented by $y = A \sin(wt - k x$), where x is distance and t is time. Write the dimensional formula of (i) ω and (ii) k

Long Answer Type Questions

13. A new system of units is proposed in which unit of mass is α kg, unit of length β m and unit of time γ s. How much will 5 J measure in this new system?

14. If velocity of light c, Planck's constant h and gravitational contant G are taken as fundamental quantities then express mass, length and time in terms of dimensions of these quantities.

Physics Motion in a Straight line

QI. A body covered a distance of L metre along a semi circular path. Calculate the ratio of its distance to displacement.

Q2. A table clock has its minute hand 5 cm long. Find the average velocity of the minute hand between 6:00 am to 6:30 am.

Q3. The magnitude of the average velocity of a particle is not always equal to its average speed. Why?

Q4. A car moves from A to B with a speed of 30 km h and from B to A with a speed of 20 km h 1 . What is the average speed of the car?

Q5. Two straight lines drawn on the same x-t curve make angles 30 0 and 600 with time axis. Which line represents greater velocity? What is the ratio of the two velocities?

Q6. A body covers one third of its journey with speed u, next one third with speed v and the last one third with speed w. Calculate the average speed of the body during the entire journey.

Q7. How can one determine (i) the distance (ii) the displacement covered by a uniformly accelerated body from its velocity-time graph?

Q8. Acceleration-time graph of a moving object is parallel to time axis. Draw the velocity-time graph and displacement-time graph corresponding to this type of motion.

Q9. Draw the following graphs for an object under free fall.

(a)Variation of acceleration with respect to time.

(b)Variation of velocity with respect to time.

(c)Variation of distance with respect to time.

QI0. A stone is dropped from the top of a cliff and is found to travel 44.1 m during the last second before it reaches the ground. What is the height of the cliff? g=9.8 m/s 2

QI l. What is the ratio of the distances travelled by a body, falling freely from the rest, in the first, second and third seconds of its fall?

Q12. A driver of a car moving at 30 m/s suddenly notices a child 80m straight ahead. If the driver's reaction time is 0.5 s and the deceleration is 8 m s- , can he avoid hitting the child?

Q13. A balloon is ascending at the rate of 4.9 m/s. A packet is dropped from the balloon when situated at a height of 245 m. how long does the packet take to reach the ground? What is its final velocity?

Q14. A body starting from rest has an acceleration of 20 m/s 2 . Calculate (i) distance travelled by body in 8 s (ii) its velocity after travelling 10 m and (iii) distance travelled by it in 5 t second.

Q15. A car starts from rest and accelerates uniformly for 10 s to a velocity of 8 m s- . It then runs with constant velocity and is finally brought to rest in 64 m with a constant retardation. The total distance covered by the car is 584 m. find the value of acceleration, retardation and total time taken.

Q16. If the displacement of particle is given by X = t2 + 5t + 3. Find (i) Velocity and acceleration of the panicle at t = 3s.

Case Study Based Ouestions

Following questions are case study-based questions. Each question has five sub parts of multiplechoice questions. Attempt any four sub parts from each question. Each sub part of question carries I mark.

In the absence of air resistance, all bodies falls with same same acceleration near the surface of the earth. This motion of a body falling towards the earth from a small height is called free fall. The acceleration with which a body falls is called acceleration due to gravity and it is de-noted by g.

(i) **For a freely falling body, which of the following equation is incorrect**.

(a) h-ut =(1/2) gt2 (b) v2 — u2 =2gh

(c) h = (1/2) ut +gt2 (d) (v-u)/g = t

(ii) **The maximum height attained by a body thrown vertically upward with initial velocity u is**

(a) h=u2/2g (b) h=u/2g

(c) h=u2/g (d) h: 2u2/g

(iii) **The time of ascent of a body thrown vertically upward with initial velocity u is**

(a) t: u/2g (b) t: u/g

(c) t: u2/g (d) t: u/g2

(iv) **The total time of flight to come back to the point of projection of a body thrown vertical-ly upward with initial velocity u is**

(a) t: 2u/3g (b) t: u/2g

(c) t: 2u/g (d) t: u 2/2g

ASSERTION AND REASON TYPE OUESTIONS

Directions: The question numbers I to 20 consist of two statements one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a)If both A and R are true and R is the correct explanation of A

(b)If both A and R are true but R is NOT the correct explanation of A

(c)If A is true but R is false

(d)If A is false and R is also false

l). **A :** It is not possible to have constant velocity and variable acceleration.

R : Accelerated body cannot have constant velocity.

2) **A** : The direction of velocity of an object can be reversed with constant acceleration.

R: A ball projected upward reverse its direction under the effect of gravity.

3). **A** : A body moving with decreasing speed may have increased acceleration.

R : The speed of body decreases when acceleration of body is opposite to velocity.

4) **A** : For a moving particle distance can never be negative or zero.

R : Distance is a scalar quantity and never decreases with time for moving object.

5) **A**:If speed of a particle is never zero then it may have zero average speed.

