2020 Advanced Mathematics 2 Paper 1

1. Which of the followings is NOT a factor of $x^{48} - 4x^{12} + 3$? Ans. D [2. Polynomial]

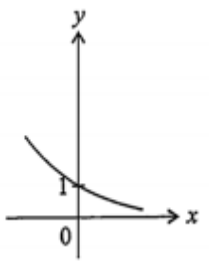
A $x + 1$ B $x^2 + 1$ C $x^3 + 1$ D $x^4 + 1$

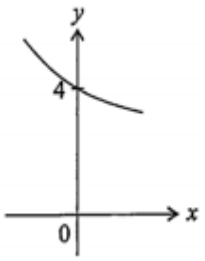
2. Find the solution set of $\{\sqrt[4]{(m-2)^4} = m - 2\sqrt[6]{(m-5)^6} = 5 - m$ Ans. C [5. Solutions of equations]

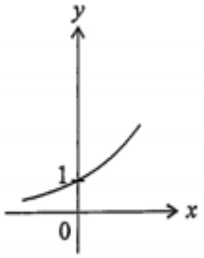
A $(2, 5]$ B $(-\infty, 2] \cup [5, \infty)$

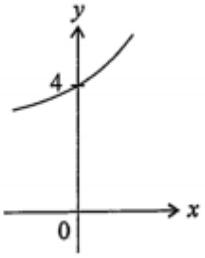
C $[2, 5]$ D $(-\infty, 2) \cup [5, \infty)$

3. Which of the followings is the graphs of $y = 2^{2-x}$?
Ans. B [15. Exponential functions and logarithmic functions]

A 

B 

C 

D 

4. Given that the complex number $w = -\frac{1}{2} + \frac{\sqrt{3}}{2}i$ satisfies $z^3 - 1 = 0$.

Find $2w^4 - 11w^3 - 7w^2 - 9w + 4$. Ans. B [17. Complex numbers]

A -21 B 0 C 1 D 19

5. $\sum_{n=1}^{\infty} \frac{1}{9n^2+3n-2} = ?$ Ans. C [8. Sequence and series]

A $\frac{1}{2}$ B $\frac{1}{3}$ C $\frac{1}{6}$ D 0

6. In ΔABC, $BC = 3$, $AC = 4$ and the area of ΔABC is $3\sqrt{3}$. If $\vec{CB} \bullet \vec{CA} < 0$, find $\angle ACB$.

Ans. C [20. Solution of triangles.]

A $30°$ B $60°$ C $120°$ D $150°$

7. 10 distinct points lie evenly on the circumference of a circle. Find the total number of acute-angled
triangles and obtuse-angled triangles that have vertices on these points.

Ans. C [9. Permutation and Combination]

A 48 B 56 C 80 D 92

8. Find the general solution of equation $\frac{2tan4\theta}{1+tan^2 4\theta} = \frac{\sqrt{3}}{2}$. Ans. B [22. Trigonometrical equations]

A $\theta = n\pi + (-1)^n \frac{\pi}{24}, n \in Z$ B $\theta = \frac{n\pi}{8} + (-1)^n \frac{\pi}{24}, n \in Z$

C $\theta = n\pi \pm \frac{1}{8} tan^{-1} \frac{\sqrt{3}}{2}, n \in Z$ D $\theta = \frac{n\pi}{8} \pm \frac{1}{8} tan^{-1} \frac{\sqrt{3}}{2}, n \in Z$

9. Given that $sin\alpha + sin\beta = a, cos\alpha + cos\beta = b$, and $ab \neq 0$. Find $tan\frac{\alpha+\beta}{2}$.
Ans. C [19. Trigonometric functions of any angle]

A 1 B ab C $\frac{a}{b}$ D $\frac{b}{a}$

10. How many solution(s) does the equation $tan^2 \frac{x}{5} = 1$ have on the interval $[0, 2\pi]$?
Ans. C [22. Trigonometrical equations]

A 3 solutions B 2 solutions C 1 solution D No solution

11. Given that $sin^{-1} a + sin^{-1} b = \frac{\pi}{2}$. Which of the followings is **TRUE**?
Ans. C [25. Inverse of trigonometrical functions]

A $a + b = 1$ B $a - b = 1$

C $a^2 + b^2 = 1$ D $a^2 - b^2 = 1$

12. Find the equation of the circle centred at $(-2, 1)$ that touches the line $3x - 4y - 5 = 0$.
Ans. A [28. The circle]

A $(x + 2)^2 + (y - 1)^2 = 9$ B $(x + 2)^2 + (y - 1)^2 = 45$

C $(x - 2)^2 + (y + 1)^2 = 9$ D $(x - 2)^2 + (y - 1)^2 = 45$

13. Find the coordinates of $(\sqrt{3},\ 1)$ in the new coordinates system after a rotation of the coordinates

axes through $\frac{\pi}{3}$. Ans. D [32. Coordinate transformation]

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

14. The locus of the points of intersection of the lines $xcos\theta + ysin\theta = 3$ and $xsin\theta - ycos\theta = 4$ is__

Ans. A [34. Parametric equations] [28. The circle]

A a circle B an ellipse C a parabola D a hyperbola

15. Given that the foci of the ellipse $17x^2 + 8y^2 = 136$ and the hyperbola $\frac{y^2}{104} - \frac{x^2}{k^2} = \frac{1}{25}$ coincide. Find

the positive number k. Ans. D [31. The hyperbola]

A 3 B 4 C 9 D 11

16. Find $\left(\frac{x+10}{x-1}\right)^x$. Ans. A [35. Limit and Continuity]

A e^{11} B e^{10} C e^{-10} D e^{-11}

17. Which of the following descriptions regarding the inflexion point(s) on the curve $y = x^4 - 4x^3$

Is **TRUE**? Ans. C [37. Applications of differentiation]

A only one inflexion point at $x = 0$ B only one inflexion point at $x = 3$

C having two inflexion points D having three inflexion points

18. On which of the following intervals is $f(x) = 8x^4 + 4x^2 - 2$ increasing?

Ans. B [37. Applications of differentiation]

A $\left(-\frac{1}{2},\ \infty\right)$ B $(0,\ \infty)$ C $(-\ \infty,\ 0)$ D $\left(-\ \infty\ ,\frac{1}{2}\right)$

19. $\int \frac{19-6x}{(5-4x)(2+3x)} dx = ?$ Ans. B [38. Indefinite integrals]

A $\frac{1}{2}\ln ln\,|5 - 4x| + ln|2 + 3x| + C$

B $-\frac{1}{2}\ln ln\,|5 - 4x| + ln|2 + 3x| + C$

C $\frac{1}{2}\ln ln\,|5 - 4x| - ln|2 + 3x| + C$

D $-\frac{1}{2}\ln ln\,|5 - 4x| - ln|2 + 3x| + C$

20. Which of the following expresses the area of the region bounded by the curve $y = x^2 - 4$, the x-axis and the lines $x = 3$, $x = -3$? Ans. D [39. Definite integrals and its application]

A $\int_{-3}^{3} \left(4 - x^2\right) dx$

B $\int_{-3}^{3} \left(x^2 - 4\right) dx$

C $\left| \int_{-3}^{3} \left(x^2 - 4\right) dx \right|$

D $\int_{-3}^{3} \left| x^2 - 4 \right| dx$