COMPLEX NUMBERS

1. If $\frac{\sqrt{-4}(2+i)}{3-i} = x + iy$, then the values of x and y are
   (a) $-1, -1$
   (b) $1, 1$
   (c) $1, -1$
   (d) $-1, 1$
   (e) $\frac{1}{2}, -\frac{1}{2}$

2. If $z = \frac{5i^3}{4-3i}$, then the conjugate of z is
   (a) $-\frac{3}{5} - \frac{4}{5}i$
   (b) $\frac{4}{5} + \frac{3}{5}i$
   (c) $\frac{5}{3} + \frac{5}{4}i$
   (d) $-\frac{3}{5} + \frac{4}{5}i$
   (e) $\frac{3}{5} + \frac{4}{5}i$

3. If $\left[\sqrt{-25} + \sqrt[3]{-27}\right]^2 = x + yi$, then the values of x and y are
   (a) $30, 16$
   (b) $-34, -30$
   (c) $34, -30$
   (d) $16, 30$
   (e) $-16, -30$

4. If $x = -i$, then $2x^4 + 2x^3 - x^2 + 1$ is equal to
   (a) $4 + 2i$
   (b) $2 + 2i$
   (c) $2 - 2i$
   (d) 0
   (e) $4 - 2i$

5. If $z = \frac{(2+i)^2}{i^7}$, then the conjugate of z is
   (a) $-4 - 3i$
   (b) $-4 + 3i$
   (c) $3i$
   (d) $4 + 3i$
   (e) $-3i$

6. If $\frac{\sqrt[3]{-8} + \sqrt{-9}}{\sqrt{-1} + \sqrt[3]{-27}} = A + Bi$, then A and B are
   (a) $\frac{5}{4}, 0$
   (b) $\frac{9}{8}, -\frac{7}{8}$
   (c) $0, \frac{5}{4}$
   (d) $\frac{3}{10}, -\frac{7}{10}$
   (e) $\frac{9}{10}, -\frac{7}{10}$

7. The value of $(-i)^{79}$ is
   (a) -1
   (b) i
   (c) $-i$
   (d) $-79i$
   (e) 1

8. The expression $\frac{i(3-4i)(3+4i)}{-\sqrt{-400}}$ is equal to
   (a) $\frac{5}{4}$
   (b) $\frac{4}{5}i$
   (c) $-\frac{5}{4}i$
   (d) $-\frac{5}{4}$
   (e) $\frac{5}{4}i$

9. If $z = \left(\frac{2+i}{1-i}\right)^2$, then the conjugate of z is
   (a) $2 + \frac{3}{2}i$
   (b) $\frac{3}{2} - 2i$
   (c) $-4 - 3i$
   (d) $4 - 3i$
   (e) $-2 - \frac{3}{2}i$

10. The expression $2(3 - 4i) - 4i^7 + (-2 + 5i)$ is equal to
    (a) $4 + i$
    (b) $7 - 6i$
    (c) $-1 + 6i$
    (d) $11 + 14i$
    (e) $11 + 6i$

11. If $x = 1 + i$, then $x^4 - ix + 4$ is equal to
    (a) $1 - i$
    (b) 0
    (c) $9 - i$
    (d) $1 + i$
    (e) $7 - i$

12. If $\left[\sqrt{-36} + \sqrt[3]{-125}\right]^2 = A + Bi$, then A and B are equal to
    (a) $11, 60$
    (b) $11, -60$
    (c) $-11, -60$
    (d) $59, -60$
    (e) $-60, -11$

13. The conjugate of $3i^{26} + \frac{5}{i^{27}}$ is
    (a) $5 - 3i$

(b) $-5+3i$
(c) $3-5i$
(d) $3+5i$
(e) $-3-5i$

14. Which one of the following is FALSE ?
(a) $(i)^{4n}=1$ for any positive integer
(b) $(i)^{253}=i$
(c) $\sqrt{(-3)^4}\sqrt{(-2)^6}=72$
(d) $(i)^{4n-1}=-i$ for any positive integer
(e) $\sqrt{-5}\sqrt{-2}=\sqrt{10}$