R : The average speed of a moving object in a closed path is zero.

6) **A**: The magnitude of average velocity in an interval can never be greater than average speed in that interval.

R : For a moving object distance travelled is greater than or equal to magnitude of dis-placement

7 **A**: The area under acceleration-time graph is equal to velocity of object.

R : For an object moving with constant acceleration position-time graph is a straight line.

MCQs

Q.1.A boy starts from a point A, travels to a point B at a distance of 3 km from A and returns to

A. If he takes two hours to do so, his speed is

(a) 3 km/h (b) zero

(c) 2 km/h (d) 1.5 km/h

Q.2.A 180 meter long train is moving due north at a speed of 25 m/s. A small bird is flying due south, a little above the train, with a speed of 5 m/s. The time taken by the bird to cross the train is

(a) 10 s (b) 12 s

Q.3. A boy starts from a point A, travels to a point B at a distance of 1.5 km and returns to A. If he takes one hour to do so, his average velocity is (a) 3 km/h (b) zero

(c) 1.5 km/h (d) 2 km/h

Q.4. A body starts from rest and travels with uniform acceleration on a straight line. If its velocity after making a displacement of 32 m is 8 m/s, its acceleration is

(a) I m/s2 (b) 2 m/s2

(c) 3 m/s2 (d) 4 m/s2

Q.5. Which one of the following is the unit of velocity?

(a) kilogram (b) meter

(c) m/s (d) second

Note -

1.Complete Your Practical Files

2.MAKE A MODEL ON ANY TOPIC FROM YOUR SYLLABUS OF YOUR CHOICE WHICH YOU CAN EXPLAIN

CHEMISTRY

I. Multiple Choose Questions

1.The empirical formula and molecular mass of a compound are CH_2O and180 g respectively. What will the molecular formula of the compound?

(a) $C_9H_{18}O_9$ (b) CH_2O (c) $C_6H_{12}O_6$ (d) $C_2H_4O_2$

2. Find empirical formula of the compound if M = 68% (atomic mass = 34) and remaining 32 % oxygen.

(a) MO (b) M_2O (c) MO_2 (d) M_2O_3

3. An organic compound on analysis was found to contain 10.06% carbon, 0.84%hydrogen and 89.10% chlorine. What will be the empirical formula of the substance?

(a) CH_2Cl_2 (b) $CHCl_3$ (c) CCl_4 (d) $CH\ Cl_3$

4. Out of two oxides of iron, the first contained 22% and the second contained 30% of oxygen by weight. The ratio of weights of iron in the two oxides that combine with the same weight of oxygen is …… .

(a) 3:2 (b)2:1 (c)1:2 (d)1:1

5 Stoichiometric ratio of sodium dihydrogen orthophosphate and sodium hydrogen ortho-phosphate required for the synthesis of $Na_5\ P_3\ O_{10}$ is

(a) 1.5 : 3 (b) 3 : 1.5 (c) 1 : 1. (d) 2 : 3

6. What is the stoichiometric coefficient of Ca in the reaction?

$Ca + Al^{3}+$ -------> $Ca^{2}+$ Al

(a) 2 (b) 1 (c) 3 (d) 4

7. In the reaction of oxalate with permanganate in acidic medium, the number of electrons involved in producing one molecule of CO_2 is …… .

(a) 2 (b) 5 (c) 1 (d) 10

8. Which of the following statements about the molecular mass is correct?

(a) Molecular formula shows the exact number of different types of atoms present in amolecule.

(b) Molecular formula can be obtained from empirical formula if molar mass is known.

(c) Percentage composition of a compound
can be calculated from its molecular formula.

(d) All the above statements are correct.

9. The weight of one molecule of a compound $C_6\ H_{12}O_{22}$ is …… .

(a)$1.3\ X10^{20}$

(b) $5.01\ X10^{-21}$

(c) $3.72X\ 10^{12}$

(d)$1.4\ X10^{21}$

10. In the standardisation of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry, the equivalent weight of $K_2Cr_2O_7$ is

(a) molecular weight (b) molecular weight

(c) molecular weight (d) same as molecular weight

11. One mole of any substance contains $6.022X\ 10^{23}$ atoms/molecules. What will be number of molecules of H_2SO_4 present in 100 mL of 0.02 H_2SO_4 solution?

(a) $12.044\ X\ 10^{20}$ molecules (b) $6.022x\ 10^{23}$ molecules

(c) 1.10^{23} molecules (d) $12.044x\ 10^{23}$ molecules

12. The number of molecules in 18 mg of water in terms of Avogadro number, NA is …… .

(a)10^{-3}NA

(b)10^{-2}NA

(c)10^{-1}NA

(d)10 NA

13. If 1 mL of water contains 20 drops then number of molecules in one drop of water is …… molecules

(a) 6.023×10^{a} (b)1.376×10^{26} (c)1.344×10^{18} (d)4.346×10^{20}

14. In which case is the number of molecules of water maximum ?

(a) 0.00224 L of water vapours at 1 atm and 273 K

(b) 0.18 g of water

(c) 18 mL of water

(d) 10^{-3} mole of water

15. Match the following Column I with Column II and choose the correct codes from the option given below.

Column I	Column II
A. 46 g of Na	1 0.01 mol
B. 6.022×10^{23} molecules ofH2O	2. 2 mol
C. 0.224 L of O_2 at STP	3. 1mol
D. 84 g of N2	4. $6.022 \text{ x}10^{23}$ atoms/molecules
E. 1 mole of any gas	5. 3 mol