15. If $A+iB=\frac{\sqrt[3]{-125}+i^{103}-\sqrt{-4}\sqrt{-1}}{(2i-1)-(i+5)}$, then A and B are equal to
(a) $\frac{17}{37},\frac{9}{37}$
(b) $\frac{5}{37},-\frac{9}{37}$
(c) $\frac{5}{37},\frac{9}{37}$
(d) $-\frac{17}{37},-\frac{9}{37}$
(e) $\frac{17}{37},-\frac{9}{37}$

16. The reciprocal of the complex number $2-3i$ is equal to
(a) $-\frac{2}{5}-\frac{3}{5}i$
(b) $\frac{2}{5}+\frac{3}{5}i$
(c) $\frac{1}{2}+\frac{1}{3}i$
(d) $\frac{2}{13}+\frac{3}{13}i$
(e) $\frac{1}{2}-\frac{1}{3}i$

17. The conjugate of the complex number $\frac{4+5i}{1+4i}$ is
(a) $-\frac{24}{15}+\frac{11}{15}i$
(b) $\frac{24}{17}+\frac{11}{17}i$
(c) $\frac{3}{13}-\frac{9}{13}i$
(d) $\frac{9}{17}+\frac{13}{17}i$
(e) $-\frac{12}{17}-\frac{8}{17}i$

18. The expression $\frac{1+3i}{3+i}+\sqrt{-2}\sqrt{-8}$ is equal to
(a) $\frac{19}{4}+i$
(b) $\frac{23}{5}+\frac{4}{5}i$
(c) $-\frac{13}{4}+i$
(d) $4-i$
(e) $-\frac{17}{5}+\frac{4}{5}i$

19. The conjugate of $i^{81}+i^{-48}$ is
(a) $-2i$
(b) $1-i$
(c) $-1+i$
(d) $-i$
(e) $-1-i$

20. The expression $i^{1413}+(-i)^{1992}$ is equal to
(a) $1+i$
(b) 0
(c) $-1-i$
(d) $-1+i$
(e) $1-i$

21. The expression $\frac{2+3i}{3+4i}-\frac{i}{3-4i}$ is equal to
(a) $\frac{22}{25}-\frac{2}{25}i$
(b) $\frac{10}{25}+\frac{4}{25}i$
(c) $-\frac{2}{25}+\frac{4}{25}i$
(d) $-\frac{22}{7}+\frac{2}{7}i$
(e) $-\frac{2}{7}+\frac{22}{7}i$

22. The value of the real number k such that $(2-i)^2\left(k-i^{23}\right)=1+7i$ is
(a) 1
(b) -3
(c) $\frac{1}{5}$
(d) -1
(e) $\frac{1}{4}$

23. The conjugate of $\sqrt[3]{-125}+2\sqrt{-16}+\sqrt{(-23)^2}$ is
(a) $-28-8i$
(b) $8i-18$
(c) $8+18i$
(d) $-28+8i$
(e) $18-8i$

24. If $z=\frac{2+i}{1-i}$, then $\bar{z}$ is equal to
(a) $-\frac{1}{2}+\frac{3}{2}i$
(b) $\frac{3}{2}-\frac{3}{2}i$
(c) $-\frac{1}{2}+\frac{1}{2}i$
(d) $\frac{1}{2}-\frac{3}{2}i$
(e) $\frac{1}{2}-\frac{1}{2}i$

25. The number $(1+i)^2$ is
(a) real
(b) bigger than 2
(c) imaginary
(d) less than 2
(e) equal to its conjugate

26. The expression $\left|\frac{-1}{2-3}\right|+\left|-3^2\right|+\sqrt{-4}\sqrt{-9}$ is equal to
(a) 23
(b) -5
(c) -7
(d) 11

(e) 7

27. If $z = a+bi, a, b \in \Re$, then only one of the following is FALSE :
    (a) $a = \frac{1}{2}(z + \overline{z})$
    (b) $b = \frac{1}{2}(z - \overline{z})$
    (c) $\overline{\overline{z}} = z$
    (d) $z \in \Re \Rightarrow z = \overline{z}$
    (e) z imaginary $\Rightarrow \overline{z} = -z$

28. Let $u = \sqrt{2 - \sqrt{2}} - i\sqrt{2 + \sqrt{2}}$, where $i = \sqrt{-1}$. Then the imaginary part of u^2 is
    (a) $-4\sqrt{2}$
    (b) a rational number
    (c) $-2\sqrt{2}$
    (d) $\sqrt{2 + \sqrt{2}}$
    (e) 4