Codes

	A	B	C	D	E
(a)	2	3	1	5	4
(b)	1	2	3	4	5
(c)	4	2	1	3	4
(d)	5	4	3	1	2

16. The mass per cent of different elements present in sodium sulphate, (i.e. sodium, sulphur and oxygen) respectively are

(a) 32.37 ; 45.06 and 22.57

(b) 22.57 ; 32.37 and 45.06

(c) 45.06 ; 32.37 and 40.06

(d) 32.37 ; 22.57 and 45.06

17. What is the mass per cent of carbon in carbon dioxide?

(a) 0.034% (b) 27.27%

(c) 3.4% (d) 28.7%

II. Assertion-Reasoning MCQs

Directions In the following questions

(Q.No. 1 to 5) a statement of Assertion followed by a statement of Reason is given. Choose the correct answer out of the following choices.

Directions In the following questions (Q.No. 1 to 5) a statement of Assertion followed by a statement of Reason is given. Choose the correct answer out of the following choices.

(a) Both Assertion and Reason are correct statements and Reason is the correct explanation of the Assertion.

(b) Both Assertion and Reason are correct statements, but Reason is not the correct explanation of the Assertion.

(c) Assertion is correct, but Reason is incorrect statement.

(d) Assertion is incorrect but Reason is correct statement.

1. Assertion The empirical mass of ethene is half of its molecular mass.

Reason The empirical formula represents the simplest whole number ratio of various atoms present in a compound.

2. Assertion Molar volume of gases change considerably with temperature and pressure.

Reason Molar volume of a substance is the volume occupied by 1 mole of that substance.

3. Assertion The balancing of chemical equations is based on law of conservation of mass.

Reason Total mass of reactants is equal to total mass of products.

4. Assertion One atomic mass unit is defined as one twelfth of the mass of one carbon-12 atom.

Reason Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as standard.

5. Assertion Atomicity of oxygen is 2.

Reason 1 mole of an element contains 6.023×10^{23} atoms

III. Question Answer

1.Calculate the molecular mass of the following :

(i) H_2O

(ii) CO_2

(iii) CH_4

2. The following data obtained if dinitrogen and dioxygen react together to form different compounds:

Mass of dinitrogen	Mass of dioxygen
(i)14 g	16 g
(ii)14 g	32 g
(iii)28 g	32 g
(iv)28 g	80 g

Which chemical combination law obeys the above experimental data? Given its statement.

3.When ten volumes of dihydrogen gas react with five volumes of dioxygen gas, how many volumes of water vapour will produce?

4. Write Postulates of Dalton's atomic theory.

5. Give one example each of a molecule in which empirical formula and molecular formula are

(i) same (ii) Different

6. Calculate the number of moles in the following masses –

(i) 7.85g of Fe

(ii) 7.9mg of Ca

7.How much potassium chlorate($KClO_3$) should be heated to produce 2.24L of oxygen at NTP?
8.Vitamin C is essential for the prevention of scurvy. Combustion of 0.2000g of vitamin C gives 0.2998g of CO_2 and 0.819g of H_2O. What is the empirical formula of vitamin C?
9.Calculate the weight of lime (CaO) obtained by heating 2000kg of 95% pure lime stone ($CaCO_3$)

Project Work

Make an investigatory project on any one of the following topics.

1. Preparation of natural indicators
2. Making smoke precipitator
3. Food adulteration
4. Rate of fermentation of different flours…. temperature ,humidity conditions
5. Hand Sanitizers ,Soaps –As our life
6. Colloids ,Aerosols-Chemistry in Daily Life
7. Checking the bacterial contamination in drinking water by testing sulphide ion
8. Study of the methods of purification of water
9. Testing the hardness, presence of Iron,Fluoride, Chloride, etc., depending upon the regional variation in drinking water and study of causes of presence of these ions above permissible limit(if any).
10. Investigation of the foaming capacity of different washing soaps and the effect of addition of Sodium carbonate on it.
11.Study the acidity of different samples of tea leaves.
12. Determination of the rate of evaporation of different liquids.
13.Study the effect of acids and bases on the tensile strength of fibers.
14. Study the acidity of different samples of tea leaves.
15. Study of acidity of fruit and vegetable juices.

Note:- For making project file following things should be mentioned.

1. Tile of project (including sub topic and submitted to)
2. Index
3. Acknowledgement
4. Aim
5. Apparatus or requirement
6. Brief content
7. Pics / Data / Flow Chart etc
8. Procedure
9. Observation
10. Inference or Result
11. Conclusion
12. Bibliography